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BRIDGING THE IMPLEMENTATION GAP

OF ACCESSIBILITY INSTRUMENTS AND PLANNING SUPPORT SYSTEMS

FACULTY OF ENGINEERING OF UNIVERSITY OF PORTO

23RD–24TH OCTOBER 2014

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ABSTRACTS

24TH OCTOBER 2014

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TRADING BETWEEN LAND USE AND TRANSPORT PLANNING: RE-CONCEPTUALIZING PSSS AS PIDGIN LANGUAGE FOR LUT INTEGRATION

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Since the 1990s, there has been a critical need for integrative conceptualizations and models that would better bridge the concerns of two planning disciplines, those of land use and transportation (LUT) planning. The paper offers a novel theoretical conception emphasizing the locality of LUT planning practices and the communicative and contextual functions of conceptual models in those practices. The argument is that the enduring implementation problems need to be theoretically re-conceptualized before they can be effectively addressed.

Contextualized PSS are less sophisticated in technological terms, rather relatively simplistic, easy to "play with". The perhaps counter-intuitive idea that a less technologically sophisticated, relatively simplistic tool is more effective in LUT planning, corresponds to our argument that a "thin description" of the complex planning issues, e.g. urban structure, is more likely to generate the type of exchanges between experts as well as others that can mediate between knowledge fields, and hence more likely to result in actionable strategic visions as well as detailed plans.

This paper presents a Finnish case of such an integrative process, which has resulted in a 'conceptual-figurative as scheme' – a model merging land use and transportation planning perspectives. The core idea of the "Kuopio Three Urban Fabrics Model" is a radically simplified conception of the urban system (Kosonen 2007). The model, developed by Leo Kosonen and his colleagues in the City of Kuopio, has been very successful locally in reorienting the LUT planning and the resulting urban structure. Efforts to transfer it to other cities and to generalize the ideas on national level have been made. We propose to interpret the success of the model in terms that it has functioned as a narrowed down "pidgin language" enabling the exchanges between the different planning perspectives in the local "trading zone" (Galison 1997, 2010) of LUT planning in Kuopio.

Methodologically, the research utilizes content analysis and a triangulation of research data, combining documentation, earlier research data and planner interviews. Documents include Kosonen's book (2007), in which he describes the Kuopio Model, including the theoretical and methodological principles and applications which have informed the planning and development of the City of Kuopio. Another key source are the data and findings of two research and development projects: Integration of urban structure and the quality of the living environment 2003-2009 (Sairinen 2009) and Car-dependent urban structure and its alternatives, 2006-2010 (Kanninen et.al. 2010; Mäntysalo 2010). Local planners were interviewed on two different occasions on subjects pertaining to LUT integration in the region.

The Kuopio Three Urban Fabrics Model has proved successful, but it has required 20 years of co-evolution of integrative planning tools and their use in inter-disciplinary planning cooperation, with projections on how concrete planning problems have been conceived and resolved in Kuopio. Through major infrastructure projects the emerging material-linguistic planning practice has been further reinforced. We perceive this practice as a local pidgin language.

The development of the Kuopio Three Urban Fabrics Model has two interrelated facets: first, as an endogenous process, the model has acquired aspects born in the local context and developed through local discourses. Second, the exogenous forces of land use – transport integration facilitated in legislation as well as policies of all government levels have created an emerging common planning framework for the disciplines, making stepwise integration the sine qua non condition of urban LUT planning.

The trading zone concept has been used heuristically in analyzing a hybrid LUT planning tool developed in a certain locality, and discussing attempts to apply such a tool in other locations and make them generalizable. Transporting a local pidgin language to other localities is not to be conceived as a simple "benchmarking" task. The new integrative tools have to be learned through efforts of using them collaboratively in the local context thus reconceptualised, in a lengthy process where the tools themselves are further developed. The local conditions, both in terms of institutional, social and material resources for planning cooperation, and in terms of shared planning objects of the physical built environment, provide a crucial platform for bridging different disciplinary approaches into a new hybrid practice. The revelation offered by the trading zone concept should not be overlooked when attempting to make use of various models and PSSs.

Keywords: Trading zone, localization, LUT integration

PROVIDING THE BIGGER PICTURE: IMPLEMENTATION OF ACCESSIBILITY INSTRUMENTS IN PLANNING PRACTICE IN REGION VÄSTRA GÖTALAND

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The potential for accessibility instruments in planning practice is especially interesting since it provides a practical framework from which the relationships between land use and transport infrastructure can be explored. For example when formerly independent planning departments need to collaborate in order to produce a wider accessibility picture beyond traditionally separated transport or land-use planning perspectives. Currently there is a wide range of accessibility instruments developed and available but not widely used in planning practice. One set of explanations for this implementation gap put forward in the literature is the lack of user-involvement in the development and implementation of such instruments. As a consequence, most tools are characterised by well-developed technological capabilities while the usability in a practice context is neglected.
This paper describes the implementation process and analyses the impact of a specific accessibility instrument on regional planning practice in the context of Region Västra Götaland, Sweden. It is based on the experiences from a long-term collaboration project between planning practitioners and the academy including problem identification, instrument development, implementation, training, and evaluation.
The paper focus on the user-perspective in terms of how practitioners and policy-makers have made use of the accessibility instrument in particular and accessibility concepts in general trough a number of practical planning problems and policy actions in Region Västra Götaland. On the one hand is attention put to the instrument performance and the significance of the high geographical resolution of the analysis and the corresponding use of individual micro-data. On the other hand is the extra-instrument context, including, resources, policies and planning practices of key importance in order to understand the accessibility instrument usability and use in practice.
In terms of methodology we follow a number of projects that use the accessibility instrument and its results. The projects are diverse ranging from instrument specific evaluation workshops to the development of new regional transport strategies. From this variety we are able to collect a number of positive usability factors as well as potential problems.
Results suggest that there are problematic technological aspects of the instrument such as understanding of algorithms, input-data supply and user-interface deficits. However, the most important limitations can be found in the lack of resources and support in the organisation and the lack of accessibility enabled policy goals. On the positive side is the fact that the accessibility instrument and analysis has been widely recognised as a potential methodology to support the interaction between transport and land-use planning, for example in the development of the new regional transport vision. The possibility to see and understand the regional accessibility landscape with high-resolution maps and micro-data has proved to be a strong motivation to leave the comfort of traditional planning specialisations and practices.

Keywords: accessibility instruments, regional planning, usability

ACCESSIBILITY AS A BRIDGE BETWEEN ACADEMICS AND LOCAL DECISION MAKERS TO MODEL URBAN MOBILITY IN THE CITY OF THE FUTURE

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An issue relevant for the conference theme

This paper develops a partnership research between a research laboratory – the Transports Economics Laboratory- and a local public entity in charge of urban and transport planning in Lyon agglomeration -the Greater Lyon. Both institutions aim at producing and analyzing road traffic modeling and accessibility for 2030. Indeed the Greater Lyon is in charge of implementing policies planned in town planning schemes under economic, locational and transportation constraints. On the one hand the local public entity would like to anticipate impacts of a new transport infrastructure or policy on mobility behaviors, traffic flows and accessibility but it hasn't got appropriated tools to model transport demand. On the other hand the research team can implement transport models often designed – or perceived- as "black boxes" by public decision-makers. This paper is the fruit of a renewed exchange between research and public authority where researchers mobilize a broad pallet of tools for modeling and visualizing accessibility following location hypothesis and transport policy scenarios built by the Greater Lyon.

Background

The model of travel forecasting is implemented on the Lyon metropolitan area, and more precisely on the Lyon Urban Master Plan territory. It is based on a reference situation and developed for two other transport policies scenarios in 2030. The base situation integers population and jobs levels and their location at an infra-municipal level for 2030. It also considers road and public transport infrastructures planned for this period. Facing the reference situation, the first scenario is called "scenario with a new main transport infrastructure". It is built introducing a new ring road tolled infrastructure combined with speed and capacity decreases on some road sections. The public transport network is also improved with a subway line extension and two new public transport lines. The second scenario is named "scenario without a new main transport infrastructure". Road and public transport networks won't be improved according to the base situation. Only speeds and capacities will be decreased in some road sections.

Methodology

Accessibility modeling is conducted during the peak period between 5:00 and 6:00 PM, for the Lyon metropolitan area divided into 777 infra-municipal zones. The model is integrated as a part of the modeling platform MOSART, developed by the research team inside the Transports Economics Laboratory. Therefore it benefit from socio-economic and transportation systems databases. Indeed traffic modeling is built considering a road network composed by more than 90,000 nodes and 220,000 links. Infrastructures planned for 2030 are also considered using data from the Greater Lyon. Public transport is composed by all existing urban lines in 2012 (i-e 6 subway and funicular lines, 4 tram-lines, 143 bus lines) and mainly non-urban lines like regional rail lines. New public lines planed in 2030 (whatever the scenario) are also integrated under hypothesis given by the Greater Lyon.

Key results

Two types of results are obtained from this modeling tool. The first one refers to traffic flow on all road sections. Each of two scenarios will be compared to the base situation in 2030 to highlight first the impacts on modal choices and then congestion levels on the road network. For example, it would be interesting to analyze the impacts of a road capacity decrease, without increasing capacities in public transport, on road demand and route choice. Then the second type of results focuses at an infra municipal level (with square areas of 250 meters by 250 meters) to analyze impacts of transport policies on accessibility. Following travel times and distance data, it is possible to compute travel time between each zone or a mean travel time from a zone to all other zones. A detailed knowledge on jobs location allows gravity-based accessibility computation. Travel time is weighted by the number of jobs reached owing to the trip. These results obtained for 2030 are directly linked to the initial aim of the partnership with the local authority that is to say: "modeling traffic and accessibility to improve public decisions and urban planning". Using traffic flows and travel speeds, public decision-maker will know how travelers facing with a new transport policy. Also results will give him information on location of zone which benefit from the new policy, and conversely.

This partnership with the Greater Lyon has improved the potential use of the model. The contribution is not directly linked to the model construction but more to its "supply" and "scope". The proposed case study is a realistic one and results will be directly included in

political discussions. The “realistic” dimension is allowed owing to realistic socio-economic data. For example, population levels and locations are directly estimated by local public authorities. Even if an “error term” is possible, these data are the most accurate and reliable we can have. Moreover, the knowledge of local urban and mobility planners allows reinforcing our hypothesis and results. The second contribution of this paper is link to the detailed transport networks integrated in the model. Therefore a multimodal analysis of accessibility is possible.

Keywords: road traffic flow modelling, accessibility modelling at medium term, Lyon metropolitan area, public decision, transport policy scenarios.

THE ACCESSIBILITY ATLAS OF THE MUNICH METROPOLITAN REGION AS A BACKGROUND FOR SUSTAINABLE MOBILITY POLICIES

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Accessibility is a great concept of integrating land-use and transport, but often misunderstood. As a compound measure of mainly transport supply and urban structure, accessibility cannot be addressed directly by planning, but needs to be specified regarding the topics and questions to deal with (What kind of activities? Which transport modes considered? Which resistances are taken in account – travel time, costs, comfort?).

For a successful implementation of accessibility instruments it has to be made clear that accessibility tools are a very good background for developing strategies of land-use and transport actions, they are able to show the potential of measures in terms of opportunities "within reach", but are unable – in itself – to predict the mobility decisions of individuals. Therefore a key question is to find suitable research questions, policy-making situations and formats of planning support.

Within the metropolitan region of Munich a comprehensive accessibility instrument has been developed over the last five years. The so-called "EMM Accessibility Atlas" is based on the vision that accessibility is a key quality criteria for a mobile society on the level of metropolitan regions. It has been set up on the background of a scientific interest in providing a new tool, a useful model for (a) analyzing the situation of mobility options, (b) generating scenarios for a strategic development of land-use and transport supply, and (c) assessing potential planning and implementation measures. In 2009, a project to set up such an instrument as a GIS-based platform has been started at the TUM Chair of Urban Structure and Transport Planning, supported by the City of Munich, the regional public transport authority (MVV), the local public transport operator (MVG), the chamber of commerce (IHK) and the European Metropolitan Region of Munich (EMM). From the beginning this platform has to be addressed as a tool for supporting the governance initiatives of the metropolitan region of Munich.

This platform has been widely used since then as well in research as in practice. Major contributions have been made in incorporating mobility costs as a crucial factor in mobility options into the tool – including the evaluation of sustainable residential location choice with respect to increasing mobility costs or potential oil price shocks (see the French-German project "Stress-tests on sustainable mobility: an accessibility approach" as well as "mor€co" / EU-Alpine Space program). The experience with local stakeholders and the exchange within the international research network show that this is a development path to follow. The Accessibility Atlas also has proven its usability in practice applications, e.g. in climate protection programs on integrated land-use and transport planning (County of Fürstenfeldbruck), in strategy making for urban-rural dynamics (LK Aichach-Friedberg) or in more locally detailed analysis and options of urban brownfield redevelopment (e.g. conversation area of the Fürstenfeldbruck military airport).

A key aspect of success for the use of accessibility tools is the interactive set up of sessions with the stakeholders concerned. Within the COST action TU 1002 a Pilot Workshop has been organized in Munich. This session was based on the questions of where to locate new residents on the regional level that are expected to move in by 2030. Within this stakeholder workshop in January 2013 (see COST report 2) the process of developing innovative strategies for a crucial planning task by the help of the accessibility instruments has shown to be successful. Especially the power of the accessibility tool in terms of generating new ideas by the planners themselves has been obvious. A key aspect to follow up is the question of interactive mapping based on suggested measures during the workshop itself.

The experience of developing and implementing the Accessibility Atlas of the metropolitan region of Munich has served as a reference on the European level. Not only approximately 20 workshops all across Europe have built upon this experience within the COST research network, also other metropolitan regions are keen on developing comparable tools and accessibility analysis experiences, now (such as the metropolitan region of Hamburg).

We are convinced that it proofs to be a successful strategy to develop these kind of tools further (e.g. in the mobil.LAB doctoral research group on sustainable mobility in metropolitan regions) in order to provide appropriate methodological instruments for the development of integrated land-use and transport concepts and for the successful implementation in planning processes of regional governance.

Keywords:
Accessibility Atlas, Munich metropolitan region, strategy making, generation of planning scenarios, interactive tools.

SOCIAL SPATIAL INFLUENCES OF NEW TRANSPORT INFRASTRUCTURE – AN ACCESSIBILITY INSTRUMENT

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The use of accessibility instruments is widespread in strategic land use and transport planning in Finland. However, the field is both fragmented and somewhat limited in the transparency of tools and methods of mobility and accessibility planning. Often only the results of “black-boxed” accessibility planning are presented - even to other planners, let alone stakeholders and decision makers.
Accessibility instruments have been introduced to land use and transport planning mainly through transport modeling, which still accounts for a majority of practices. However, integrated models and strategic approaches have also been developed during the past decade, in order to bridge the gaps between “technocratic” modeling, “practical” planning procedures and “political” needs for better understanding the systemic consequences of decisions made in the sub-systems and the interrelations between land use and transport choices.
A workshop and an accompanying two-day course on accessibility planning was arranged in June, 2013, in an attempt to shed light on this issue – both by providing possibilities for improved mutual understanding and dialogue, a trading zone, and by addressing the inherent and contextual properties of accessibility planning instruments, three of which were specifically portrayed for this discussion.
This paper looks at the achievements of the three workshop days from the point of view of how the issues of bridging the “implementation gap” were approached, discussed and concluded upon in the workshop practices, presented papers and discussions related to them, as well as how the third day workshop for practitioners approached the issues concerning accessibility instruments in general and in detail.
The extended workshop proceedings were recorded by and the results were analyzed in an expert panel, consisting of the Work Unit members. Furthermore, the presentations that dealt with the Finnish situation were studied through content analysis from the point of view of whether or how the “implementation gap” exists or becomes visible in planning practice.
Indeed, implementation gaps were recognized, especially in relation to a strategic use of the accessibility instruments. While the planners still feel the instruments are black-boxed, this was found to be of minor importance in the current practices. However, this sidelines the question of whether planning practices could and should be developed to better accommodate for multi-faceted accessibility planning. On the other hand, much room for developing a sense of importance of accessibility approaches in planning and decision-making was seen – also as strategic tools for e.g. making choices between scenarios and developing sound strategic principles for a multitude of locational decisions.
The conclusions point at the need to develop both the understanding of the instruments by e.g. provision of easy-to-use modules for bringing out some of the basic principles of how accessibility is affected by different factors and framings, and the instruments as flexible tools that provide approximations for strategic planning decisions both within and as end results of planning processes. This was seen as necessary for a wider inclusion of accessibility point of views in the defining factors of land use and transport planning.

Keywords: accessibility instrument, black box, strategic planning

CONTACT POTENTIAL MEASURES FOR ANALYSING FUTURE INTERCITY LINKS MADE POSSIBLE BY THE PLANNED TOURS–BORDEAUX HIGH-SPEED RAIL LINE

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New high-speed rail transport infrastructure provide deep modifications in time-space that allow for new sets of activities to be performed. Usually classical accessibility measures can indicate the increase in the level of access but do not capture the network view of access conditions. In addition not much is said about the type of activities that can occur with the new transport supply.
This proposal aims to supplement accessibility indicators with a complementary view that would allow for a better understanding of how transport networks contribute to accessibility at the local level. Contact potential approaches has the aim to overcome the shortcomings of classical accessibility measures.
The planning issues to be addressed are associated with the objectives of spatial cohesion, as expressed in the ESDP (European Spatial Development Perspective): What is the degree of cohesion in a city network? What is the level of contact potential for cities and metropolitan regions? Which links are missing in the transport network for better spatial integration of the city network?
The indicator is set up in the context of the extension of the High-Speed Rail line between Tours and Bordeaux, in western France.
Metropolises have become the focus of contemporary economic development. They constitute a type of settlement organising both the short distances of co presence and the long distances of telecommunication and transport—facilitated by fast transport systems. Despite the rise of telecommunication, many analysts in the fields of economy and geography maintain that face-to-face contact remains paramount. The analysis of professional mobility shows that these contacts take place predominantly during single day trips.
Time geography (Hägerstrand 1970) provides the theoretical and conceptual framework still suitable for analysing this type of metropolitan mobility. It considers the space-time individual constraints as key parameters in the measurement of access conditions. The main indicator is contact potential (Erlandsson 1979), also called contactability (Haggett 2001). It measures the possibility to realise a trip to a distant location respecting the time-space prism.
Accessibility is defined in the contact potential indicator as the potential for a person to realise face-to-face contact with another person in a distant location.
Contact potential is measured by associating two optimal transport chains corresponding to a return trip. Fast transport systems (by rail and air) are operated with timetables. To reach a certain level of realism, and to consider inter-modality in a satisfactory way, a scheduled minimum path must be computed (L'Hostis and Baptiste 2006). Therefore, timetable information must be collected and manipulated in a large database.
The implementation of the indicator show the possibility for contact from a series of key cities concerned by the new HSR infrastructure, before and after the completion of the project. The analysis shows that Bordeaux is strongly benefiting from the extension of the rail line: contact to Paris will be preferably done by rail instead of air currently and several cities will become "contactable" when they are not reachable in the current pre-project conditions. Other cities benefiting from the project are Angoulême, Tours and Poitiers. From a methodological point of view, the implementation shows that the indicator is suitable for evaluating some key business activities potential in the context of metropolitan development. The analysis provides indications on the territorial strategy cities could set up in terms of cooperation and relationship networks building.

Keywords: contact potential, accessibility, High-Speed Rail, metropolis, business trips

ACCESSIBILITY IMPACTS OF MADRID-SEVILLE HIGH SPEED RAIL ON LOCAL LAND COVER CHANGE

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The implementation of High-Speed Rail (HSR) in European countries since late 1970s has largely shrunk intra-European travel time, offering a new alternative to conventional rail. As one of the first European countries to enter the HSR era, Spain opened its first HSR line in 1992, connecting Madrid, Ciudad Real, Puertollano, Cordoba and Seville.
Past case studies about Madrid-Seville HSR line simply focuses on the impacts of HSR on each station area. However, a comprehensive joint analysis about the aggregated impacts of this HSR line is absent. Thus, this paper attempts to measure the joint accessibility impacts of HSR on urban land development including all five cities, i.e. Madrid, Ciudad Real, Puertollano, Cordoba and Seville, with HSR stations along this HSR line. The analysis period ranges from 1991 to 2006. This study adopts two models involving all five study areas -- a mixed logit (ML) model and a spatial mixed logit (SML) model -- to find the relationship between the improvement in accessibility and the land cover changes due to the arrival of HSR. The study areas are defined as the HSR station centered area within a 5 km buffer, which are divided into equal-sized square land cells. We focus on the land cover change as the outcome of decisions made by households, developers, planners, etc. The choice sets comprises the change of land cover from 1991 to 2006 in the five HSR stations surrounding areas, based on the European Union CORINE Land Cover data during the corresponding years. To link transport infrastructure to land cover change, various regional accessibility indicators based on different origin-destination travel time measures are applied to the models. Aside from regional accessibility, the development of local transportation networks (leading to local accessibility changes), evolution of socioeconomic variables and neighborhood impacts are also taken into account as explanatory variables influencing land cover change procedures.
The estimation results of both ML and SML models are shown, illustrating improved performance resulting from controlling for spatial autocorrelation. In systematically modelling the impacts of HSR on the cities along with Madrid-Seville line in Spain, this study provides a general view of the joint accessibility impacts on land cover change in HSR station areas brought by this line, and also validates past studies showing that HSR may produce diverse impacts depending on the size of cities. Potential reasons behind these variations are also discussed. In addition, this study also has the potential to provide guidance for urban modelers and planners to forecast possible future urban local impacts arising from HSR.

Keywords: High-Speed Rail, Land Cover Change, Spatial Mixed Logit Model

MEASURING GEOGRAPHIC ACCESSIBILITY OF MUNICIPALITIES TO THE NEAREST HOSPITAL

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1) Issue/research problem
The geographical accessibility to health care services is widely accepted as an important issue to improve the population health, once it allows the identification of territories with higher or lower geographical accessibility. It can be used as a tool to address disparities in the geographic accessibility, present and estimated, and it can be a critical aspect on the planning of infrastructures. This way, measuring geographical accessibility enhances the development of policies based on evidence. However the computation of an index to measure geographical accessibility is very complex, mainly when applied at a regional scale of analysis (e.g., municipalities). The solution is the definition of a geographical accessibility indicator applied to a regional scale, to know the distance (measured in minutes/hours or meters/kilometres) of a region to the closest infrastructure.

2) Relevance for the conference theme
This indicator can be used as an accessibility tool for Planning Support Systems (PSS), suppressing a gap in this kind of system, and easily applied to practical situations, mainly because its easily understandable by politicians and the society. Thus, this indicator supports a broader range of planning concerns and is useful within different PSS.

3) Background
Usually, in order to measure the geographical accessibility, one point inside the region in analysis is chosen (the centroid of the region or the location of an important building as the municipal administration, the church or the city centre). Then one of two approaches is adopted: consider the distance as a straight line or takes into account the road network and possible barriers between the two points. Finally the value is allocated to the value to the area. Whichever the approach, this process creates a problem of ecological fallacy, that can negatively induce further analysis or conclusions; as greater as the size of the area. This problem, known as Modifiable Areal Unit Problem (MAUP), one of the better-known problems in geography and spatial analysis, is potentially present in studies that use aggregate data (census tracts, ZIP codes, or census blocks) to study neighbourhood effects on groups and individuals (Openshaw, 1984; Fotherringham and Wong, 1991; Tate and Atkinson, 2001). In fact, the population is not concentrated in a single location of a region; is dispersed by the territory and, as so, the distance or travel time to the closest infrastructure is different between locations within the same area.

4) Methodology
In this paper we present a methodology to build an indicator - the regional geographic accessibility (RGA) - to identify the overall time needed to reach the closest facility by the population of a municipality. This method aims to model the geographical accessibility by taking into account the population distribution within the area and the road network.
The process to compute this method is straightforward: i) the step 1: building of service areas of each facility, until all the territory is under a service area; ii) the step 2: determines the time (minutes) of each centroid of a small area level (within the municipality) to the closest facility; iii) the step 3 weights the time for the population living in each small area level and iv) the step 4: aggregates the scores in order to identify the weighted average travel time from the municipality.
To apply it, is necessary to have information about the distribution of the population at the lowest scale, the road network (cartography) and the location of facilities being analysed. It also requires access to geographic information system software, in order to generate the service areas and cross this data with the spatial distribution of population (step 1 and 2). Steps 3 and 4 do not require the spatial component of data so they can be applied on any statistic or database software. This method can be applied to measure geographical accessibility in terms of distance or time.

5) Key results of the paper
To exemplify the applicability of this method, we quantify the overall time that the Portuguese population living in each municipality need to reach the closest hospital. We use the rail road network of Portugal (in 2011) the distribution of the population by census track (the higher disaggregated level of data available) and the location of the general public hospitals. We found that most of the Portuguese municipalities are within 25 minutes from the closest hospital, representing 88,8% of the population (9.277.108 inhabitants). However,

almost 8% of the population lives in municipalities over 30 minutes (770.513 inhabitants). Although this value is small, is important to know the socioeconomic, demographic and health profile of these municipalities, for instance, the age group, morbidity profile and their capacity to overtake the barriers to access healthcare services.
With this method it is possible to move from a local geographic accessibility indicator to a regional one without falling into a statistical bias that could compromise further analysis and conclusions. As a single indicator RGA can easily be applied in Planning Support Systems (PSS) for regional infrastructures (Hospitals, Airports, e.g.) or even to support the application of national policies (accessibility to emergency-urgency infrastructures, e.g.). For instance, the characteristics of this indicator make it easily understandable and a useful tool for the policy makers, contributing for the design of regional policies and intervention programs: it can be used to identify in which extent different groups of people living at different locations may 'gain or lose' from the applications of those policy or programs. Although, two main issues need to be taken into account when applying this tool: a) the computation process requires knowledge of geospatial computation that potential user of the indicator may find difficult to overtake and, b) if applied at a national scale, it will lead to significant increases in the computational demands.

Keywords: Geographical Accessibility, Regional Scale, Municipality, Closest Facility, Spatial Planning

THE PROCESSUAL APPROACH IN ACCESSIBILITY PLANNING

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This paper discusses about new processual planning approaches in the context of accessibility issues of urban environments. The focus is on interaction between people, activities and infrastructure and the simulation model is used as a reference. The continuously changing and complex nature of urban development has raised new paradigms and understanding about planning problems during the last two decades. Widely used traditional planning methods are not fully able to answer the challenges of this new operational environment. This paradigm change and processual approach has created a new demand for planning tools – including accessibility instruments – that increase knowledge of the development process and cumulative effects of individual interactions. New planning instruments should be able to reveal causal relations and boundary conditions that can lead to system phase transitions. Modelling tools can work as useful instruments in discussions between private and public sectors in planning processes and particularly in situations where tensions exist between different interest groups.

The paradigm change concerns widely the whole field of urban planning and the accessibility planning intertwine with other sectors of planning and thus with the processual approach. In the context of accessibility measures the good knowledge base of measures and tools exist, but the instruments should be developed towards better applicability in planning problems that deal with interconnectedness and evolutive nature of urban development. This paper discusses about modeling methodologies that grasp this problem. The dynamic retail model which combines several aspects of accessibility in simulation process is used as an example.

The overall structure of the simulation model follows Gabriel Dupuy's theoretical framework of urban networks conceptualised as a three-level structure (Dupuy 1991). The simulation model comprises all the three level elements: (1) infrastructural networks, (2) networks of production and consumption and (3) networks of households. As the focus of the model is on the dynamics between the three elements it also gains from the tradition of spatial interaction modeling (e.g. Batty 1976, Wilson 1985). The dynamic retail model aims to combine these approaches from different theoretical backgrounds with agent based modelling techniques. The agent based modelling methodologies offer new powerful tools for planners to understand dynamic development such as behavioural mechanisms in more detail description of urban environments. The ABM methodology implies a new level of heterogeneity compared to traditional modeling methodologies which creates new possibilities to understand bottom-up processes of urban development. The accessibility in the case study model is mainly approached through urban morphological interpretation. The utilization of simulation models in planning practice and specially in accessibility problems is linked with the complexity paradigm that deals with emergent patterns in space-time processes.

As conclusion the paper discusses about the inconsistency not only between current planning methodologies and the evolutive nature of urban development but also between current planning methodologies and the aims of planning itself that require dynamic properties of the environment such as generating new economic activities and new jobs. The limitations of models, their ability (or inability) to make predictions and changes needed in planning methodologies are discussed as well.

Keywords: processual planning, agent-based modelling, urban retail system, network city

KNOWLEDGE OR STRATEGIC MISREPRESENTATION IN PLANNING PRACTICE?

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In this paper a study of planning in the Stavanger region in Norway is presented. The goal of the study was to explore the need for planning tools or instruments in practical planning. Semi-structured interviews was the main method, senior planners were interviewed based on guidelines from the project COST 1002 Accessibility instruments in planning practice. The planners interviewed had on average 27 years' experience, and hence worked very close to the political decision makers. Their main focus was on strategic and integrated land use and transport planning. The findings from the study show that the planners use all information and data at hand to solve each particular planning problem. Accessibility tools are used when appropriate and available, but such instruments are not in the forefront to deal with the planning problems in the region. Some of the planners pointed to the history with very low forecasts making the anticipated future challenges a lot smaller than they became. The planning practice and plans produce "artificial knowledge" as demanded by the decision makers. The discussion in the paper will focus on the usage of "artificial knowledge" or "strategic misrepresentation" in practical planning, seen in the perspective of the challenges confronting the region with very high growth in population, income and car ownership leading to further problems with sprawl and increased emissions.

ACCESSIBILITY TO TECHNICAL INFRASTRUCTURE AS PART OF LAND DEVELOPMENT POTENTIAL

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Land use planning methods in the Republic of Slovenia have so far been focused in particular on the physical balancing of land surfaces for a particular type of land use, and have not taken into account the economic aspect in preparing the foundations for land use decision-making in the process of spatial planning. A consequence thereof is an irrational use of either agricultural or building land. The research problem lies within the need to develop a methodology for determination of land development potential and to create a model for the decision-making on the best (optimum) land use. This paper presents guidelines only for a part of the research problem - developing a methodology to support the decision-making concerning the accessibility to technical infrastructure, which could be included in the process of spatial planning. Final goal however is to achieve the implementation of land development potential within accessibility instrument and its recognition as one of key factors in land use decision making process.

Part of the research problem was focused in the making of accessibility instrument with land development potential taken into account. For the purpose of the COST ACTION TU 1002 the accessibility instrument was developed but only one aspect of land development potential was taken into account within the first phase. The proposed instrument defines the accessibility to technical infrastructure at the strategic level of spatial planning. The accessibility to technical infrastructure is in the first stage defined in terms of the physical accessibility to the technical infrastructure. Physical accessibility to technical infrastructure is measured as the accessibility to the provided land use at the local level, taking into account the capacity of the existing and planned technical infrastructure and the physical distance from the technical infrastructure.

Urban development is directly interconnected with the construction of technical infrastructure. Housing construction can take place on developed land only. Construction of technical infrastructure, however, is linked with the relatively high (direct) costs. The question is which method of urban development and/or land use zoning is conditioning the lowest land development costs (costs of technical infrastructure) over the long-term period? By the long-term policy of construction, and thereby, of land development (technical infrastructure), housing construction may be adjusted in such a way that the additional social costs of land development, at certain social benefits and in a certain long-term period, are minimised. To this end, we will need to define the appropriate factors and indicators, on the basis of which we will define the impacts of technical infrastructure on land development potential and on the additional social costs and social benefits of construction.

The defined land development potential in the role of accessibility to technical infrastructure is taken as basis for the model, which is founded on the evaluated additional costs and benefits ensuing from the envisaged technical infrastructure. The model could be supplemented by qualitative indicators of land development potential, using an index point system.

Land use modelling and simulation have not been carried out yet in Slovenia before our workshop. A consequence to that fact is that certain vacant plots of building land are not interesting for private investors, whilst certain land uses are causing exceedingly negative external effects, which had not been foreseen at the spatial level of planning. The land use modelling and simulation including the accessibility to technical infrastructure are trying to introduce a dynamic model of decision-making on land use in land use planning, based on the land development potential, determined by the (social) costs and (social) benefits.

In 2013, the Slovenian Work Unit organised a local workshop for a small group of end users who could be using the proposed accessibility instrument as support of their planning practices. One main finding from the workshop was that with some additional key parameters the proposed accessibility model can be very useful for the purpose of spatial planning – especially with the addition of cost accessibility which will show not only physical accessibility to technical infrastructure but also cost consequences of different planning scenarios (for example when deciding on new settlements area) from technical infrastructure point of view. With that addition we will be one step closer to the answer how to show land development potential trough accessibility instrument.

Keywords: land development potential, technical infrastructure, residential land use, accessibility

ACCESSIBILITY INSTRUMENTS IN PLANNING PRACTICE: PRACTITIONERS VIEW ON THE STRUCTURAL ACCESSIBILITY LAYER (SAL)

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Accessibility concepts are increasingly acknowledged as fundamental to understand the functioning of cities and urban regions. Thus Accessibility Instruments have been recognised as potential land-use and transport planning support tools. However, despite the large number of instruments available in literature, they are not widely used to support urban planning practices.
The study presented in this paper is part of a wider research project concerned with the lack of implementation of accessibility instruments in planning practice across Europe: the COST Action TU1002, entitled Accessibility Instruments for Planning Practice in Europe. The Action aims to discuss this implementation gap with planning practitioners by bringing together Accessibility Instrument developers' and local Planners in a number of local workshops across Europe in order to provide insights into the current implementation gap. This paper presents the main results and outcomes of the Portuguese local workshops involving the Structural Accessibility Layer (SAL) as accessibility instrument.
Outcomes of these workshops confirm several of the implementation barriers of Planning Support instruments found in previous literature. Practitioners showed genuine interest for accessibility concepts and for the use of accessibility instruments although workshops rendered clear that these were generally unfamiliar. With regard to the Structural Accessibility Layer, practitioners involved in the workshop were sceptic of their ability to use this instrument in daily practice, while the interest in its use and the compatibility with their planning interests and concerns, showed mixed results.

Keywords: Accessibility Instrument, Implementation Gap, Planning Practice

VISUALIZING URBAN ACCESSIBILITY METRICS FOR BUS RAPID TRANSIT PROJECTS: A PARTICIPATORY FRAMEWORK

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More widely adopted accessibility measures could help guide complex multimodal transportation planning toward better outcomes. New interactive ways to communicate these measures create opportunities to transform public participation for transport projects. In particular, accessibility metrics can provide valuable insights into the design of bus rapid transit (BRT) projects, which tend to consider a wide range of possible streetscape, transport, and network improvement options in response to varying local contexts. This paper describes a participatory framework built around an off-the-shelf, open-source, web-based toolkit that community advocates and planners can use to visualize how the characteristics of different flexible bus transit scenarios affect access (at a personal level) and accessibility (at a regional level). This toolkit uses Open Trip Planner Analyst and other packages, as well as open data such as transit information in the general transit feed specification (GTFS) format. It considers transit performance and accessibility for example BRT projects in two contexts, Boston (United States) and Santiago (Chile). Focus groups with transit advocates and planners were conducted in these two settings to evaluate the proposed toolkit. Members of community-based transit advocacy organizations found the toolkit to be both understandable and able to represent some of their key concerns; professional planners thought the toolkit could help them better understand existing operations and proposed projects. These evaluations suggest that the participatory framework developed around this toolkit could be an effective platform for dialogue between planners and community organizations. By connecting individual perspectives on access with broader accessibility metrics, this framework has the potential to build political will for the adoption of equity-focused accessibility metrics.

Keywords: Visualization tools, public participation, transit planning

ISSUES AND QUESTIONS ON THE APPLICATION OF SPACE SYNTAX ACCESSIBILITY INSTRUMENTS ON THE GREEK PLANNING AND DESIGN PRACTICE

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This paper investigates into the application of Space Syntax accessibility instruments in the Greek planning and design practice. The paper approaches the issue of the applicability of accessibility by looking into three aspects: a. by looking into the existing frame of policies b.by studying the cases when these instruments have been used in several projects and finally c. by presenting the results of a workshop on the applicability of accessibility instruments.
In the first case an extensive study of the Greek political framework regarding accessibility is done. We look into the current policies and guidelines on urban design and planning and whether these impose the concept of accessibility, whether they put obstacles to accessibility or whether they are unresponsive to it.
In the second case several urban projects where space syntax accessibility instruments have been used will be presented in order to study how these instruments have been used in the Greek urban design practice and what is the outcome regarding the applicability of the instruments in this projects.
Finally, in the last case the results of a workshop on accessibility instruments will be presented. The workshop which was part of the workplan of COST Action "TU1203 :Accessibility Instruments in the Planning Practice in Europe" took place in the city of Volos in April 2013. In this workshop 5 professionals, from the public and private sector, participated. The professionals who had not used any accessibility instrument before were first introduced to the space syntax tools, then the application of these tools in the city of Volos was demonstrated to them and finally a discussion on the applicability of the accessibility tools followed. The outcome of the workshop was based both on questionnaires that were replied by the professionals before and after the workshop and on the discussion that followed.
The paper by looking into these three different aspects is attempting to approach the issue of the applicability of accessibility as more spherical as possible. Besides the first aspect that attempts a top-down approach by studying the political framework, the second and third aspects approach the issue from bottom-up. The main outcome is that although there is no specific political direction towards the concept of accessibility, there is big interest among practitioners and stakeholders in the use of accessibility instruments however it is mostly the lack of information and the extra cost that is added on the projects budget that obstructs their applicability.

Keywords: accessibility, space syntax, Greek urban design policies, Greek urban design practice

PRACTICAL IMPLICATIONS FROM GDATI INSTRUMENT APPLICATION

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Krakow is a city of diversified and uneven deployment of land-use and population density. Public transport is being developed and maintained, , along main and also – at the same time - often historical transport corridors. Volume of passengers' transportation demand is estimated on the base of marketing research in which not only the number of passengers in public transport vehicles but also the assessment of passengers' satisfaction and preferences in the field of selected characteristics of public transport quality are examined. Up to now, any analysis considering assessment and comparison of transport accessibility in subareas defined within the city or its suburban area have not been carried out.

GDATI instrument is a tool allowing to evaluate the size of transport network in area, to ilustrate its size on maps in the MAPINFO program and to compare the level of accessibility in different areas. The workshop that was prepared and carried out as a task of national team in the framework of TU1002 project, has been a great challenge and an opportunity to verify assumptions of the model as well to find its practical application through the potential users. For the purposes of discussion during the workshop four coefficients of geographical and demographical density for point (stops) and linear (lines) elements of existing network of public transport in 60 areas of Krakow and four coefficients of public transport service density (measured by: number of rides of public transport vehicles - per 24 hours and in peak hours; and number of public transport lines) have been calculated and two cases of coefficient assessment which included the expansion of the tram network and the new construction of a housing estate in the northern part of the city have been devised.

The discussion during the workshop between instrument researchers and invited transport practitioners performance, transport systems planning and housing developers reveal necessary and possible future modifications of coefficients to extend their applicability in planning practice and confirmed possibility to use them both in the planning works as well as in management.

JOINT ACCESSIBILITY DESIGN: STRATEGIC URBAN DEVELOPMENT PLAN BREDA 2030

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Breda is a city of 180.000 inhabitants in the southern part of the Netherlands. The city consists of a medieval core surrounded by different expansion added mostly during the 20th century. Recently the city was connected to the new high-speed rail link between the Netherlands and Belgium providing Breda with fast connections to both Rotterdam and Amsterdam and Antwerp and Brussels. The city is still growing in population both the region around the city is hardly growing any more. The municipality was developing the new Strategic Urban Development Plan "Breda 2030" in which different scenarios for expanding the city were explored. Due to demographical and economical developments the municipality is lowering development schemes. One other political assignment is to create a carbon-neutral city by the year 2044.
The municipality of Breda wanted to use the accessibility framework as part of the development of a new Strategic Urban Development Plan "Breda 2030". They were considering different scenarios for expanding the city and we curious to see what the accessibility framework had to offer to evaluate the scenarios. This case-study was part of the COST-Action TU1002 and provided a case-study to test the accessibility framework developed during the action. We had two workshops: one pilot-workshop (july 2012) and a 2nd workshop (april 2013). The pilot workshop coincided with the start of the Strategic Urban Development Plan 'Breda 2030'.
We setup workshops with participants consisting of municipal policy makers of Breda with multiple backgrounds, such as urban planning, transportation planning, economic development, architecture and public transport. Participants were selected not only on their background, but also on their eagerness to learn from new insights; the so-called 'early adopters'. To produce the accessibility maps we used the national accessibility mapping tool developed by Goudappel Coffeng. This tool is able to calculate cumulative opportunity measures for each zip code in the Netherlands for different modes of transport and travel times.
We used the accessibility framework developed within the COST TU1002 action. First we defined the accessibility criteria. In order to guide the participants, we asked them to choose one of the following viewpoints to assess future strategies for the city: Breda city for living; Breda city for working; Breda city for education; Breda city for recreation. After choosing a point of view, we asked the participants to further elaborate and translate their policy questions into accessibility criteria. We collected the individual answers and clustered these on corresponding themes, which were: urban diversification and regional economic accessibility and interregional public transport connectivity. After that we collectively explained the concept of accessibility mapping and showing a few pre-fixed maps on a screen. This 'collective learning' gives all participants an equal level of knowledge on both the concept ('What is accessibility and what do the maps tell me?') and the content ('What does it mean for my city?') and gives the workshop moderator the opportunity to undermine wrong conclusions made by participants. Finally we divided the group in two sub-groups, both consisting of 3 to 4 participants. We asked them to focus on one of the planning questions ('urban diversification' and 'regional economic accessibility'). We selected some pre-fixed maps (we had over 20 different maps made in advance), handed these out and asked the participants what these maps told them and what the policy implications could be, both infrastructural, economically or spatially. After 30 minutes we asked each group to shortly present their findings and lessons learned.
The accessibility framework and accessibility maps gave new insights in the correlation between urban development and mobility patterns. Although certain areas in the city have dense flows of traffic, the accessibility map showed the policy makers this area was still attractive, considering the definition of amount of
inhabitants that could reach these zones, even in peak hours. This insight eventually gave direction for the municipality to focus on certain areas in the city for future development: almost all main (re)developments until 2030 are focused along the northern corridor. This will be the focus area for local and regional development in the coming decades. Next to this, the municipality stated accessibility will be a pre-condition for urban planning, meaning (re)development is only accepted if the accessibility conditions are suitable. In this case, accessibility mapping reversed the process of planning: positioning accessibility as a pre-condition for urban development instead of the –more classical- other way around.
Evaluating both workshops, the municipality of Breda stated: "The COST-workshops provided us with new information on accessibility form a social and economic perspective. The maps showed which areas where accessible, even though traffic is dense. Analyzing the mechanism behind accessibility connected economic developers, urban planners and traffic managers. Next to the content it delivered, the maps functioned as a bridge between urban disciplines. Eventually we choose to focus developments along the northern corridor and 'lowering' traffic density on the southern corridor. In doing so, we both create different environments in our city and securing regional accessibility to and from the city. To make integrated choices makes decision making more sustainable and cost effective, which is important in these economic times."

Keywords: Accessibility map, joint accessibility design, Breda, Netherlands

TESTING GRAVITY-BASED ACCESSIBILITY INSTRUMENTS TO ENGAGE STAKEHOLDERS INTO INTEGRATED LAND-USE AND TRANSPORT PLANNING PRACTICE

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In this paper we present the results of a structured-workshop involving private and public stakeholders to test usability of gravity-based accessibility measures (GraBaM) to assess integrated land-use and transport policies. The research is part of the COST Action TU1002 "Accessibility Instruments for Planning Practice" during which different accessibility instruments where tested for different case studies. Here we report on the empirical case study of Rome

In the first part of the paper, the accessibility measure adopted and the tool in which these are implemented (i.e. GraBaM) are presented. The used accessibility measure is defined in literature as "gravity-based", since it can be derived from "gravity-type" trip distribution model (Hansen, 1959). In particular two types of accessibility have been considered, referred to as "active" and "passive" accessibility (Cascetta, 2009). The active accessibility of a given zone i is a proxy of the ease of reaching the activities/opportunities located in different zones j of the study area for a given purpose (e.g. workplace, shopping) moving from i. On the other hand, the passive accessibility is a proxy of the opportunity of an activity located in a given zone i to be reached from the potential "consumers" coming from all the other zones j of the study area for a given purpose. Such definitions do consider the accessibility of a given zone as a sum of the generalized travel costs between zones itself and the other zones of the study area, weighted by an attraction term representing either the opportunities to be reached in the other zones (in the case of the active accessibility) or the potential "consumers" of the opportunity located in the given zone (in the case of the passive accessibility).

The tool integrates the calculus of these accessibility measures with the production of accessibility maps, allowing easily changing parameters and visualizing the outputs, with the use of GIS, which provides easily spatial data entry, management, retrieval, analysis and visualization. In particular the accessibility maps represent for each traffic zone in which the study area is divided, the accessibility measure, also allowing overlapping it with other geographical data.

The GraBAM (Papa and Coppola, 2012) tool can be integrated in comprehensive Land Use Transport Interaction (LUTI) modelling architecture, simulating the impacts of changing accessibility on the spatial distribution of residential and economic activity as well as on dwelling prices (Coppola and Nuzzolo, 2011). In doing so it can also assist urban planners in identifying optimal locations for new development areas and can support the analysis of the real estate market dynamics due to changing land-use and transport variables.

In the second part of the research the accessibility tool have been tested within a structured workshop involving public and private stakeholders, according to a four-step protocol (te Brömmelstroet et al, 2014) defined within the COST Action. The main goal was to evaluate usability and applicability of the tool in the current practice of the practitioners involved in the experiment, and, at the same, time to generate an experiential learning-cycle process within the group of people (researchers and practitioners) involved.

The experiment was set in Rome, and involved a panel of experts in the fields of Land Use and Transport planning. Different backgrounds guaranteed different perspectives on the usability of the instrument, both transport and urban planners from the private sector (consulting), public sector (municipal planning offices) and academia were involved. The heterogeneity of the group was a key factor for the success of the workshop. Nevertheless, this required a more complex preliminary activity to organize 'customized' pre-workshops with selected groups of participants.

The paper describes the experience and give answers to the following questions enriching the final outputs of the COST Action: what the tool's developers learned and how the tool has been improved after the test; what practitioners learned from the experience, also in relations to their background and to which extent the test had a direct impact on the local context and on the ongoing planning processes.

Keywords: Accessibility tool; learning process; land use – transport policies

BOTTLENECKS FOR PSS USAGE: A WORKSHOP PERSPECTIVE

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In a much-cited paper, Vonk et al. (2006) describe the bottlenecks that are blocking the widespread usage of Planning Support Systems (PSS). At the time of writing it seems many of the bottlenecks for PSS are still in place, making this a necessary and relevant field to bridge the implementation gap. This argues that it is critical to complement Vonk et al.'s (2006) work with a micro-perspective of PSS application. This is relevant because the level of group interaction in digitally supported planning workshops is becoming increasingly important (Salter et al. 2009, Nyerges et al. 2006). Hence, it becomes relevant to ask the question: what are the bottlenecks of PSS application in workshop settings and how can they be overcome?
This paper answers this question in the following way. In collaboration with the Dutch research institute TNO and the Municipality of Utrecht we organized a planning workshop facilitated by the PSS Urban Strategy. This is an integral and interactive PSS that includes the state-of-the-art models for several environmental dimensions (noise, air quality, safety) and traffic. The focus of the area was the redevelopment area of the Cartesiusdriehoek in Utrecht, the Netherlands. In the workshop it was discussed what the possibilities and limitations were to include new functions (dwellings, commercial etc.) in this area. For instance, including a lot of commercial functions would lead a more traffic and, as a consequence, more environmental hindrance. The workshop was facilitated by a moderator and a chauffeur of TNO. The participants consisted of the project team of the Cartesiusdriehoek with different disciplinary backgrounds, such as an urban designer, an environmental analyst and a transport planner.
To study the bottlenecks in the workshop we applied three methods: observation, surveys and qualitative evaluation. First, two researchers observed the whole workshop and made notes during the workshop. In addition the whole session was filmed by two cameras. These video images and a verbatim transcript transcript of the workshop were analyzed after the session. Second, a survey was conducted directly after the workshop in which participants could react on the workshop by responding to a range of statements about the session and the instrument. Thirdly, directly after the workshop a qualitative group evaluation was conducted to reflect on the session. In addition, a feedback interview was conducted with one of the key stakeholders.
Preliminary findings indicate the following bottlenecks. First, the tool was to a certain extent a barrier to communication. Literally, because all the focus was on the rather complicated output on the screen, but also in terms of information flows, which focused particularly on the dimension that could be measured, rather than dimensions that were relevant for the area. Second, power dynamics in the group hampered a successful session. Not all stakeholders had equal access to the tool and were allowed to provide input. Third, there was too much interactivity in the workshop; stakeholders could ask anything they wanted. The PSS was not able to answer all the questions that were asked in an adequate and timely manner. In order to overcome these bottlenecks, we recommended: a skilled and experienced moderator, inclusion of analogue tools in addition to a PSS, careful preparation of the workshop in which the research questions are as clear as possible from the outset.

Keywords: Planning Support Systems, bottlenecks, workshop, mixed-methods, usage

THE ACCESSIBILITY IMPACT OF A HIGH-SPEED RAIL LINE IN PORTUGAL

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High-speed rail (HSR) has been seen by policymakers as one of the major solutions to alleviate road and airport congestion, and to stimulate regional economic growth and development. The inauguration of a HSR line increases the accessibility to resources, goods, and markets, which then increases the interactions between economic activities, brings locational advantages, and improves the attractiveness and competitiveness of the urban area near the station and its immediate surroundings.
This paper analyses gains in accessibility for the Portuguese municipalities by examining the likely winners and losers due to the construction of the HSR lines. The Portuguese HSR project is comprised of three priority links, Lisbon-Madrid, Lisbon-Oporto, and Oporto-Vigo axes with a total length of about 650 km. The major cities benefit from significant improvements in accessibility when a new HSR line is built. However, there may be equity issues at stake, as higher accessibility gains are verified as appearing distorted in the surroundings of HSR stations and showing clear core-periphery patterns. The presence of this effect is usually termed as the ''tunnel effect'', accessibility improvements tend to concentrate in the surroundings of the HSR stations and decline sharply as we move away from them. HSR project may contribute to an increase in spatial inequity and lead to more diverged patterns of spatial development. Therefore, the assessment of the accessibility impacts of the Portuguese HSR project is twofold in this paper, assessing both the magnitude and distribution of the accessibility improvements derived from the proposed HSR project. Magnitudes indicating the efficiency impacts of the HSR project are measured in terms of the improvements in accessibility resulted from the HSR project, with a special focus on major municipalities. Spatial equity issues are derived from changes in the relative accessibility values among the municipalities. To measure municipal accessibility, we calculated the travel times between all the municipalities in the mainland Portugal. The travel time takes into account the travel time by road from the origin municipal centroid to the nearest railway station, the travel time by railway to the station nearest the destination centroid and the travel time by road from the destination station to the destination centroid. The transfer time penalty when a transfer between car and train or a transfer between trains is not included for simplification purpose in this study. The computation of the travel times is supported by a Geographical Information System (GIS).
Furthermore, conclusions on accessibility improvement can be quite inconsistent depending on which accessibility indicator is used, since they respond to different conceptualizations. For this reason, we calculate four accessibility indicators: an index of location, economic potential, relative efficiency of the network and daily accessibility. The relative accessibility of each municipality is discussed according to the results of these accessibility indicators. And the results of different accessibility indicators are compared. The results are used to extract some policy considerations with respect to balancing the spatial development within the Portuguese territory. Examination of a HSR line should consider a wider geographic area than just the major cities. HSR service clearly improves the accessibility when compared to the previous situation, but it does not guarantee the alteration of the existing differences and the dominant positions of some cities. Adequate planning and the implementation of economic development measures in parallel with the connection to the HSR network can reduce the spatial disparity and prevent the resources shifting to more competitive regions.

Keywords: High-speed Rail; Accessibility indicators; Spatial inequity.

PUBLIC TRANSPORT ACCESSIBILITY: MEASURING NEGATIVE SYNERGIES OF URBAN SPRAWL AND ECONOMIC CRISIS

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According to the European Green Paper on Urban Mobility (2007), just less than 85% of the EU's GDP is created in urban areas which are home to over 60% of the population. It is therefore necessary to ensure a high quality of life in these areas. Analyses of barriers facing cities in their efforts to achieve a more sustainable development, invariably give a high priority to the problems of mobility and access. One of the main challenges is to achieve accessible urban transport for all, by means of integrating mobility and enhancing collective transport modes.
Therefore, accessibility to public transport is one of the key factors to assure sustainable mobility patterns. However PT accessibility levels are linked to PT supply, both in terms of number of stops and also frequency of services. After more than two decades of a clear trend for urban sprawl, PT has increasing problems of efficiency to compete with car trips. This tendency could only be counterbalanced through more and better PT transport services. However these problems are now ever greater because the lack of resources for financing PT services. The clear risk is that cities could fall in the so called vicious circle of mobility, where less quality of PT services would reduce demand producing less income which would has the consequence of reducing more the services and so on.
This paper aims to analyse the urban transport systems on some Spanish metropolitan areas in order to determine their evolution during the last years, given the challenges they have to deal with, mainly urban sprawl and economic decline, both considered as important threats in European urban areas. The required data for this work are taken from The Spanish Metropolitan Mobility Observatory (MMO) which comprised supply, demand and economic data from the majority of the big cities in Spain. The MMO publishes an annual report analyzing a wide range of indicators on this regard.
The paper shows the results of the analysis of 10 years of PT performance, including those of very severe economic crisis in Spain from year 2008 up to now. The paper differentiates the situation in central cities and in those cities in the suburban areas. A number of indicators are analysed based on the following data: population and population density, GDP, unemployment rate, PT demand (both passenger and passenger-km) and supply (vehicles-km of different transport modes).
Based on those data, 2 accessibility indicators have been designed to analyse PT efficiency and PT quality in 8 selected cities and metropolitan areas along Spain. The results indicate that PT accessibility levels are measures that indicate which transport policies should be foster to keep PT efficiency and quality levels in order to keep PT competitiveness in urban areas.

The paper also shows how different cities have reacted in very different way to the lack of resources and reduction of trips, with very different results. Those policy actions are analysed on the light of the PT accessibility levels. Some cities has increased the PT supply to provide better PT to those affected by the reduction of income, while other cities have adopted a more pragmatic policy by reducing services and lines when the number of travellers is decreasing due to the reduction of economic activities in the area.

Keywords: accessibility to PT, urban mobility, urban sprawl, economic crisis

SOCIAL JUSTICE AND THE GAP BETWEEN POTENTIAL AND REALIZED ACCESSIBILITY

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Social justice has increasingly been used as a criterion to evaluate urban transport policies. The distribution of levels of accessibility across the city is one of the main issues in this field, as the disadvantages faced by some groups in the access to key services and facilities may contribute to processes of social exclusion. The analysis of this issue has traditionally made use of measures of potential accessibility, often looking at the geographic mismatch between jobs and residences and, more recently, also at inequalities between the levels of public transport provision in different areas of the city. However, the applicability of this kind of analysis in the assessment of public policies is limited by the fact that the measures used may not be reliable indicators of the actual effects of the policies in the wellbeing of the local populations.

This paper addresses this problem by focusing on the social imbalances in the realization of the accessibility potential of each neighbourhood in a metropolitan area. The main hypothesis is that levels of realized accessibility depend not only in the locations of residences, main centres, and transport facilities, but also on the actual daily destinations and travel modes of the population in each neighbourhood.

A series of indicators of potential and realized accessibility is estimated for each neighbourhood, including gravity-based job accessibility measures, the ratio between public and private transport accessibility, actual times to work and commuting distances, and the effect of modal choice and congestion on time to work. These indicators are then compared with variables measuring the socio-economic structure of the population using correlation analysis.

The study incorporates aspects that are often neglected in the estimation of travel times to work. The modelling of trips to work in each area is based on a large set of destinations for the working population in each sector of activity, and considers information on starting time of different jobs, and on the proportion of walking trips. The modelling of public transport trips includes information about the availability and frequency of services and the time of walking, waiting and interchange sections. Car and bus travel times include the effects of road congestion at different times of the day.

The analysis is applied to the case of the Lisbon Metropolitan Area at two moments in time, assessing the distributive effect of a series of policies that gave priority to the expansion of the private transport network, combined with trends such as population ageing and urban fragmentation.

The analysis suggests that while it is possible to identify inequalities in times to work of groups with different socio-economic status, these inequalities are mainly explained by different levels of private transport usage and not by geographic factors such as the mismatch between locations of jobs and people or between levels of transport provision and the mobility needs of the population in each neighbourhood.

These results have implications in the debate regarding the role of spatial planning in addressing equity aspects in urban transport networks. These implications are discussed in the closing section of the paper.

Keywords: social justice, equity, job accessibility, time to work, commuting distance, modal choice, congestion

THE IMPACT OF THE PORTUGUESE FREEWAY CONSTRUCTION PROGRAMS IN THE EVOLUTION OF SPATIAL EQUITY BETWEEN 1991 AND 2011

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After the integration of Portugal in the European Union, in 1986, investment in road infrastructures and in particular freeways became one of most visible outcomes of the national infrastructure policies. Increasing road capacity and decreasing travel times was generally considered to be an essential component for the national and regional development. The time-saver characteristic of freeways enabled the shortening of distances between urban areas, municipalities and regions, especially on long distance travel. Road capacity was substantially increased in the metropolitan areas of Lisbon and Oporto, also as a congestion reduction policy.
This paradigm of development remained until the economic and financial crisis halted it between 2009 and 2011, which consequently led to the discarding of new projects and to the implementation nationwide of tolls on almost all of the previous shadow toll freeways..
The aim of this work is to analyze the regional impacts of freeways in terms of accessibility changes and spatial equity, measuring which regions benefited more and which benefited less with the construction of freeways in Portugal between 1991 and 2011. The analysis will consider three periods 1991, 2001 and 2011, and the differences experienced between them. This work will also establish a brief comparison of the final outcomes with the official road planning of the time periods, in order to assess the validity and quality of the same planning..
For this reason, it was calculated four accessibility indicators: an index of location, economic potential, relative efficiency of the network and daily accessibility. The relative accessibility of each municipality is discussed according to the final results. And these results of different accessibility indicators are used for the 3 different periods, from which their differences along the time, are used to calculate a series of spatial equity indicators such as: variance, mean absolute deviations, sum of absolute deviations, Gini coefficient, range and Hoover concentration index. These measures are calculated considering all the Portuguese continental municipalities, and sub regions (NUTS III), and will be weighted both by population and GDP. Also the changes in spatial equity will be calculated for the municipalities inside of each NUT III, in order to investigate changes of equity inside of each of the sub regions.
This methodology will be applied through the use of Geographic Information Systems (GIS) where a road network of 1991, 2001 and 2011 is built, in which existing freeways are to be included by correspondent opening date. Then, travel times used to estimate accessibility indicators will be used on the ArcGIS Network Analyst. The obtained results and its implications will be discussed, as well as its implications for spatial equity, and contrasted with the policy objectives put forward in the official documents which supported the road construction program followed by the Portuguese Governments in the last two decades.

HOW IS ACCESSIBILITY IMPORTANT FOR CROSS-BORDER DEVELOPMENT? THE CASE OF PORTUGAL AND SPAIN

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Accessibility is fundamental in local development. However in many cases, accessibility does not imply development, unless in the presence of other factors.
In the European Commission's policy called "Regions and Local Development", the structural development funds and cohesion, are supporting several priority programs such as the Trans-European Transport Networks (TEN -T) and the current INTERREG. Some European regions are especially important because they are traditionally less dynamic areas, especially in the case of the peripheral countries of Southern. Also in these areas the transport networks have links with several European programs and projects, as the road infrastructure as an essential element for the development of many of these border regions. This is one of the key areas of the European Union, which requires specific policies generally materialized in cooperation projects between countries.
The vision of the infrastructure as a key element of integration is based on the notion that accessibility can generate a decisive impetus to overcome geographical barriers, the approximation of markets and the promotion new economic opportunities, not only by eliminating inequalities but also by counteracting the disadvantages of the long transport distances. This goal was reformulated later by some authors interested in evaluate the accessibility conditions within specific geographical dimensions: the accessibility among rural and peripheral areas, and the central towns. The evaluation of the development of these regions is essential to understand the role of the local investment in transport infrastructure. For example, the implementation of the road infrastructure in Portugal and Spain, raised expectations of a positive impact on the local development. However, this implementation did not happen with the expected magnitude and extension, especially in border regions, more peripheral, which have been losing competitiveness and population.
Recent accessibility studies are following new approaches to understand how people use the transportation system, and how transportation and land use interact. A way to understand road infrastructure's impact in the local development - which means in this particular to study the effects of accessibility on cross-border areas between Portugal and Spain - is through the use of spatial analysis methods, such as autocorrelation studies and spatial regression. In addition, the accessibility effects were tested through the use of different accessibility variables.
Thus our methodology includes the development of a Regression Analysis process using the spatial influence (Spatial Regression Analysis) among variables that reflect accessibility and variables that reflect local development. The geographical unit used is the municipality. The municipality level is fundamental to evaluate the regional development differences at a local scale within the cross-border area, which is not possible at a higher level such as the NUTIII. A database was built considering geographical units of similar size on both sides of the border. This step is essential to analyse in these areas, at a municipal level, the spatial behaviour with statistical significance of relevant variables, including accessibility..
Some conclusions of this study identify that there is clearly an effect of border with strong statistical significance related with how the variables are distributed geographically and how they relate to each other. Variables studied related with the accessibility seem to have no influence in population density evolution, independently from the country considered (Portugal or Spain) and when in presence of other control variables for development such as population educational skills.

Keywords: Cross-border regions; accessibility and development; spatial analysis; spatial autocorrelation.

ASSESSING THE BIG MOVE: ACCESSIBILITY MEASURES AS A PLANNING SUPPORT TOOL

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Transportation plans are designed to ensure a better quality of life for current and future residents in a region. Assessing the benefits of a new transportation plan and measuring its impacts can be done through the utilization of accessibility measures. This paper assesses the impacts of the 2031 Toronto, Canada transportation plan, Big Move and measures the extent that this plan will reach its goal of providing better transit service to residents and generating mobility hubs. Using gravity based and cumulative accessibility measures, different scenarios are built to assess the impacts of suggested projects in the new plan and compare them to the situation in 2001. Two scenarios are being evaluated, the first is a business as usual scenario where accessibility is measured for 2031 assuming no changes in the transportation system will take place, while a second scenario is assessed based on the implementation of various public transport systems in the plan. This is done using projected employment and population changes. The results show the extent to which the new plan will enable the generation of multimodal transportation hubs in several areas in the region. The results also show that not adopting this plan is expected to marginalize several areas in the region by not providing adequate public transport service, making it almost impossible to reach any desired destinations with public transport. The paper highlights the effectiveness of accessibility measures as a planning support system tool that can be used in evaluating transportation plans and in measuring the extent that these plans can attain their goals.

MEASURING ACCESSIBILITY TO LABOUR MARKETS: INCORPORATING DISTANCE DECAY FUNCTION INTO 2 STEP FLOATING CATCHMENT AREA METHOD

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An accessibility is a key issue to understand and evaluate the spatial relationship between employment and residential locations, and a crucial factor that influences the individual differences in unemployment and career development. The spatial differentiation of balance between job supply and demand provides to spatial planner an empirical evidence to argue for possible interventions. Measure that assesses an accessibility to jobs is then an important tool for monitoring transportation planning performance.
The motivation for the presented analysis is to develop the accessibility-based planning support tool that combines the recent developments of 2 step floating catchment area (2SFCA), and the method of estimation of distance decay function, which is based on the empirical data on daily travel-to-work flows.
First, the study implements the distance decay function in order to overcome the weaknesses of the binary nature of the results of the 2SFCA method by introducing the differentiation of accessibility level inside the catchment area (cf. Langford et al., 2012; McGrail, 2012). Second, it applies variable catchment size function to take into account a potentially wider area of influence of larger labour markets and narrower – of smaller ones. Third, the analysis implements the distance decay function form and parameters that are derived from the empirical data on commuting flows in the study area. Finally, the study uses a very detailed spatial scale (statistical locations; 8,000 units approx. located within the study area). The research applies the so-called 'third' step of 2SFCA method (Bell et al., 2012), i.e. an aggregation of 2SFCA results into larger population units (municipalities) in order to improve the 'readiness' of the results, as well as to provide results which are easy-to-translate into concrete planning decisions and policy actions, as the municipalities are the smallest action areas for spatial and regional planning in Poland.
In the first step, the research is based on the assumption that the importance, and in consequence, the spatial impact of particular labour market is differentiated according to its scale (i.e. number of job places). Thus, the market area of a labour market reach further in case of more attractive labour markets than in case of less attractive. Following the Halás's et al. (2014) approach to estimation of distance decay function of daily travel-to-work flows, we provide individual distance decay functions for: capital city (Warsaw), individual regional centres and remaining (local) labour markets. In consequence, we include in our model a set of different distance impedances relating to either slow (for bigger, more important labour markets) or fast decay (for smaller ones). As in cited study, the impedance functions are negative power-exponential ones, with two parameters used to express two crucial factors of a labour market, i.e. the spatial extent of the regional centre's influence and the shape of the decrease of this influence over space. The function estimation is based on the dataset of real commuting flows (OD matrix) provided by Central Statistical Office, Poland.
In the second step, the analysis concentrates on the assessment of places of residence (and not their residents), which are treated as origin zones when delimitating the catchment areas. The decrease of destination attractiveness with the increase of travel time needed to reach the particular destination is not spatially differentiated. Thus, there is no need to diverse the distance decay function acquired for the delimitation of catchment area for each residential area. An exponential function form, $f(cij)=\exp(-\beta cij)$, is applied, as it is consistent with the assumption of a constant distance decay parameter for all trip makers (Reggiani et al., 2010). A particular value of the parameter β is calculated basing on the assumption that the half-time value of destination attractiveness should be acquired at a median travel time typical for a specific travel purpose (cf. Spiekermann et al., 2013) derived from the empirical data from Traffic Survey.
The case study area includes Mazovia region, the biggest (35,600 km2) and the most populated (5.2m inhabitants) and highly monocentric region (voivodeship, NUTS-2 unit) in Poland. Moreover, in order to overcome the 'edge effect' (i.e. the distortion of the results observed in peripheral parts of the study area), the neighbouring areas are included in the calculations as well. The Mazovian most important agglomeration, Warsaw, concentrates almost 60% of the whole employment of the study area, offering the highest earnings even at the country level. The high attractiveness of the labour market provokes a high number of in-commuters originated even from the remote areas.
The results provided present the spatial pattern of accessibility to jobs in Mazovia region. The presented study investigates the extent to which the competition of local workers and in-commuters at the particular labour markets affects the spatial pattern of accessibility to job in the study area. The results show that location of the particular municipality in relation to the Warsaw's labour market plays a dominant role in evaluation of accessibility to jobs, even when including its largest extent of area of influence, either its higher competition resulting from population distribution. The influence on accessibility level of the secondary labour markets is almost negligible in comparison to the decisive impact of the Warsaw's labour market.

Keywords: 2SFCA; accessibility measure; labour market; distance decay; Poland

MEASURING RAIL ACCESSIBILITY USING OPEN DATA

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Rail transport is a strategic sector and its importance is fully recognised by the European Commission. As stated in the White Paper on Transport, efforts are needed to increase the share of rail passenger transport over other modes.
Although conventional planning approaches tend to overlook and undervalue the concept of accessibility, several studies have highlighted that accessibility is a key factor in determining the mode choices made by the transport system users. Planning support systems are therefore more and more requested to have a sound capacity to evaluate accessibility.
Railway systems are often less accessible than the other transport modes due to their highly infrastructure-based nature, so special attention must be put in measuring the accessibility of such systems. However, available studies about railway have some methodological weaknesses: they are usually based on infrastructure data (e.g. distance, planned speed) rather than on the real service performance (timetables); or they are referring to a selection of cities and on most relevant connections. These limitations are often due to the lack of detailed data.
In the order to overcome the mentioned weaknesses, this paper presents a comprehensive methodology aimed to evaluate rail accessibility and monitor the railway attractiveness for passengers introducing a time-based element (i.e. timetables) in accessibility analysis. This approach allows to add a new dimension of evaluation that was previously challenging to reproduce at a wide scale. Moreover, since European Commission is supporting Open Data in the public sector and it's encouraging the release of these data and the reuse for policies analysis and social gains, our methodology is based on the use of real timetable Open Data.
The prototype of this study was proposed in the Nectar Cluster 6 meeting in Seville on 6th February 2014, where one of the authors presented a preliminary elaboration based on some capital cities at NUTS3 level. This paper go a step further on and illustrates a series of accessibility indicators based on passenger train timetable with a comprehensive analysis of the railway connections inside three main European countries (Netherlands, U.K. and France). Additional advantage of the developed methodology is the introduction of the LAU 2 level (municipalities or equivalent units) analysis. Furthermore we set up the study also on the main urban centre definition, , based on the concept of Greater City, developed by EC DG REGIO and OECD, because the lack of harmonised definition of a city and its functional area allows limited cross-country analysis.
Given the growing utilization of the General Transit Feed Specification (GTFS) data by transit agency also at national level, it was decided to build accessibility indicators on this timetable format developed by Google for their map service Transit. Several benefits from the use of Open GTFS have become obvious during this work, such as data accuracy, format standardization, and regular updates availability. Therefore, another relevant purpose is to explore the potentiality of GFTS, that is now becoming a standard for public transport operators and evaluate its integration in GIS to study the accessibility of the different zones of Europe.
A key result of the paper is the description of the real connections representation using GIS with an open-source toolbox that incorporates GTFS data into the spatial graphic representation of the road network. Each connection between stations is reported with regard to the number of trains stopping, calculating in addition the frequency of the service based on the type of the train. The analysis does not use the average travel time of all daily connections but the real travel time. This allowed, after processing the raw data with a GIS, the evaluation of the real impact of the service on customers: number of trains per day, train category, possibility of direct connection, number of transfer and total travel time (including waiting at transfer points).
The study analyses two main aspects of the accessibility as presented in the literature:

(i) transport component (travel time and cost of the O/D trip) based on real timetable.
(ii) temporal component (time restriction/availability of service) based on service availability and calendar.
This extended concept of accessibility can be fully considered as a social indicator (evaluation of services and infrastructure) in a spatial and economic dimension. The examination of these results could help the national and European authorities to further advance transport policy objectives.
The lesson learned and the recommendations will serve as a foundation for the objective of expanding the uses of schedule and route information that resides within the Open Data and particularly in the GFTS format. In addition, this research illustrates the possibility of fostering Open Data to promote their innovative use in planning activities and policy evaluations. The presented methodology could be further enhanced once all European rail data will be available to present a comprehensive European-wide assessment of the level of service (LOS) of passenger railways in Europe.

Keywords: Accessibility, Rail, Timetable, Open Data, GTFS, Degree of urbanisation, LAU2, GIS

THE INFLUENCE OF THE IMPEDANCE FUNCTION ON GRAVITY-BASED ACTIVE ACCESSIBILITY MEASURES: A COMPARATIVE ANALYSIS APPLIED TO PORTUGUESE MEDIUM-SIZED CITIES

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Active accessibility, i.e. walking and cycling accessibility, has been growing in importance as an urban planning objective to promote the creation of sustainable and healthy spaces. However, there is not a unique way of measuring active accessibility, but instead four different categories of measures can be found in the literature: topological, walkability-type, distance-based, and gravity-based or potential accessibility measures. Gravity-based accessibility measures incorporate a travel impedance function, calibrated with different parameters, in order to reflect the influence of distance or time needed to travel between origins and destinations. Several impedance functions have been used to reflect the cost of travelling, namely inverse power, negative exponential, linear, modified Gaussian, amongst others. Moreover, the parameters used in each of these functions are also varied, and so, in accordance with the impedance function and the parameters used, different, and often quite distinct, values of accessibility can be obtained for the same measure and the same location. To measure active accessibility the importance and influence of the chosen impedance function and associated parameters is therefore emphasized, not only due to the level of spatial data detail required to measure it, but also because active modes are extremely sensitive to travel distance as they negotiate it with muscle power.
This paper contributes to this discussion, by measuring and comparing several gravity-based active accessibility measures, stabilizing all other specifications of the measures (namely spatial disaggregation, origins and destinations, and attractiveness of opportunities), and varying only the impedance function and the associated parameters, in order to evaluate their influence on the final result. In particular, we have calculated, applying these variations, twenty-four different 'walking to school' accessibility measures, using as origins all buildings of the Portuguese medium-sized cities selected as case-studies, where public transport is rudimentary, and people travel mainly by car or by active modes. Schools were chosen as destinations as they constitute fixed space-time constraints and often represent important locations in these cities. Cycling was neglected due to the insignificance of this mode in the majority of these cities and lack of data regarding slope, and also because walking to school is being actively promoted as a health improvement policy.
We compared the different measures by applying spatial pattern analysis, correlation analysis, and factor analysis. Spatial analysis reveals that all measures produce similar spatial results when identifying high and low accessibility locations, but different values for the medium accessibility locations. Correlation analysis helps to interpret how similar and how distinct these measures can be, and to what extent, i.e., which parameters and which impedance functions actually affect the overall accessibility value. Finally, by applying factor analysis to these measures we can identify a small group of factors that explain a high total variance, and in turn allows us to identify clusters of measures in accordance with their loadings. Overall, our results show that these measures are extremely sensitive to the chosen function and associated parameters, alerting that their choice may reveal substantially different phenomena, and arguing and stressing therefore that they should be made clear in all active accessibility measurements. We conclude our paper by presenting the limitations of our work, namely the specificities of our case studies and the chosen destinations (schools), and suggesting further developments, as for instance to validate the measures with experts and local stakeholders, and to calculate the measures in different spatial and cultural settings.

Keywords: accessibility, active travel, travel impedance, distance decay function, walking to school

IAAPE - PEDESTRIAN ACCESSIBILITY AND ATTRACTIVENESS ASSESSMENT TOOL WHEN PLANNING FOR WALKABILITY

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From the many benefits associated with walking – from the individual health to its role in promoting "livable communities" and sustainable cities – critical questions are posed to researchers and urban planners: how and to what extent can the built environment encourage people to walk, and how to measure the intensity of that link. The aim of this work was to find suitable pedestrian accessibility and attractiveness aggregate indicators for walkability assessment, in order to support more objective and comprehensive planning strategies and interventions, facilitating the progress towards more integrated and appealing walking cities. This GIS-based measuring tool provides a set of harmonized indicators to assess accessibility and attractiveness of pedestrian urban environments in order to evaluate their walkability.

This work is particularly relevant for the conference theme (Track A2 - Measuring accessibility), since planning for walkable environments still lacks of support tools when planning for more walkable urban environments, at different scales of analysis and from different planning practitioners perspectives.

Pedestrian accessibility has now been fairly extensively addressed by the literature. However, it is not only the existence of an accessible environment that makes pedestrians use it. Being attracted to it plays a fundamental role. Hence, measuring the quality of urban walkable spaces (walkability) adds on an attractiveness dimension to pedestrian accessibility analysis, which enriches the modeling and evaluation of more urban walkable environments.

The walkability concept is straightly related to the extent to which the built environment is walking friendly, being fairly accepted that it can be described by 5 dimensions, the Connectivity; the Convenience; the Comfort; the Conviviality; and being Conspicuous. Given the particular importance of addressing factors related to 1) pedestrian safety from traffic and traffic impacts on the public space and 2) policy level pedestrian promotion, the authors of this paper proposed in previous work two additional walkability dimensions to be addressed: Coexistence and Commitment, forming a 7Cs layout. Many indicators of walkability have been put forward in the literature for each of these dimensions, coming from different fields of expertise: urban planners, architects, sociologists, psychologist and transportation engineers. Some models and tools were also suggested to integrate these indicators into aggregated measures of walkability. In fact, several issues and concerns drawn from the various existing models are typically addressed, namely the walking purpose (transportation, leisure, etc.) and the user group (young, old, male, female, fit, unfit, deprived, etc.), the dimensions or fundamental viewpoints to be assessed and the scale of analysis. Still, integrated indicators that bring together these dimensions are lacking, especially when different scales of analysis and perspectives of practitioners call for different sets of indictors and aggregation specifications into walkability indexes.

A walkability assessment model was developed with the aid of multi criteria decision analysis techniques and GIS network analysis, able to address different scales (city, neighborhood and street). The model was then applied to case studies (city: Lisbon; neighborhood: Bairo Alto and Campo de Ourique; Streets and Avenues: both neighborhoods) with the results showing a positive correlation between estimated walkability and pedestrian travel patterns. As such, various scales were addressed in the model, which each scale providing a different level of understanding useful for planning practitioners: the Global scale (at city level): useful in characterizing whole urban areas, comparing urban settings. and master plan level studies; the Macro scale (at neighborhood level): useful in classifying existing or proposed neighborhoods in terms of their walkability. In terms of planning, this may be useful for identifying critical intervention areas, for assessment of urbanization impacts and for benchmarking/monitoring purposes.the Meso scale (as the walkable buffer from a given point) addressing the pedestrian accessibility of public services and facilities (schools, health centers, sport and recreation) or for real estate prospection. They may also be useful for transportation planning and the Micro scale (at street level): useful in identifying intervention needs and in providing a reference for benchmarking. In terms of urban design it may be useful in rating intervention alternatives.

Keywords: IAAPE, walkability, pedestrian accessibility and attractiveness indicators, scales of analysis, Lisbon

DETERMINATION OF SQUARE AND PEDESTRIAN WAYS AS AN ALTERNATIVE TRANSPORTATION OPTIONS IN İZMIR-SEFERIHISAR

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The increase of urban population with factors such as internal migration, tourism and industrialization and the demand of space for the growing population in the short term has led to the emergence of some disruptions in the planning process in Turkey. These are experienced in integration of transportation planning containing the alternative transportation types with the city plan. This is observed especially in the touristic sites.

Settlements located on the coast of Aegean Sea in the west of Turkey are highly demanded centers in terms of tourism. The importance of making arrangements for the necessary infrastructure was born to meet the growing demand of tourism especially in summer seasons. Seferihisar which is located close proximity to the crowded touristic sites such as İzmir, Çeşme, Kuşadası and Bodrum, chose a slow living in 2009 on the contrary to these settlements types with the effect of its natural, cultural and historical values. After being a slow city, population began to increase unlike the obliged criteria of Seferihisar. This is mainly because of the region where Seferihisar located in has a high tourism potential. This rapid growth has led to the emergence of the transportation problem as a priority. In the examinations occurred in the study area, the lack of pedestrian ways has been identified in the district at the beginning of people's basic transportation problem. There isn't any available transportation plan in the district. The necessity of minimizing the motorized transportation should be taken into consideration in accordance with the Cittaslow criteria. The use of motor vehicles will also decrease which is preferred accessing short distances when the safe and quality pedestrian way circulation are planned. City squares should be designed both for the importance of urban identity and transportation network.

City squares are among the most influential identity elements for determining the urban identity when urban open spaces is analyzed from past to the present. Squares are the city spaces which have an integrating characteristic that allows people to come together, make organizations, activities and entertainments. Squares that represent urban identity should reflect the characteristics of urban public spaces further to fill of any spatial gaps.

For taking correct planning and designing decisions about urban area uses such as city squares, city routes, stations and sidewalks, pedestrian ways play an active role for the creation a qualified city. In this respect, existing land use decisions and recommendations have been analyzed situating in the current development plan of Seferihisar and directly linked to both proposal of the transportation network and the decisions of development plan. Sığacık which is a neighborhood of Seferihisar, due to the distance of 5 km from the city center, make difficult to offer a single pedestrian way between Sığacık and Seferihisar. Therefore, pedestrian way proposals will be presented separately for Seferihisar city center and Sığacık where the coastline located. In addition, recommendations were made for a city square proposal for pedestrian way circulation and intersections which aim to highlight the urban identity among to the public space, city center and settlements.

In this study, the first Cittaslow of Turkey, İzmir-Seferihisar has been investigated in terms of integrated planning approach and spatial land uses. When primarily analyzed the priority issues in the city due to the lack of squares and pedestrian ways, centers which serve characterization of city squares in city center and in Sığacık district situated in the coastline of Seferihisar detected and planning recommendations are made in this direction. Recommendations have been made in pedestrian ways for walking which is generally lack of an alternative transportation of the city, especially a pedestrian road transportation network has proposed between the squares and main axis of the city.

Keywords: İzmir-Seferihisar, Land Use Plans, Cittaslow

DEVELOPING PROPOSALS ABOUT SPATIAL USAGE ACCORDING TO CITTASLOW CRITERIA IN İZMIR-SEFERIHISAR AND EVALUATION OF DIFFERENT TRANSPORT OPTIONS

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Basic reason for the adverse effects on natural and cultural environment, which are encountered in metropolises, and the sociologic problems brought by them, is related to the fact that the concept of urbanization is perceived as just a population movement. In other words, urbanization process has generally been restricted by satisfaction of the increased spatial demands of the increased population in Turkey. In fact, urbanization includes the elements also relating to conversion of social and cultural lifestyle having very different dynamics depending on the spatial growth. Social change and conversion, which has emerged as a result of migration from generally rural areas to cities in Turkey, has affected its development. In addition to migration, tourism activities are another important urban dynamic in Turkey. This change process has been occurred much faster, especially in coastal cities and small settlements in which tourism has been practiced in all aspects. Tourism and relevant activities have been destroying natural factors and creating effects in a wide range including socio-cultural values, regional architectural and historical identity in many coastal settlements. As a result, it has been caused formation of settlements representing a uniform physical appearance and a sociologically standard lifestyle.
These processes, which have been experienced in the cities also having high tourism potential across the world, have ensured that different considerations and different approaches for city management have emerged. For example, the International Cittaslow Association, which was established in Italy in 1999, is an international organization in which local governments of settlements with population less than 50,000 aiming to protect local identity and historical elements without depending on global economic standards participate. Approximately sixty criteria under the titles like “environmental policies, substructure, protection of historical urban texture and local manufacturing places, transparency in social life and administration” exist in the statement of the association. It may be said that the concept of slow city is a local development model suitable for especially small settlements, which are under severe tourism pressure, and tend to grow, on the base of protection of local and cultural values.
Seferihisar County, which accounts for the working area of the project, and exists in the south of Izmir on the coast of Aegean Sea, has significant natural beauties due to its geographical position. Furthermore, it has a rich cultural identity in addition to its significant local values depending on its 4000-year historical past dating back ancient Teos City. Therefore, it has a fast spatial change potential especially in tourism as did in other coastal towns in Turkey. However, the areas under protection existing very near to the town and presence of military zones have restricted building developments significantly and the city has experienced noticeable changes despite the short time. The internal and external tourism mobility has been a significant increase especially in the summer. It can be estimated that the interest from the settlements near to the town, especially from Izmir and other settlements will grow incrementally in the years ahead. This case has increased existing problems, including transportation (Parking shortage, lack of pedestrian and bicycle path, lack of public transport…) in the city.
The present local government in Seferihisar has been making effort to supply the demand for increasing tourism activities as well as the transport problem. In addition, aims the protection of urban elements with taking advantage of scientific methods. In this respect, developing permanent proposals for the use of areas according to cittaslow criteria are intended in project. Also, solving the problems of transportation, traffic and in this context the development of recommendations for improving bicycle and pedestrian paths are basic purposes of the project.
Within the scope of the study conducted, in the first stage, the current situation of the study case area has been analyzed; such as physical, socio-cultural structure and pollution. In this stages, the datas that gathered are mapped. The datas referred to the natural structure, distribution of population and the activity types in the area, transportation infrastructure and the other urban land uses are mapped according to the actual datas. After this stage, the extensive survey are conducted for the city-dwellers. The survey aims to the information regarding to the transportation types preferred by city-dwellers. In accordance with datas gathered, the zoning plan producted according to the characteristic of the transportation in the area. In the final stages of the study; the recommendations on two issues such as for the spatial uses of the city depend on natural and artificial factors and implementations of the local authorities are developed.

Keywords: İzmir-Seferihisar, Sustainable Transportation Network, Cittaslow

ACCESSIBILITY AS A CRITERION FOR URBAN DESIGN OF NEIGHBOURHOOD AREAS

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Contemporary trends in some European cities show declining role of individual automobile; both as a means of transport and the factor determining urban structure. Pedestrian movement, biking and public transport increase their share in the modal split. They also increasingly define our built environment. Maximum mobility – an important planning goal until now, is being replaced by the requirement for maximum accessibility of all activity places. The present „urban design brief" is gradually shifting from planning automobile dependent cities to planning public transport oriented, pedestrian and biking friendly housing environment. In big cities rapid transit will provide a framework for development corridors. Future neighbourhoods will be more „fine-grained". They will be offering a rich mixture of uses: residences, shops, restaurants, cafes, offices, facilities for culture and social interaction and other activities. Public space will be shaped to best facilitate pedestrian movement and activities; and not – as often until now – car traffic flows. Rich mixture of uses, but with strong emphasis on housing environment quality, will be enhanced by "performance-based" planning methods, where impact on environment quality, and not actual use, would be strictly controlled. Accessibility indicators offer in this context a useful urban design instrument both to program and shape urban complexes. The paper attempts to discuss in more detail potential impact of the accessibility criterion on the form and function of future neighbourhoods. The text will be supported by solution examples of already existing residential complexes.

ACCESSIBILITY FOR ALL IN CZECH CITIES AND ENVIRONMENTALLY FRIENDLY MODES IN TRANSPORT

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Spatial mobility - a basic human need for movement influences today the overall development of society, its economy and our cities. The present day offers many kinds of means of transport and ways how to move fast even at a long distances in the global world mostly ba car. But fast growing individual car ownership has many negative side effects like environmental impact – poor quality of air, water and soul, noise, land fragmentation and worsening the quality of life in the cities. Economical and societal impacts endanger the healthy development. There is an urgent need to find more environment friendly solutions for our cities to stop negative development and offer better life quality to urban people. The key question is: how to reduce mobility in cities and provide better accessibility.

Land Use and urban planning have a key influence on the accessibility and mobility needs. This impact has a long-term and lasting character. It is significant in the area of economic growth, transportation of people and goods; it also has an influence on the environment and is economically demanding. From this reason we need to analyze relationship between land planning, urban development and development of the traffic. Czech planning that has been transformed from socialist planning to market oriented planning two decades ago has gained experience and tradition to cope with these fast growing problems.

The professional discussion starts with evaluation of mutual influence of transport planning, urbanism and land use. Key factors that influence the mobility are locations of activities – housing, work and leisure/education activities. Clever activity location and integrated planning reduces the demand for transport. We need to change the attitudes and procedure of the land planning not only in developing areas, but also at first in metropolitan areas, suburban and building areas, where the influence is supposed even more important. The same should be considered in the case of the study of public transport, pedestrian movement and its accessibility.

Historically, after the revolutional changes two decades ago, nobody has been responsible for ensuring that people can get to key services and employment sites. As a result, in open market economy, services have been developed with insufficient attention to accessibility. And too often accessibility has been seen as a problem for transport planners to solve, rather than one that concerns and can be influenced by other organizations, for example by locating, designing and delivering services so that they are easily and conveniently available.

The key idea at is now accessibility in Czech cities: can people get to key services at reasonable cost, in reasonable time and with reasonable ease? Should we secure access to work, access to healthcare, access to food shops, access to social, cultural, and sporting activities. These problems have an impact on the individuals concerned, for example by cutting them off from jobs, education and training. This in turn prevents them from breaking out of the cycle of social exclusion. The problems have costs for communities, which may be left isolated or unable to attract investment. They also undermine objectives that are essential to combat poverty and social exclusion like welfare to work, raising educational participation and attainment, narrowing health inequalities, and reducing crime and antisocial behaviour. Accessibility depends on several things: does transport exist between the people and the service? Do people know about the transport, trust its reliability and feel safe using it? Are people physically and financially able to access transport? Are the services and activities within a reasonable (walkable) distance? Solving accessibility problems may be about transport infrastructure but also about locating and delivering key activities in ways that help people reach them.

Fascination by this previously unknown possibility - to travel all over the world in a relatively short time - often diverts attention from the most natural and also the healthiest modes of transport in our cities. Walking indeed is the first and basic transport mode, and when extreme cases such as the handicapped, injured and for other reasons walking - incapable people are left out, it is also the healthiest and most typical transport mode of urban human beings. Unfortunately, the benefit of walking in cities is nowadays often disregarded and replaced with other means of transport - most frequently individual car traffic. Present - day cities have changed into car areas in which pedestrians are pushed out by danger, noise, and combustion gases produced by columns of stopping and starting vehicles. Parking cars in city centres obstruct pedestrians' view and movement. The liberty of walking in city centres can be regarded as an attribute of a free personality according to The Charter of Fundamental Rights and Freedoms.

Right from the beginning of car transport development pedestrians have been paid little attention; with the growing number of vehicles and roads for these vehicles their position is becoming even worse. Unequal position of pedestrians is also emphasized by their significantly greater vulnerability in the road traffic as compared to other road users. These circumstances have been highlighted more frequently only in recent years, when suitable solutions have been searched on the worldwide scale particularly with regard to making especially the roads in towns safer and friendlier to pedestrians. The objective of this study was to map possibilities and bases for searching optimum outputs within the limits of the Czech urban development. Comparative case study Czech Republic – impact of accessibility on development of pedestrian programmes in Czechia was elaborated. The objective of this study was to map feasibility of re-urbanization programmes, legal bases and urban planning attitudes for searching optimum outputs.

PERFORMANCE INDICATORS AND ACCESSIBILITY MEASURES IN ACCESSIBILITY PLANNING PRACTICE

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Over the decades, the increase of transport infrastructure and travel time distance has caused the increase of mobility. In addition, the expansion of urban areas have also been changing through the phenomenon of urban mobility. However, despite the growth in mobility is evident, the same has not been observed with the concept of accessibility during the last years. Today, it is notable the lack of quality of urban space and the need of people in using the car to have easier access to a greater number of activities achieved in a less travel time. These changes have provided the improvement of regional accessibility versus the loss of local accessibility. Therefore, it becomes imperative to recognise the change of paradigm from mobility-based planning to accessibility-based planning which means a change of thinking from "predict and provide" to "predict and prevent". This paradigm also involves goals setting through the implementation of accessibility measures and performance indicators. Moreover, the importance of performance indicators in urban planning has assumed a strong emphasis on monitoring and evaluation of different urban system within the scope of performance planning concept. Basically, performance indicators in accessibility-based planning identifies the strategic outcome in which the effectiveness of the plan and the efficiency of urban management are oriented.
This paper aims to review a set of performance indicators arising from other countries and which can be considered for introducing accessibility concerns in Portuguese planning system, specifically into local plans.
The methodology will focused on the literature review by bringing together a set of performance indicators combined with simple accessibility measures from different accessibility-based planning systems. By bringing together a variety of examples of how performance indicators are used as accessibility-oriented goals in land-use plans, the intention is to make a comparative analysis and take advantage of key performance indicators for major accessibility.
This paper is divided into three sections. Section 1 provides a brief background of the concept of indicator. Section 2 differentiates planning performance from planning conformance concepts. Section 3 presents some examples of the use of performance indicators in local planning practice.

Keywords: accessibility-planning, accessibility measures, performance indicators, planning practice, land-use plans

OPPORTUNITIES AND CONDITIONS OF PUBLIC TRANSPORT ACCESSIBILITY DEVELOPMENT IN KRAKOW METROPOLITAN AREA

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Development of metropolis resulting with growth of demand for effective, rapid and environmentally friendly transport possibilities that meet requirements of different social groups is a big challenge for public transport. Also spatial changes in metropolis that influence mobility creates phenomenon of growth of the area, so called „spreading of central cities in the metropolis" which is accompanied by change of the population density in different areas of the city. It creates specific difficulties for the organization of public transport. In the existing spatial and demographic conditions it is necessary to provide conditions for life and development of metropolis in accordance with principles of sustainable development. It results with necessity to remodel of metropolitan transport systems in order to assure dominant role of public transport together with effectiveness of mobility for people and freight. The goal of those activities is an improvement of life quality in clean environment and according to the European Union policy. As the consequence metropolis authorities' activities should be aimed at the reduction of private car transport in cities. In Polish reality metropolis is a complicated spatial structure consisting of few zones and only the area of metropolitan (central) city is marked out with administration borders. In this area 3 zones are assigned: very center of the metropolitan city; its downtown and the area around the central city. The Krakow metropolitan area is approximately 4000 square kilometers, with a population of 1,4 million. Population of Krakow - the central city – is more than 750 thousand inhabitants and six communities (gmina) of the area (Bochnia, Krzeszowice, Skawina, Myślenice, Wieliczka and Wadowice) are inhabited (each) by more than 30 thousand people.

Transport accessibility defined as a result of functioning of transport system is the basic measurement used in spatial analyzes; level of accessibility determines favorable position of the area to other areas. Analyzes of transport accessibility of the Krakow metropolis has been conducted with 4 accessibility indicators that were determined in the COST TU1002 project for the whole city as well for its specific areas: density of public transport stops; density of public transport lines; density of public transport services measured by number of rides (per 24 hours; in peak hours); density of public transport services measured by number of public transport lines. All densities have been calculated in reference to the surface of the region and number of its inhabitants.

In the article the analyzes of innovation activities undertaken in 2013 as a result of researches on the public transport accessibility measures elaborated in the framework of COST have been evaluated. They include activities focused on modifications of public transport lines resulting with better services in the areas of dense housing development and elaboration of the concept of premetro introduction in the metropolitan area. Evaluation of public transport accessibility in different areas of metropolitan region resulted with recommendations for housing developers who should take under consideration both good public transport service in the area as well as the lack of convenient services which need to be improved by the organizer of public transport.

PEDESTRIAN MOBILITY AND ACCESSIBILITY PLANNING: SOME REMARKS TOWARDS THE IMPLEMENTATION OF TRAVEL TIME MAPS

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The objective of the proposed contribution is to propose a methodology for evaluating pedestrian accessibility in urban areas.
Accessibility is a quite recurring topic in the scientific literature (see Handy , 2002; Banister , 2008), and emphasizes the strong inter-relationships between land use and mobility.
In the last decade, dependence on GIS -based approaches for accessibility assessment and management has grown considerably (see, i.a., Hull, Silva & Bertolini, 2012), and the crucial role of GIS techniques for the analysis of accessibility is nowadays well established.
With particular reference to the Organic Urban Planning vision developed in Italy in the '60s (see, i.a., Columbo, 1966), the proposed contribution focuses on pedestrian accessibility as major mobility mode at the scale of the neighborhood.
But how is it possible to measure the level of pedestrian accessibility of a given territory and to map the results in a GIS environment ?
First of all, there is a need to collect the different layers of information related to pedestrian mobility for the area, with particular reference to the road network, the location of pedestrian paths and sidewalks as well as the presence of physical barriers in the area that impede pedestrian permeability (built environments, railways, waterways surface ...) .
The proposed assessment methodology is based on the detailed discretization of the area being analyzed in a uniform grid of cells. In this grid a calculation algorithm is applied. This algorithm, on the basis of the information layers that overlap in each cell, assigns each cell a pedestrian travel time and evaluates the existing connections between the cell in question, and the cells adjacent to it. This model allows the creation of thematic maps that show the timing of pedestrian access to each cell.
The proposed model can be applied with a dual purpose. On the one hand it is possible an ex-post application of the model, which aims to assess whether the location of the services and functions available on a given urban area is proper in terms of pedestrian accessibility, or whether there are some critical issues in certain portions of territory. On the other hand, the model can be used ex -ante, as a decision support tool to evaluate the optimal location of specific services or urban .
Among the possible future developments of the work, there is the application of the model to analysis involving the use of different modes of travel, and therefore pedestrian accessibility can be added , for example, whether the transport routes collective (note the location of bus stops and public transport network exists).

Keywords: Pedestrian movement; PSS; Accessibility

ACHIEVING A 'COMPLETE' RANGE OF PUBLIC TRANSPORT MODES IN DEVELOPED CITIES: GOVERNANCE IMPLICATIONS AND ACCESSIBILITY OUTCOMES

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Drawing on the authors' participation in the COST project on Accessibility Measures in Planning Practice as well as their own, Australian-funded research on Spatial Network Analysis of Multimodal Urban Transport Systems (SNAMUTS), this paper will introduce the comparative results of public transport accessibility measures in 23 metropolitan regions in developed countries on four continents. These results will be assessed according to two criteria highlighting important strategic perspectives in contemporary public transport planning.

Firstly, we will look at the SNAMUTS results from the vantage point of a typological and functional network analysis to highlight the contribution of each of the common public transport modes (conventional bus, bus rapid transit, tram, light rail, metro, suburban/regional rail, ferry) to maximise (or not) the integration of transport networks with the urban structure to optimise accessibility outcomes. It will be shown that the capacity and performance spectrum embodied by these different modes represents a gradual scale that allocates a role, or niche, to facilitate spatial accessibility to each mode, which we will seek to characterise using real-world examples from the 23 cities.

Secondly, we will discuss the varying accessibility outcomes in a smaller sample of cities where the entire spectrum of public transport modes is either fully present (such as Vienna, Barcelona, Amsterdam or Munich), or where one or more of these modes are absent, potentially leaving a performance gap (such as Hamburg, Copenhagen and the New World cities in Australasia and North America). In this context, we will examine, by way of a generalised typology, the planning and policy decisions that have contributed to the status quo in our sample of case study cities, and identify the sources of synergy towards or resistance against the establishment or retention of a full public transport mode spectrum, and the benefits for land use and transport integration associated with it.

In conclusion, we will utilise some of our work on future scenarios for network development in selected cities where particular public transport modes are absent or underdeveloped (Melbourne, Perth, Hamburg, Copenhagen) and assess whether their introduction or expansion in the future appears critical in order to enable these cities to improve spatial accessibility for public transport and thus grow their public transport mode share.

Keywords: Public Transport, Accessibility, optimising accessibility

USING STATE-OF-THE-ART OPTIMIZATION SOFTWARE IN PUBLIC FACILITY PLANNING WITH ACCESSIBILITY OBJECTIVES

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Public facility planning is the activity through which decisions about the location and size of facilities such as schools, police barracks, hospitals, fire stations or tribunals are made. Such decisions are necessary to respond to urban and regional demographic and economic changes, and include where to open new facilities and close existing ones, as well as where to expand or shrink facilities and by how much. The important social role played by public facilities requires that the best possible decisions are made taking into account the pertinent objective or objectives and the relevant constraints.
One of the objectives pursued more often in public facility planning is the maximization of accessibility (that is, the minimization of the average distance between facility users and facilities) while satisfying the demand from the services provided by the facilities. The decision problem corresponding to this planning context can be represented by one of the best-known mixed-integer optimization models – the p-median model. Extensions of this model can accommodate a wide variety of planning requirements, such as capacity constraints and maximum-distance constraints, respectively aimed at ensuring that facility sizes are within given maximum and minimum limits and that all users are within a given maximum distance from the facility they patronize. Further extensions account for the dynamic and stochastic nature of demand, as well as for the hierarchical nature of some public facility networks.
As many other mixed-integer optimization models, p-median models and their extensions can be solved today in a matter of seconds by state-of-the-art software even when models involve many thousands of integer or binary decision variables. If this software also provides the graphic display of solutions as is the case of FICO xpress, then it can be a powerful tool in the usually complex processes within which public facility planning decisions are made. Several school, hospital and tribunal network planning exercises conducted in Portugal in the last decade were carried out using this software.
In this presentation, the usefulness of optimization software in public facility planning will be demonstrated. Specifically, it will be shown how planners can use it in real time during a working session of a public facility planning process to assess the implications of different planning requirements as well as of different scenarios regarding the evolution of demand for the services provided by the facilities. In-depth discussions of such implications will certainly contribute to better informed facility planning decisions, thus more likely of being accepted and eventually implemented.

Keywords: public facility planning; accessibility; p-median model; optimization software.

DEVELOPING JOINT UNDERSTANDING OF STRATEGIC ACCESSIBILITY PLANNING IN FINLAND

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1.1 Background

Increasing expansion of transport infrastructure is taking place in more and more countries. This trend, strongly encouraged by the globalization process, is reflected in ever-shorter journey times in both national and international travel. During such developments, extensive urban-planning alterations in areas that are being provided with new transport infrastructure tend to be viewed purely in terms of economic and efficiency benefits. However, there has been little research on the socio-spatial effects of new transport infrastructure systems. There is no awareness or sensibility for such changes, and as a result hardly any methods are available to investigate phenomena of this type. The present instrument is therefore intended to add a new level to research on the efficacy of new transport facilities – namely, the socio-spatial effects of transport infrastructure.

1.2 Conceptual framework and theoretical underpinnings

Accessibility in this case means not only the time needed and distance to a newly developed transport infrastructure. The instrument looks also on accessibility aspects before and after the new transport infrastructure was established in the same municipality. Also it has a stronger look on regions which are no longer connected, because of the new transport infrastructure, traversing another way.
So accessibility is measured with the number of connections to the next lager city. These numbers of connections are compared over the years, especially before and after the improvement of the new transport infrastructure. In the same way travel times will be collected and compared, in a way of time table analysis.
To this quantitative meaning and measurement of accessibility, there are additional qualitative approaches by observations of human behaviour before and after the new transport infrastructure was built.
This methods and definitions are used to find a new level beside economic and ecological aspects of new build transport infrastructure, this means, to find social influences. So the sociology approach was used to find out, what influences better accessibility has on human's behavior and what social and behavioral changes can be observed in better accessible municipalities.

1.3 Operational aspects

Besides travel time and connections per day accessibility means also changes in social spatial terms. So the development of new apartments for rent is counted and greeting and talking behavior of people living in the better accessible municipalities are observed. This is all to see differences in social behavior in fact of the new transport infrastructure. Questionnaires with shop owners are used to show better accessibility. Better Accessibility means therefor: longer shop opening times, renovations in the shops, more international and not only local shops, more articles and what kind of articles (more local or national orientated?). So these Questionnaires help to understand accessibility in a more social way. To start with all these social observations, expert interviews are useful as a pretest for preparing all observations.
All the data is available, but needs own investigation and research. Also the list is not completed here. So in other cases maybe other data will be more interesting. No soft- or hardware is needed. Maybe a statistic program can be used, like SPSS. But at the end it is more analyzing qualitative data.
All observations are long term observations within 5 up to 10 years. The first computation is possible after three years. The time needed for computation depends on the available data and the research questions, but needs no longer than one or two weeks. But it has to be repeated every year, maybe more often.

1.4 Relevance for planning practice

Because it is a long term research and observation, this instrument on social influences of new transport infrastructures can be used for future planning. Accessibility to infrastructure is not only seen on economic and ecological basis, but also on social facts. Specific on this instrument is that it provides information's about former projects. With this information's it is possible to make future projects for good accessible transport infrastructure more socially acceptable.
One mayor problem of the instrument is the long term operation time of the instrument, before valid data is available. This fits not within a planning context. And also five years after a new transport infrastructure was built, no special interest on social effects is drawn by planers, who are already preparing the next project.
Despite this, the instrument is really easy to apply in other countries. Only view ideas about social research have to been learned, like doing an observation or preparing a questionnaire. The needed and useful data varies from case to case.

1.5 Strengths and limitations

In scientific way it is hard to find any methods to measure social accessibility. So the used methods are a kind of testing methods. Because social effects are overall hard to measure and also hard to interpret, all findings sometimes are very subjective. Nevertheless the

instrument is easy to use and produce much qualitative data.
The instrument is most useful after implementing a new transport infrastructure, because it is hard to analysis social behavior before something happened in reality. But it is useful for ideas in urban planning for constructing new accessible buildings and places. So the instrument is more useful for future accessibility tasks than for the case used for the research. This means other projects can learn from the faults, but also from the good things of the observed project.
The advantage by using the instrument is, to create maybe better social contexts for new transport infrastructure. But most important is even to think about social influences of new transport infrastructure and accessibility. One major disadvantage is that the instrument cannot be used every time in the same way and it needs long term observations. But this disadvantage can also been seen as advantage, because every case study is best prepared and the methods used are exact these ones that are needed.

Keywords: Social space, mobility, transport infrastructure, moving methods

GEOICT TOOLS FOR HARNESSING LOCALLY CONSTRUCTED KNOWLEDGE

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This paper looks into existing geographical information and communication technology (geoICT) tools used to construct and harness local knowledge in collaborative and bottom-up initiatives. It is based on a document research from multiple sources, concerning recent projects in which geoICT tools were deployed for harnessing locally constructed knowledge. The analysis focuses on theory-centred and case-study publications with the following characteristics: local knowledge and local users integrate the project, which is usually a grassroots, collaborative or participatory initiative, and spatial technology is relevant to at least part of the process.
In an increasingly complex and competitive world, the local use of these tools is spreading quickly with the realization that information matters. Several initiatives and projects of this nature have taken place, making use of different geoICT tools within specific contexts, often with the participation of non-expert actors within complex collaborative or auto-motivated processes for which procedures differ case-to-case. While the legitimacy of generalizing or trying to scale up local initiatives and processes is debatable, comparing different initiatives related to the local use of geoICT tools can clarify how they are faring in terms of flaws and strengths. For this reason, the objective of the paper is to contextualize the current use of geoICT tools and relate them to different fields, processes and types of knowledge, in order to provide an overview of their possible applications and suggest paths for future improvement.

Keywords: Local knowledge; geoICT; collaborative mapping; lay-based mapping; spatial policies.

SOCIAL ASSIGNMENT OF SURPLUS-VALUES ACCRUED BY PLANS: A NEW SUSTAINABLE URBAN MANAGEMENT INSTRUMENT

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The current article reports a proposal of a new territorial management instrument, aimed at assuring municipal economic and financial sustainability, through the financing of municipal urban development directed to social purposes, and through clear and fair procedures in equal development distribution of costs and benefits that accrue from planning decisions.
This new urban management instrument is based on the taxation of licensed built surfaces above the municipal abstract average built surface. It is duly explained, justified under an economic and financial perspective, and applied to the Detailed Plan of Avenida Papa João XXIII, in Fátima (in the Municipality of Ourém, Portugal).
In this study average municipal building capacities are computed, as well as the concrete building capacities/m2 that accrue from urban interventions in the planning area for the different plots, anticipated kinds of uses, and applicable urban parameters. The homologous surplus-values assigned by the Detailed Plan are further anticipated, as well as the potential values this new instrument would be able to collect. Finally, respective costs and benefits that result to the Municipality of Ourém are assessed.
From this research one can conclude that this new territorial management instrument is sustainable from an economic and financial standpoint. Its application is generalized to other municipalities, and it potentially exerts important impacts in respective financial strengthening.

Keywords: Territorial plans; Land Territorial Ordinance and Urbanism Act; Juridical Regime of Territorial
Management Instruments; socio-economic sustainability of Municipalities; social assignment of surplus-values accrued by plans

INTER-MUNICIPAL COORDINATION AND THE "LOGIC OF COLLECTIVE ACTION": THE CASE OF PORTUGAL

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Inter-municipal scales of coordination have been receiving a growing attention in research dedicated to urban policies. Nevertheless, despite the multiple models of inter-municipal coordination experienced in diverse countries, their operationalization often faces important obstacles. The paper focus the collective action "dilemmas" related with the implementation of territorial policies in such fragmented contexts. Using the Portuguese case as a target territory, it evidences the diverse inter-municipal coordinated experiences in the last few decades, a period characterized by strong experientialism in this field. We aim to deepen knowledge related with conception and implementation of more effective territorial policy instruments.

Keywords: Territorial policies; collective action; inter-municipal coordination; Portugal

METAPLANNING: TOWARDS 2ND GENERATION PLANNING SUPPORT SYSTEMS

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This contribution reports current results of an ongoing research project on the impacts of Strategic Environmental Assessment and Spatial Data Infrastructure policies in urban and regional planning. While the first requires methodological innovation in the plan-making methods and processes in order to achieve more sustainable, informed and democratic decision-making, the second is starting to offer the Information Communication Technology (ICT) tools (i.e. interoperable digital spatial data and services) for easing knowledge building, collaboration among stakeholders, and decision-making support. These two factors together are starting to affect the way plans are made, their contents, their format, generating the urgent need -as well as the unprecedented opportunity- for developing planning support systems and for their diffusion in practice.
Hence the relevance of the question on how to fill the gap between PSS research and real-life planning practices. The tentative answer given by the research results presented in this contribution is twofold: on the one hand, much work is still needed to adapt existing software (i.e. 1st generation PSS) to local contexts easing their adoption by local planners; on the other hand, innovative models for process-oriented 2nd generation PSS should be conceived, implemented and tested in order to address some of the acknowledged pitfalls of current PSS including, among other, limits to the adaptability to different planning models and contexts.

Keywords: Planning Support Systems; Geodesign; Metaplanning; Business Process Management

THE PPP IN THE ENVIRONMENTAL SECTOR: IT IS AN EFFICIENT PUBLIC POLICY? A LITERATURE REVIEW

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The rapid global economic development over the last 30 years has required large investments in infrastructure in almost all countries. Most of them have sought financial alternatives to provide these demands through procurement models that reduce the immediate impact on their limited budgets. Following this thought, Governments have sought together with private partners contractual solutions, which would bring economic and financial benefits for both parts. The Public-Private Partnerships (PPP) has emerged as a tool, world widely used, to enable major projects. Its use may be supported in delegating service delivery to the private body.
According to the World Bank´s Infrastructure Policy Unit in its 2012 Global Report, the commitments of private investment in infrastructure in developing countries increased in 2012 to $181.4 billion, which represents an increment of 4 percent relatively to 2011. Among the sectors that have made use of this procurement model is the Environmental, through the provision of water supply, urban wastewater and collection and treatment of municipal waste. According to Cruz and Marques (2012, p.151), the PPP on the environment constitute a viable alternative to the provision of services by municipalities, already having some expression in Portugal and with a tendency to grow in the future, because of increased local Government difficulties in fulfilling its tasks. Also according to the World Bank´s report, the largest increase was in the water sector, which doubled the investment of low level of global commitments of over U.S. $4 billion, with 32 new projects. Brazil has led the investment in projects related to water, with more than $3 billion, while China had the largest number of projects.
During this time, many researchers around the world have expressed definitions of PPP concept, differing in terms of the purpose for its establishment, what are the different types, their specific characteristics, advantages and disadvantages associated. This work intends to summarize the result of a large research developed based on a literature review on the aspects mentioned above, presenting an overview of the history and evolution of PPPs in this sector, its development, main difficulties and competencies identified so far.

Keywords: Public-Private Partnerships, Environmental, Infrastructure, Procurement

MORPHOLOGICAL REGIONS: SCIENTIFIC RESEARCH AND PLANNING PRACTICE

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This paper explores the use of a morphological concept, the 'morphological region', in Portuguese planning practice. The paper is based on a research project, funded by the International Seminar on Urban Form (ISUF). The project compares four different approaches to urban morphology – historico-geographical, process typological, space syntax and spatial analytical – aiming at combining and coordinating them to better describe, explain and prescribe the physical forms of cities.
The paper addresses one of these approaches, the historico-geographical, and one of its fundamental concepts, the 'morphological region'. The concept of 'morphological region' as an area of morphological distinctiveness (in terms of ground plan, building fabric and land utilization) and the method of 'morphological regionalization' as a tool to recognize and delimitate each of these areas were developed by M. R. G. Conzen, notably between the late 1950s and the late 1980s. Over the last decades the concept has been applied, in different parts of the world, in morphological research and, in some exceptional cases, in professional planning practice.
Most of the Planos Diretores Municipais (PDM) that are being prepared in Portugal draw on a zoning mechanism to guide the process of development control. In this mechanism, the definition of the different zones in each particular city is based not on the existing urban forms but on the land use. This has lead to dramatic consequences in the built environment of our cities.
It is argued that the concept of morphological region can offer a valuable, and transferable, framework for the design of a form-based zoning. It is our strong believe that this can be a sound contribution for the conservation of built heritage and for the design of new built forms in accordance with the historico-geographical structure of urban landscapes.
Drawing on a literature review on the concept of morphological region (with a particular emphasis on its application to planning practice), the paper moves to the application of the concept to the city of Porto – in particular to the Rua Costa Cabral and the street blocks fronting it. This study area, a traditional gateway of the city leading to the north of Portugal, includes a fair amount of morphological variety: from areas of continuous building frontages to single-family housing areas and areas of isolated buildings. Finally, the paper offers a reflection of the strengths and weaknesses of the application of this concept in the Portuguese planning system.

Keywords: morphological regions, historico-geographical approach, form-based zoning, urban morphology, planning practice

URBAN DESIGN AND AGEING - MEASURING THE QUALITY OF ELDERLY FRIENDLY PUBLIC SPACES

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The issue/research problem
Regarding the demographic growth presented by WHO where the global population aged 60 will double from 11% in 2006 to 22% by 2050, how can planning systems ensure age-friendly urban environments?

The relevance for the conference theme
The article attends to an architectural sketch of innovative skill for planning practice.
The scale of application aims the urban design principles to plan, analyse and intervene on existing public spaces or even in its design phase.
Finally, a proposal to connect new local policies/governance and professionals to get an international good practice for urban design in residential areas looking to elderly's' quality of life is settled down.

The background
Planning age-friendly neighbourhoods is perhaps one of the most effective local policy approaches for responding at city scale to demographic ageing. So, physical, social and cultural environments are key determinants of whether people can remain healthy, active, independent and autonomous throughout the standard process of getting older.
As public space has to assume the role as promoter of quality of life for elderly people, attending to their different needs and degrees of capacity and limitations, constraints and adaptation, all compared to the standards of the global society, urban design should emerge as a supportive instrument for city go beyond the adaptation of its structures and services based on the (socio) cognitive dimension of ageing process.

Methodology
The research will reach:
• A methodological proposal to relate elderly needs with the assessment of the quality of public space.
• New urban design criteria for public spaces regarding elderly outdoor daily life.
• New parameters that should guide municipal rules and politicians to ensure friendly neighbourhoods.

Innovation and key results of the paper
One expected to present a practical methodology to measure the quality of public space focusing a deep 'inclusive' skill to apply as a supportive tool for planners, politicians, decision makers and converging to the concept of 'Age-friendly Urban Design'.

Keywords: quality of life; quality of public space; neighbourhoods; age-friendly cities; planning.

URBAN SHRINKAGE AND HOUSING VACANCY IN OPORTO: TRENDS AND POLICIES WITHIN THE PORTUGUESE CONTEXT

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This paper is as a test-bed for future cross-research in the field of urban shrinkage and housing. It investigates the relationships between urban shrinkage, housing vacancy and planning policy responses and has been developed within a post-doctoral project examining paths of population and housing development in Portugal. The focus of this paper is on one of the most harshly shrinking cities in Portugal: Oporto.

The city is in the top ten hardest hit shrinking cities in Europe, amongst cities in Romania, Slovenia, East Germany, and Italy, as well as the capital city Lisbon also in Portugal (Feldmann, 2008). Interest in shrinking cities has been growing (Blanco et al., 2009; Großmann et al., 2013; Sousa and Pinho, 2013), nevertheless there remains a gap in the literature concerning the relationship between population decrease, housing vacancy and planning policy response (Couch and Cocks, 2013). The paper aims to add yet another contribution to the literature, by means of an analysis from a Portuguese standpoint with an explicit focus on Oporto, and a concluding comparative analysis with Liverpool (Couch and Cocks, 2013), in view of the so-called 'Spanish paradox' (Hoekstra and Vakili-Zad, 2011). This paradox stands for rising house prices hand in hand with a high or even rising vacancy rate.

Oporto is the second most important Portuguese city, the heart of the metropolitan area of Oporto, and the main economic centre of the Northern region. In 1996, Oporto's historic centre was classified as a UNESCO World Heritage Site. In 2001, the city was a European Capital of Culture. One of the largest Portuguese universities, the most visited museum of modern art in the country (Serralves) and other major cultural facilities (e.g. Music House/ Casa da Música) are also located there. The city has good and modern transport infrastructures. The urban development of Oporto has, in some way, been framed by a double peripheral context, both in relation to other countries in the European Union (EU), and in relation to the city of Lisbon revealing the typical second city syndrome.

Although the city/municipality is losing population as a whole, planning policy focus has been mostly on the historic centre and the Baixa, which corresponds to Oporto's downtown core area. The main causes of population loss in Oporto can be associated to general processes of deindustrialisation, tertiarisation and changes in lifestyles and standards of living. Vásquez (1992) asserted that since the beginning of the 20th century, Oporto's peripheral municipalities polarized, almost constantly, the demographic vigour of Greater Oporto. However, the author noted a significant time lag: the progressive drop in the growth rate in the urban centre did not have immediate influence in the haste of population dynamism in the peripheral municipalities.

Within the framework of the debate around urban shrinkage, this paper aims to better comprehend and differentiate the various types and causes of housing vacancy identified in other seminal research in this field which have affected Oporto, set within a wider context of housing vacancy rates in Portugal. It also asks whether planning policy responses suitably mirror evidence found. The paper first debates the topic of shrinkage and looks at the linkages with housing vacancy, followed by the consideration of the characteristics and causes of housing vacancy. A case study of the relationships between population change, housing vacancy and planning policy responses in the city of Oporto is then presented. Finally, conclusions are drawn about the features of housing vacancy, and the evidence base of planning policy response in the case study. The methodology of the paper relies upon the quantitative analysis of secondary data and the qualitative analysis of planning policy responses.

The data available on housing vacancy in Portugal is derived from the decennial Census of Population and Housing, which includes data about vacant dwellings, housing and population. A further source of time series data available is the Regional Statistical Yearbook, the key publication regarding the dissemination of statistical data at regional and municipal levels. Finally, one last secondary data source is central and local government (and other public institutions) documents, such as plans, reports, etc.

Keywords: urban shrinkage, housing vacancy, spatial planning, Oporto

THE REDEFINITION OF PUBLICNESS IN THE CONTEXT OF PUBLIC SPACE PROJECTS

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Public spaces, one of the key elements of urban morphology, and essential to understand its wider dynamics, have always accompanied the major urban changes, with different levels of success. Recently, new forms of space provision and management have emerged, creating social and spatial shifts, redefining social values, needs and routines, and changing the way we look to traditional public spaces.
Large sums, often guided by experimentation, have been poured into the requalification and the creation of new public spaces, in an attempt to revitalize rundown and underused areas of our cities. In financially stranded public authorities, privatization has been seen as a valid measure of urban development. However, questions arise on whether this is socially and morally sustainable. By including the concept of publicness in the definition of public space projects, this study allows for the creation of a relevant planning support system, with the potential of assisting both public and private authorities in the design and management of these spaces, with positive outcomes for the city and its inhabitants.
This paper is framed on a PhD thesis which tries to develop a new comprehensive framework for the evaluation of a space's publicness, defining how its different components help each other, with the creation of a successful space in mind.
In the end, a list of do's and don'ts for the production of successful spaces will also be defined, as well as determining the suitability of privately owned spaces to city production.

Keywords: Public space, publicness, privatization, contemporary city, quality of place

URBAN PLANNING AND MOBILITY IN THE CITY OF TARANTO: FROM THE DESCRIPTION OF THE CASE STUDY TOWARDS AN EVALUATION OF PUBLIC TRANSPORT ACCESSIBILITY

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In European cities, the last years have been characterized by a growing attention to urban mobility issues and by an increasing awareness of the need to move towards more sustainable and climate friendly transportation modes. In Italy, urban and suburban mobility is still highly overbalanced toward the car. For this reason an important goal, in terms of transport policies may be a modal shift from individual transportation modes towards public transport.
According to this goal, an assessment of the accessibility level provided by the existing public transport network represents a first step to investigate the spatial coverage of the existing public transport facilities: the aim of the paper is to check the space-time efficiency of an on-road public transport network.
The study area for the empirical analysis is the province of Taranto. Taranto is a coastal city in Apulia (South Italy) where the biggest steel factory in Europe (namely, ILVA), and one of the most important industrial port in the Mediterranean Sea are located. Taranto is a city with a population of nearly 190,000 and a migration process from city centres towards zones with less accessibility but better environmental conditions have been occurring in the last years. The city is connected to the other urban centres by road networks and public transportation bus services (both bus and rail services) but the interurban railway network does not connect the most important households in the study area. In 2014, a new internal bus system serving the peri-urban zones will be incremented and new lines will be planned changing the entire asset of urban mobility.
Public transport accessibility is influenced by many variables: among them there are physical distances and frequency of public transport. The second one greatly changes during day and night time, so that the town can be seen through multiscaled and diachronic maps.
Therefore, the paper will present a first analysis of accessibility by Public Transport in Taranto, starting from the following data: bus network, bus stops location and bus frequencies during the day. In a GIS environment, the pedestrian catchment area served by each bus stop can be mapped. Furthermore, it is possible to link every stop with the average waiting time of the bus for the different frequency slots of the day, and then to add this time to the walking access time to the stop itself.
This process results in public transport accessibility maps, that can then be overlapped with the location of facilities and opportunities to highlight the strengths and the weaknesses of the transport system.

Keywords: Taranto, Space-time accessibility; Public Transport

ASSESSING THE BENEFITS FROM COMBINED URBAN PARKS AND RETENTION BASINS USING THE SULD DECISION SUPPORT TOOL: A CASE STUDY FOR THE CITY OF AVEIRO (PORTUGAL)

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Over the last decades, urban green/blue spaces were rarely considered in spatial development and management policies. However, they provide important ecosystem services, stimulate higher real estate values, mitigate flooding problems and reduce associated costs. Hence the need to better deploy the potential of green/blue spaces in urban landscape development and planning. This paper aims to contextualize this problematic and show how the SULD (Sustainable Urban Landscape Development) decision support tool can be used to assess and compare socio-economic impacts of green/blue space development scenarios. SULD is a GIS-based optimization model, based on an analytical urban-economic model with environmental amenities that builds on hedonic pricing theory to determine property values as a function of proximity to environmental amenities and urban centres. The paper illustrates the application of SULD, by assessing the cultural and regulating ecosystem service values of green/blue space projects in Aveiro (Portugal). Results show that the establishment of urban parks leads to an increase in total real estate (rental) value of between +0.5 and +0.8 m€/yr. Moreover, urban parks provide flood mitigation benefits of approximately +0.8 m€/yr. Total cultural and regulating benefits from urban parks amount to between 1.3 and 1.6 m€/yr. The SULD decision support tool is not an aim in itself but the starting point of a process. It facilitates participatory planning and scenario development, creating confidence and familiarity with the model and its outputs, encouraging stakeholders to reflect about their reality and future possibilities, and effectively engaging them in the design of urban development plans.

Keywords: green/blue space; cultural ecosystem services; regulating ecosystem services; hedonic pricing; scenario simulation

IMPLEMENTATION DIFFICULTIES IN LOCAL PLANNING: THE CASE OF THE PLANO DIRETOR IN BRAZIL

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The urban development process in Brazil was characterized by a fast and rather chaotic growth. This hasty urbanization process gave place to serious environmental and social problems and cities became mirrors of social inequality through spatial segregation, the arena of a profound urban crisis featured by severe lack in housing and infrastructure, and a suburban unplanned sprawl, occupying mostly flood areas, hills and green areas. For decades different planning tools were used but were unable to deal with these problems and indeed encouraged social segregation, urban inequalities and environmental degradation. The new 1988 Constitution provided a change in the perspective towards urban planning and in 2001 the City Statute embodied an urban planning decentralized perspective and framed the new local participated planning instrument: the Plano Diretor. The present work aims to identify the difficulties faced by the Brazilian local development plan when it comes to its implementation. This tool was conceived with a strategic and consensual nature, protecting public interest and acting as a local development and management tool. The study revealed that in spite of the new legislation contents, most of these plans are generic and do not become effective, drifting from their intended strategic nature, postponing regulation to specific local laws or simply not being used at all. Also noticeable was the fact that civil society and communities are very distant from public participation. The result is that most cities are still trying to find the path to bring into practice their local plans.

Keywords: local plan implementation, urban development, spatial segregation.

COLLECTING SOCIAL NETWORK DATA AND ITS IMPORTANCE IN THE STUDY OF TRANSPORT ACCESSIBILITY AND MOBILITY

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The importance of social networks in counteracting poor accessibility and/or mobility is often overlooked despite allowing individuals to remain included under otherwise adverse mobility conditions. Looking at mobility patterns without complimentary social network analysis (SNA) gives an incomplete and biased understanding of the issue. Living in poor accessibility areas and having low mobility is associated with a higher risk for social exclusion; that is, the ability to participate fully in society. In order to gain insight on how social network support can compensate for reduced accessibility and mobility, thus reducing the propensity for exclusion, a survey methodology to collect social network, mobility and accessibility data was defined. The survey targeted residents of neighborhoods in Lisbon previously designated by City Hall as “priority intervention areas”.
The paper presents an overview of the methodology. It includes several subjective scales, a trip diary and several SNA tools to measure the density, interconnectivity and the supportive nature of individuals´ personal networks. Among them, a name generator to identify very close and somewhat close alters (network members), a two-part interpreter which explores the nature of these relationships and the social interaction patterns of the respondents and a position generator to measure potential social capital. Some of the key difficulties encountered and lessons learned are presented along with descriptive statistics of the sample and preliminary analyses. This paper provides the reader with important insights regarding the importance of considering, studying and measuring the social aspects of accessibility and mobility, when planning for urban transport systems.

Keywords: social network analysis; social exclusion; well-being; mobility survey; Lisbon

CAPIBARIBE AND BEBERIBE RIVERS NAVEGABILITY PROJECT: IMPACTS OF ITS IMPLEMENTATION IN URBAN MOBILITY AND SUSTAINABLE DEVELOPMENT

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New urban life styles portray new challenges in terms of urban sustainable development. In this sense, accessibility becomes a major issue in urban planning. In South American emerging countries case, the urbanization process led to low levels in urban mobility and accessibility to urban services, due to infrastructure poor condition and the absence of an efficient public transport system accompanied by the increasing private vehicles number. Problems such as congestion, pollution and social segregation are present in the population daily routines. In this study the urban waterways degradation and its requalification is the main issue. The Capibaribe and Beberibe rivers navigability project is an example of the recognition by Recifes' authorities that accessibility and environmental quality are fundamental to the city development. Recife is now in the process of implementing water transport to improve urban mobility, developing a public transport system within its urban area using the Capibaribe river. This study aims to characterize and identify the impacts of this project implementation which includes the public waterway transport integration in the public metropolitan transport system providing a more environmentally friendly transportation mode. Other expected benefits are environmental, historical and cultural heritage preservation, reduction in pollution levels and to redevelop the marginal river area. The study revealed that serious impacts are emerging around population resettlement but there has been some economic and job creation dynamics and real estate valuation. In the future tourism activities recovery is expected as well as modal changes, with an increase in the population mobility quality.

Keywords: accessibility, mobility, navigability, water transport system, urban sustainable development

LOCATION OF BIKE-SHARING STATIONS

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In the last decades the promotion of sustainable alternatives to car, such as public transportation, bicycle and pedestrian mode, is seen as one of the cornerstones in the reduction of the externalities related with mobility. Bicycle sharing systems are particularly adapted in cases of connection with other transport modes (intermodality), namely collective transport, and are adequate to solve problems usually associated with cycling itself as travelling longer distances or ascending slopes, carrying loads or being subject to weather conditions. This intermodality enhances the success of the system ensuring complete journeys in a sustainable way. One of the most important elements in implementation of these systems is the location of the stations. In fact the location of bike sharing compromises the success of the system. This work intends to provide a methodology to help in the decision-making for the implementation of bike-sharing. It will be applied in Coimbra, Portugal.

Keywords: Bikesharing systems, optimization models, location models

URBAN FORM AND SUSTAINABILITY: A SCENARIO ANALYSIS FOR THE CITY OF ROME

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This paper investigates the relation between sustainability and urban spatial forms (i.e. compact, sprawl, TOD). To this aim a scenario analysis tool, based on a system of Land-Use and Transport Interactions (LUTI) models has been designed and applied to the urban area of Rome, to understand the interdependence of key variables such as travel behaviour, transport supply, property values, jobs and residents choice location. A system of assessment indicators has furthermore been defined to systematically test and compare alternative scenarios of urban forms and to evaluate to what extent different locations and density distribution of activities achieve economic, environmental and social goals. Preliminary results show that at the city level different urban development forms have found to differ in their sustainability, and in particular the compact development appears to better performs in comparison to others forms of spatial development.

Keywords: Urban form; Sustainability; LUTI

LINKING URBAN AIR QUALITY AND TRANSPORT PLANNING: WHAT ARE THE IMPACTS OF LOW EMISSION ZONES?

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While considerable progress has been made in improving urban air quality, road transport is still one of the major pollution sources in cities, leading to a high proportion of the population being exposed to pollutant levels above EU standards. In this context, it is essential to establish a link between transport planning and air quality to define the most effective ways to solve traffic-related pollution problems in urban areas while ensure compliance with legislation. In accordance with the European Directive (2008/50/EC), Member States must provide Action Plans for those areas that do not match air quality standards. Therefore, developing a harmonised approach to support transport planning by evaluating the air quality impacts of alternative policies and plans is an important and urgent task.
Implementation of Low Emission Zones (LEZ) is one of the possible options to reduce air pollution. Such zones have been widely adopted across European cities during the last decade. They are defined as areas where the most polluting vehicles are restricted from entering. For this purpose, criteria based on Euro standards are used to distinguish the vehicles with higher emissions to be banned or charged if they enter a LEZ. Traditionally, the effectiveness of LEZ has been examined based on the evidence for reduction transport emissions, rather than the improvements in air quality levels. However, it should be noted that there is no linear relationship between changes in transport emissions and changes in air pollutant concentrations. Therefore, despite the direct effect on emission reductions, this policy has not always been successful in meeting European air quality limit values,
in particular with regard to particulate matter (PM) and nitrogen dioxide (NO2) levels. Therefore, there is very little understanding of the effectiveness of LEZ in reducing urban air pollution levels.
The prime objective of the current study is to evaluate the effectiveness of LEZ on the reduction of PM10 and NO2 concentrations with high spatial and temporal resolution, based on an integrated modelling approach at urban scale. In order to achieve this objective, a modelling system including transport-emissions-dispersion models was implemented to characterize the traffic flow changes driven by a LEZ (transport modelling), to quantify transport emissions (emission modelling), and finally to evaluate its impact on the air quality (air dispersion modelling). The numerical system implemented within this study is based on three modelling tools: (i) a macroscopic network flow model (VISUM); (ii) a transport emission model for line sources (TREM) and (iii) an air quality dispersion model (AUSTAL2000). The modelling tools were linked and applied to a study area in order to evaluate how changes in traffic road assignment resulting from the implementation of a LEZ and related pollutant emissions affect air quality in terms of concentration of air pollutants in a medium-sized Portuguese city (Coimbra). For this area, violations of air quality standards are frequently reported by the traffic air monitoring station, particularly for PM10. Thus, the simulation period was focused on the daily violations observed during the year 2008. In this study, the emissions criteria of LEZ were analysed based on the entry restriction applied to private vehicles that do not meet Euro 1 emission standards. These vehicles were assumed to move to alternate routes outside the LEZ. The zone classified as LEZ cover a wide area of Coimbra's city centre.
Firstly, based on the four-steps" traffic modelling approach, data related with traffic flow and traffic speed for each segment were estimated by VISUM. Traffic was assigned to the links of the network according to the userequilibrium method.. Next, considering main roads as line sources, on-road hot emissions were calculated by the TREM model taking into account road class, vehicle technology (engine type, model year) and engine capacity. Emission data is one of the principal inputs to air quality modelling. In order to calculate the atmospheric dispersion of PM10 and NO2, the AUSTAL2000 model was applied in the current study thus providing a detailed characterization of pollutant concentrations within the selected urban area and the identification of hot-spots, accomplishing a more detailed picture of the combined effects of city structure, weather conditions, and traffic dynamics.
To access the effectiveness of LEZ, the modelling results are presented in terms of air quality levels, rather than just the emission reductions. The quantitative information on spatial and temporal variability of PM10 and NO2 concentration is analysed and discussed. Adopting an integrated modelling approach, the current study stresses the importance of linking air quality and transport planning to evaluate the sustainability of urban mobility policies, thus providing key information to support transport planning by answering crucial questions regarding the performance of LEZ.

Keywords: transport planning; urban air pollution; low emission zones; road traffic.

COMBINED STATED AND REVEALED PREFERENCE MIXED LOGIT DEMAND MODEL FOR LISBON - OPORTO CORRIDOR

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Using a stated preference (SP) model is a common approach in order to forecast demand in case of a new alternative to be introduced in the market. Revealed preference (RP) models rely on data representing the actual behaviour and thus can provide more realistic estimates. Both data types utilized separately have a number of weaknesses and limitations, while combining the two data sets allows avoiding some of these disadvantages and straighten the prediction power of the model. The present study aims to address practical implications of using a combination of RP and SP data in intercity travel demand modelling and important issues associated with it, demonstrated for a case study of the high-speed rail (HSR) project within Lisbon-Oporto corridor in Portugal. For this we estimate discrete choice models based purely on SP and RP data and a combined SP/RP mixed logit model with accommodating heterogeneity across the respondents. We compare estimates of the models, models' goodness of fit, and the resulting values of time (VOT), which, in turn, are compared with VOTs presented in other studies for Portugal. The results suggest presence of serious issues associated with RP data specific to intercity travel demand modelling, which, in turn, might affect the combined RP and SP models. The paper provides a discussion on the model features and challenges specific to intercity travel demand modelling and implications for the data collection.

Keywords: combined stated and revealed preference discrete choice model; travel demand modeling; mixed logit; interurban demand modeling; Portugal

MODELLING COMMERCIAL ESTABLISHMENTS' FREIGHT DEMAND: A COMPARISON OF ALTERNATIVE METHODOLOGICAL OPTIONS

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Freight vehicles are widely regarded as crucial in the support of the urban lifestyle but also as the contributors to many of its negative dimensions (e.g., pollution, noise, etc.). Assuming freight demand as the number of vehicles arriving for loading/unloading purposes, the prediction of commercial establishments' freight demand is not a straightforward process. We hypothesize two reasons for this: a) the inexistence of clear guidelines depicting the most adequate modelling methodology, but also b) the partial dependency of the modelling methodology on the available data. These are barriers to widespread modelling of freight demand, which obstructs its inputs to Transport Planning Support Systems. These systems can be useful for dimensioning infrastructure (e.g. freight parking) or testing policy alternatives (e.g., vehicle access restrictions). The general lack of data can also limit the development of experimental studies. Contributing towards the development of adequate, and relevant, freight demand modelling methodologies allows bridging the implementation gap of Planning Support Systems, especially those that consider freight traffic.
This work aims to experiment and compare alternative modelling methodologies to those presented in the literature. Doing so, it has the objective of achieving superior quality of predictions. Quality is judged considering the number of correctly predicted sample values as well as the errors associated with predictions (average, standard deviation, sum of errors and share of total deliveries). The main source of data for this study is an Establishment-based Freight Survey, used to collect data about 604 retail establishments in the city of Lisbon. The selected independent variables were establishment industry category, number of employees and sales area. Variable choice was conditioned by the availability of data for the full population of establishments. This limitation is accepted as, with the selected variables, the models can be used to further characterize retail establishments outside the original sample.
The authors have previously developed Ordinary Least Squares (OLS) Linear Regression and Generalized Linear Models (GLM). These were considered, on its own, unfit for supporting the analysis of freight demand due to poor prediction capabilities. A commonly proposed alternative to OLS Linear regression and GLM are Multiple Classification Analysis models (MCA), based on the ANOVA procedure. This option was tested, along an experimental approach with Ordinal Logit and Multinomial Logistic models to predict demand in ranges (e.g., between x and y vehicles). A two-stage model was also tested, combining the Multinomial Logistic model and: OLS Linear Regression, GLM, Ordinal Logit, MCA and Multinomial Logistic models.
The analysis allowed concluding that it is possible to model freight demand with acceptable results. The ANOVA allowed a considerable reduction of the prediction errors but could never predict correctly over 9% of the sample elements, being comparable with the outputs of the GLM. The Ordinal model allowed predicting correctly 60% of the samples' demand ranges and the Multinomial Logistic 64%. Still, these approaches would only allow the use of the results in ranges. Hence, the two-stage model framework is proposed. In the first stage, demand is modelled in ranges using a Multinomial Logistic model. Then, inside each range, Generalized Linear Models or Ordinal Logit Models or Multinomial Logistic Models, are used. This allows a correct prediction between 67% and 76% of deliveries, with absolute errors between 8% and 10% of the total number of deliveries. Testing modelling assumptions and assessing model quality was a challenge for all approaches. This might have occurred due to a) the need for a bigger sample due to the high variability of demand for establishments, within the same industry category, or employees range; and b) the skewed distribution of the chosen variables. Further research is suggested, mainly targeting the application of these models to other samples to allow for the comparison of results and methodological validation.

Keywords: Urban freight, City Logistics, Freight demand modeling methodology, Multiple Classification Analysis, Ordinal Logit model, Multinomial Logistic model

PLANNING SUPPORT SYSTEMS - ALTERNATIVES EVALUATION USING COST-BENEFIT ANALYSIS AND THE IMPACT OF THE DISCOUNT RATE

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Planning support systems aid in developing scenarios or alternatives for urban, environmental or transport systems for the future. These alternatives have to be evaluated. In order to evaluate the alternatives they must be discounted over time. The choice of discount rate is crucial. Understanding the impact that the discount rate has on the alternatives will aid in comprehension and possibly the implementation of planning support systems.
The discount rate is impossible to forecast long-term and the consequences of unpredictability are that higher rates favor smaller investment or short-term benefits and lower rates favor long-term returns. Discounting is used because a benefit is worth more now than it is some time in the future. This is referred to as time preference which includes the assumption that future society will be better off which along with decreasing marginal utility of consumption makes an extra dollar of benefit worth less in the future than it is to current society.
The importance of the discount rate will be shown by using a case study. Most evaluations of investment projects through comparison of a set of alternatives (or at least, one with the “do nothing” option) require cost-benefit analysis (CBA) for final approval. Therefore, a case study using the economic analysis of a CBA for a high-speed rail project will be used. The key results of the paper are a qualitative conclusion of the importance of the discount rate when evaluating planning support system alternatives.

Keywords: transport systems, high-speed rail, discount rate, evaluation, CBA, decision making

TRANSPORT PROJECT EVALUATION AND DECISION SUPPORT: MODELLING GROUP PREFERENCES FOR THE MULTIPLICATIVE AHP AND FEASIBILITY RISK ASSESSMENT

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Transport appraisal in many countries is primarily based on Cost Benefit Analysis (CBA), where the advantages and disadvantages of particular investment alternatives are assessed in terms of their relative importance for society. The principal element concerns the estimation of user benefits, mainly in terms of travel time savings, and the capital and operating costs of the scheme, all of which are discounted over the lifetime of the project. These elements are all given monetary values to allow comparison, and the preferred alternative is the one that achieves the highest rate of return. Traditionally in terms of the handling of uncertainties the CBA will undergo national standardized sensitivity tests, where e.g. individual impacts, input criteria such as discount rates or GDPs are treated in order to determine how much the output might vary before the project is rejected.
Decision making and planning support solely based on CBA has, however, been found to be highly inadequate both in terms of incorporating and assessment of multiple criteria or attributes like environmental or social issues which are usually intrinsically difficult to quantify and the fact that the conventional CBA rests heavily upon the estimation of both demand forecasts and construction costs. This paper therefore presents the final output from research based upon the findings of the UNITE: Uncertainties in Transport Project Evaluation project, which among other things have disclosed the uncertainties and inaccuracies within construction cost estimations and demand forecasts. Thus, the following presentation introduces the so-called UNITE decision support model (UNITE-DSS model) which is the end product from the project and its theoretical anchoring on both the pair-wise comparison procedure of the multiplicative AHP creating a synergy between decision support in the transportation sector and quantitative risk analysis by the use of Monte Carlo simulation and Reference Class Forecasting.
The UNITE-DSS decision support model, illustrated in Figure 1, is designed to bring informed decision support, both in terms of single aggregated estimates such as the Benefit Cost Ratios (BCRs), and also in terms of interval results by so-called certainty graphs, i.e. detailed information with regard to the probability of socio-economic feasibility. The current interaction between the deterministic and the stochastic parts of the UNITE-DSS model is made up by the feasibility risk to be investigated when assessing transport infrastructure projects. Moreover, the decision making process should be expanded beyond the consideration of solely economic factors and point estimates such as present evaluation schemes proposes. Therefore, the methodology of multi-criteria decision analysis (MCDA) which previously has been used within transport planning to overcome this issue has been introduced in this modeling scheme. MCDA is based on value measurement using qualitative input from a ratifying group, and is a widely used methodology for assessing impacts that only with great difficulties can be quantified. The proposed MCDA methodology extends information from the multiplicative analytic hierarchy process (AHP) which in several cases has been proven well suited for group decision making.
The deterministic part of the UNITE-DSS model concerns conventional CBA in a socio-economic context, evaluating costs and benefits towards society over a number of years. The stochastic part on the other hand, enhances the deterministic results into probabilistic outputs through a quantitative risk analysis. The main purpose of this module is to incorporate risk and uncertainty within transport appraisal in a straightforward and comprehensive manner. This module is based upon correspondence with the UNITE Project Database (UP Database) set out in the final third calculation scheme below.
The UP Database contains information with regard to approximately 200 transport infrastructure projects with regard to costs and demands as depicted below. By allowing the UP database to “feed” the inaccuracies into the stochastic calculation module a set of probability distributions can be determined depending on the case study to be investigated, thus, the UNITE-DSS model can be tailor-made to fit all types of transport related projects for evaluation. Modules 1), 2) and 3) highlights the importance of including empirical information from reference classes in terms of overestimation of transport related benefits and underestimation of construction cost estimates. Module 4) seeks to include exploratory scenarios into the decision support model i.e. by allowing various economic growth scenarios, financial situations, integration between regions and/or countries, etc. Finally, Module 5) seeks to exploit SIA: Stochastic Impact Assessment which introduces non-monetary impacts through stochastic simulation in terms of inputs from stakeholder and decision-maker involvement.
The full paper and presentation therefore, covers the overall perspective of the UNITE-DSS model together with an implementation case study concerning a new fixed link in the sub-urban city of Frederikssund, located approximately 30 minutes from Copenhagen in Denmark.

Keywords: Transport appraisal, Decision and Planning Support System, Feasibility Risk Assessment, multiplicative AHP, group decision making, Optimism Bias and Reference Class Forecasting

ACCESSING AIRPORTS: WHAT DETERMINES THE PREFERRED MODE

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This paper examines the published and gray work that has been undertaken to examine the preferred passenger mode of transportation to and from airports taking cognizance of the available supply of options, the nature and scale of the airports' traffic, the types of the airlines using the facilities, and the peculiarities of the local economies and geographies. It makes use of a variety of existing studies and, where possible, to utilizes meta-analysis to bring together findings. The subject is gaining in importance with the growth of air travel and the general outward spread of urbanization that is encroaching on the hinterlands of airports. The underlying objective is examine the ways that regional authorities have approach airport development and with what outcomes.

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