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Assessing Usability of Accessibility Instruments



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Assessing Usability of Accessibility Instruments

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TABLE OF CONTENTS

LIST OF FIGURES	III
LIST OF TABLES	V
PREFACE	VII
LIST OF ABBREVIATIONS	XIII
GLOSSARY OF ACTION TU1002	XV
CHAPTER 1 USE OF ACCESSIBILITY INSTRUMENTS	1
1.1 The potential relevance of accessibility instruments	3
1.2 Limited usability in planning practice	4
1.3 Research question	5
1.4 Guide to this report	5
1.5 References	5
CHAPTER 2 METHODOLOGICAL CONSIDERATIONS	9
2.1 Introduction	11
2.2 Research rationale: Reflection in Action	11
2.3 Multiple one-off experiential cases	13
2.4 Study cases	15
2.5 Workshop template	16
2.6 Organisation into physical meetings	19
2.7 Data collection	21
2.7 Data analysis	23
2.8 References	24
CHAPTER 3 LOCAL WORKSHOP REPORTS	27
3.1 SNAMUTS for metropolitan strategic planning: Adelaide 2040	29
3.2 Space Syntax –multiple urban developments in Limassol	39
3.3 HIMMELI for comprehensive transport planning	47

3.4	EMM Accessibility Atlas for increasing housing demand	53
3.5	Space Syntax–evaluating spatial accessibility in Volos	59
3.6	Gravity-Based (GraBAM) for sustainable development of Rome	65
3.7	Invito for m new development areas in northern Turin	73
3.8	Joint Accessibility Design for Urban Development in Breda	81
3.9	GDATI for planning in Krakow	89
3.10	SAL for the urbanisation plan of Alto do Lumiar	95
3.11	ATI for accessibility to technical infrastructure	101
3.12	Isochrones & contour measures for leisure facility in Madrid	107
3.13	Accessibility Atlas for accessibility to labour in the food sector	115
3.14	SNAPTA: Climate change and sustainable transport	123
3.15	Cittaslow: evaluation of different transport options in Izmir	129
3.16	Contact potential measures Tours–Bordeaux HSL	135
3.17	Survey of planning practice in the Stavanger region	143
	CHAPTER 4 AGGREGATED OUTCOMES	155
4.1	Participant profiles	156
4.2	Perceived quality of the process	157
4.1	Perceived usability of the instruments	163
	CHAPTER 5 CONCLUSIONS AND DISCUSSION	173
5.1	Conclusions	174
5.2	Reflections on the methodology	179
5.3	Discussion	179
5.4	Steps forward	181
5.5	References	183
	APPENDICES	185

LIST OF FIGURES

Figure 2.1: The experiential learning cycle (adapted from Kolb and Fry 1975)	12
Figure 2.2: Combining multiple case studies with experiential case study elements	14
Table 2.1: Study cases and their accessibility instruments.....	15
Figure 2.3: Four-step workshop template (developed by Goudappel Coffeng).....	17
Figure 2.4: Data collection instruments.....	21
Figure 3.1: Example of SNAMUTS output for the composite indicator.....	31
Figure 3.2: Setting of the Adelaide workshop.....	35
Figure 3.3: SNAMUTS Indicators	36
Figure 3.4: Limassol's integration	41
Figure 3.5: Setting of the workshop in Limassol	44
Figure 3.6: Part of HIMMELI output as transferred to print	49
Figure 3.7: Workshop discussing HIMMELI	51
Figure 3.8: Typical EMM maps	54
Figure 3.9: Participants at the Munich workshop	55
Figure 3.10: Participant using EMM map to clarify a point.....	56
Figure 3.11: Angular segment analysis by metric distance of Volos	60
Figure 3.12: The Volos workshop in progress.....	62
Figure 3.13: Development strategies for the urban area of Rome	69
Figure 3.14: GraBAM outputs: comparing car and transit active accessibility	70
Figure 3.15: Measuring, interpreting, analysing accessibility.....	71
Figure 3.16: screenshot of InViTo	75
Figure 3.17: The setting of the Turin workshop.....	77
Figure 3.18: Participant with InViTo map.....	78
Figure 3.19: Accessibility maps used for the Strategic Urban Development Plan	83
Figure 3.20: Pilot workshop Breda (July 2012)	86
Figure 3.21: 2nd Workshop Breda (April 2013).....	86
Figure 3.22: GDATI density of PT stops.....	90
Figure 3.23: Setting of Krakow workshop.....	92
Figure 3.24: Krakow participants with maps.....	94
Figure 3.25: Clusters of accessibility in Greater Oporto	96
Figure 3.26: The logic of ATI	102
Figure 3.27: The setting of the Ljubljana workshop.....	105
Figure 3.28: Screenshot of an isochrones output.....	109
Figure 3.29: Presentation of the instrument at the Madrid workshop.....	110

Figure 3.30: Set-up of the Madrid workshop	111
Figure 3.31: T500+ in TransCAD (right) and accessibility map in ArcGIS (left)	117
Figure 3.32: Two planners discussing the content of the maps during meeting one ..	118
Figure 3.33: All four planners discussing the content of the maps on posters	119
Figure 3.34: Screenshot of SNAPTA.....	124
Figure 3.35: Screenshot of SNAPTA.....	126
Figure 3.36: The maps used during Edinburgh workshop	127
Figure 3.38: Presentation of the instrument	132
Figure 3.37: Discussion of transportation challenges and cittaflow requirements	133
Figure 3.39: The principle of the contact potential for a one-day return trip.....	137
Figure 3.40: Existing and improved contact potential from Bordeaux.....	138
Figure 3.41: Existing and improved contact potential from Poitiers	138
Figure 3.42: Total new and improved contact potential	139
Figure 3.43: Testing the contact potential indicator	140
Table 3.1: Answers to policy issues and tools	147
Figure 3.44: The Stavanger region (Source: KVV Bybanen)	152
Figure 3.45: Population growth in Stavanger region (Source: SSB)	153
Figure 3.46: Income developments in the region (Source: SSB).....	153
Table 4.1: Cities, countries and number of participants in the local workshops.....	156
Table 4.2: The socio-demographic profile of the participants in the local workshops ..	156
Figure 4.1: Perceived quality of the process aggregated for all participating cities	159
Figure 4.3: Perceived quality of the process according to gender.	161
Figure 4.4: Perceived quality of the process according to age.	161
Figure 4.5: Perceived quality of the process according to profession.....	162
Figure 4.6: Perceived quality of the process according to the organisation's sector. ..	162
Figure 4.7: Perceived usability of instruments aggregated for all participating cities..	165
Figure 4.8: Perceived usability of the instruments according to city (1/2)	166
Figure 4.9: Perceived usability of the instruments according to city (2/2)	167
Figure 4.10: Perceived usability of the instruments according to gender.	168
Figure 4.11: Perceived usability of the instruments according to age.	169
Figure 4.12: Perceived usability of the instruments according to profession.....	170
Figure 4.13: Perceived usability of the instruments according to sector.....	171

LIST OF TABLES

Table 2.1: Study cases and their accessibility instruments.....	15
Table 3.1: Answers to policy issues and tools	147
Table 4.1: Cities, countries and number of participants in the local workshops.....	156
Table 4.2: The socio-demographic profile of the participants in the local workshops .	156

PREFACE

Cecilia Silva and Marco te Brömmelstroet

Accessibility concepts are increasingly acknowledged as fundamental for grasping how cities and urban regions function. In particular, accessibility instruments are able to provide a framework for understanding the reciprocal relationships between land use and mobility. Such a framework has an important potential added value for urban planning practice. However, despite the large number of available instruments, they are not widely used to support urban planning practices, a fate shared with other types of planning support instruments. The literature on Planning Support Systems (PSS) identifies the dichotomy between supply and demand of planning support instruments, such as accessibility instruments, as the main reason for this phenomenon of underutilisation. On the one hand, planning practitioners (the potential users) are generally unaware of the instruments or, if familiar, then quite inexperienced in using them. The value and potential of the instruments is not recognised, resulting in low intention of utilisation. On the other hand, developers of planning support instruments have little awareness of the demand requirements. The effective use of PSS is currently suffering from a 'rigour-relevance dilemma', with developers mainly concerned with rigour while users are mainly concerned with relevance. The increasing complexity of planning in addition to current technological developments (especially in computer sciences) has stimulated the development of complex PSS. There appears to be a pursuit of scientific rigour in order to contain the growing complexity. The resulting 'black box effect' seems to only increase the gap between supply and demand.

This report contributes to this debate by presenting the results of a number of experiential workshops with local planning practitioners. In these workshops, these practitioners, first experienced and then reflected on the usability of accessibility instruments. These workshops were promoted by developers of accessibility instruments from different European countries (and Australia). The report also presents the workshop methodology developed for this research. In order to produce a scientifically valid analysis of usability of the different accessibility instruments, we needed to compare the results across workshops in different countries with often very different contexts. The report begins by presenting a discussion on the current implementation gap of accessibility instruments (Chapter 1). Chapter 2 provides a detailed description of the workshop methodology (the 'workshop protocol') and the methods for data collection and analysis. The largest section, Chapter 3, presents the qualitative

reports of the local workshops, demonstrating the contextual richness of the work done. A quantitative and general analysis of the surveys follows in Chapter 4. The last section, Chapter 5, examines the findings, distils the key conclusions and shares some suggestions for further research. The report provides valuable new contributions to the already extensive, ongoing debate on the usability of accessibility-based planning support instruments by highlighting the perspective of their potential users—the planning practitioners. We hope that this research will launch a debate on how to improve their application in everyday planning practice.

This report presents the outcomes of the second stage of the COST Action TU1002 ‘Accessibility Instruments for Planning Practice in Europe’, financed by the COST Office (with support of the EU Framework Programme). The aim of the Action is to gain insight into the usability of accessibility instruments in planning practice, and thus to act as a catalyst for the effective implementation of accessibility instruments in European planning practice. The Action will promote knowledge on how accessibility instruments can be effectively applied to support urban planners in their daily practice. It brings together researchers, with different approaches to accessibility, and a set of practitioners from selected reference cities. The relevance of accessibility instruments for specific urban planning challenges (related to land use and mobility) is studied through reflection workshops with local practitioners (described in detail in Chapter 3).

This Action, therefore, has added value for both accessibility instrument developers and users. For developers, this Action will provide information on the planning context and tasks as well as the skills and preferences of urban planning practitioners, enabling more effective integration of these characteristics in existing and new instruments. For the potential users, the Action will pilot accessibility instruments with practitioners in interactive workshops. This will demonstrate how accessibility instruments can provide key information; on the appropriate and equitable level of service provision and on the impact of proposed urban planning decisions on the accessibility of people across their jurisdiction. We expect that the additional knowledge on the potential role of accessibility instruments in urban planning practice will have beneficial impacts on urban quality and decision-making on urban land use patterns in each of the countries involved in the Action.

This report presents the scientific outcomes of the research carried out during 2012-2013 by Work Group 3 (WG3) ‘*Workshop Methodology*’. The general structure of the report is as follows:

Chapter 1. An introduction to the relevance of accessibility for practice, the identified implementation gap and the rationale for our research.

- Chapter 2. A presentation and discussion of a common workshop and measurement protocol. These were created to enable a structured experience, analysis and discussion among accessibility instrument developers and planning practitioners across Europe.
- Chapter 3. A series of qualitative reports from all local workshops, authored by the participating Work Units (WU). These show how their accessibility instruments (presented in Report 1, see Hull et al., 2010) were used to promote the discussion on usability in planning practice among participating local planning practitioners.
- Chapter 4. A quantitative and general overview of the outcomes, based on the surveys completed by all participating planning practitioners, which outlined their experiences before, during and after the workshop.
- Chapter 5. Conclusions, discussion and a critical review of the research design, methodology and methods.

Many scholars agree that accessibility is an old idea in planning research that needs a fresh take, in order to make the leap into applied planning practice. This report benefited from such inventive thinking through the involvement of planning practitioners from across Europe (among others, from transport and land use context). Researchers and local practitioners in different countries joined the debate on the usability of accessibility instruments in practice and shared their views with their colleagues across the continent.

This report is the second of a series of reports to be produced by this COST Action. It was preceded by a report on accessibility instruments for planning practice, which provided a review of the literature and a number of accessibility instruments used in the Action. Following the work plan of this Action, the results attained during the individual local workshops will be cross-analysed in the next phase, to distil recommendations for the development of more useful accessibility instruments and for more effective use of accessibility instruments in practice. This second report will be followed by a final report that will present the lessons learned on the usability of accessibility instruments in planning practice.

Notes on contributors

This second report of COST Action TU1002 *Accessibility instruments for Planning Practice in Europe* has been produced by Work Group 3 (WG3) of this COST Action, under the management of Marco te Brömmelstroet and general management of Cecília Silva (Chair) and Luca Bertolini (Vice Chair). The work of this WG and the entire Action are supervised by the Management Committee (MC), which is closely coordinated by the Core Group (CG) and by the

Rapporteur of the Action, Willi Hüstler. WG3 has also benefited from the support of other groups and individuals from the COST Action during specific tasks. At the time of publication of this report, WG3 had 40 members from 21 of the 22 participating countries (see detailed list below). Although only some of them have contributed to the elaboration of this report, all have actively contributed to the discussions that shaped this report.

The work conducted for this report started formally during the first MC meeting in Oporto, organised by Cecília Silva and her local research team. The WG3 meetings held during this MC meeting and the subsequent meetings (in Munich, organised by Benjamin Büttner; in Turin, organised by Matteo Tabasso; in Amsterdam, organised by Luca Bertolini, Janko Vollmer and Marco te Brömmelstroet; in Munich, organised by Gebhard Wulfhorst and Benjamin Büttner; in Krakow, organised by Lidia Zakowska; and in Helsinki, organised by Raine Mäntysalo) were of vital importance for the development of this report.

WG3's main activities were to develop, test, discuss and communicate a common structure for organising the local workshops, and to collect and analyse the data. The active work on the protocols was started at a special WG3 event, organised by Gebhard Wulfhorst and Benjamin Büttner in Munich in December 2011. There, the work was voluntarily divided into a number of smaller groups.

A four-step workshop protocol, based on the work by Thomas Straatemeier, was further developed and presented by Raine Mäntysalo, Vesa Kanninen and Marco te Brömmelstroet. This set-up was discussed in the wider WG3 group during the Turin MC Meeting. Here, Ron Bos also contributed by sharing his extensive experiences with using accessibility instruments in Dutch planning practice. Parallel to these developments, Carey Curtis, Roger Mellor, Dimitris Milakis and Marco te Brömmelstroet developed a structured guideline for the administration of the experiential workshop. This work was initiated during the MC meeting in Porto in 2011.

To structure the data collection, WG3 developed a measurement protocol. The active work ran in parallel to the workshop protocol. Lidia Zakowska (participant observation), David Zaidel (focus group), and Dimitris Milakis and Roger Mellor (pre- and post-workshop surveys and analysis) developed the separate parts of the evaluation protocol under the leadership of Marco te Brömmelstroet and Carey Curtis. Dimitris Milakis and Roger Mellor also took the lead in compiling the materials developed by the team into the 'Local Workshop Working Kit'.

The protocols were tested in two consecutive pilot workshops in the summer and winter of 2012, in order to ensure that the protocols were effective and

understood by the participants. The first pilot workshop was held in the Netherlands and organised by Thomas Straatemeier, Ron Bos, Luca Bertolini, Marco te Brömmelstroet and the Municipality of Breda. The municipality provided support staff and the meeting place to run the workshop according to our developed draft protocols. The experiences of the team were shared with the wider group of Action members during the Amsterdam MC meeting. The ensuing debates and issues were then consolidated in a revised version of the protocols. The second pilot workshop was organised by Benjamin Büttner, Gebhard Wulfhorst and the Municipality of Munich. Again, the experiences were shared and discussed at a consecutive MC meeting in Munich. Based on these debates, Roger Mellor and Dimitris Milakis finalised the Working Kit and forwarded it to all local WUs. The administration of the local workshops in 2013 and the subsequent data collection was guided by Anders Larsson, Dimitris Milakis and Carey Curtis.

The contributions of all these fine professionals, the extensive debate among all Action members as well as the refinement of the protocols made the work presented in this report possible. It enabled us to develop a shared structure that allowed adaptation to local contexts while, at the same time, ensuring comparability of experiences and results. Other members have contributed by authoring parts of this report or by providing feedback on specific chapters. Their work is explicitly credited in each chapter and paragraph.

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LIST OF ABBREVIATIONS

ABICA	: Activity-Based Indicators of Connections and Access Needs
ACCALC	: Database suite for calculation of UK accessibility statistics
AIS	: Accessibility Instrument Survey
ASAMeD	: Space Syntax: Spatial Integration Accessibility and Angular Segment Analysis by Metric Distance
ATI	: From Accessibility to the Land Development Potential
CAPITAL	: CalculAtor for Public Transport Accessibility in London
CBD	: Central Business District
CG	: Core Group
DfT	: Department for Transport
DLR	: Docklands Light Rail
EMM	: Erreichbarkeitsatlas der Europäischen Metropolregion München
GDATI	: Geographic/Demographic Accessibility of Transport Infrastructure
GIS	: Geographic Information System
GraBAM	: Gravity-Based Accessibility measures for Integrated Transport-Land Use Planning
HIMMELI	: Heuristic three-level Instrument combining urban Morphology, Mobility, service Environments and Locational Information
IMaFa	: Isochrone maps to facilities (shopping centres in the Metrosur area)
InViTo	: Interactive Visualization Tool
JAD	: Joint Accessibility Design
MAAC	: Marginal Activity Access Cost
MaReSi SC	: Method for arriving at maximum recommendable size of shopping centres
MC	: Management Committee
MoSC	: Measures of Street Connectivity: Spatialist Lines

OS	:	Ordnance Survey
PST	:	Place Syntax Tool
PTALs	:	Public Transport Accessibility Levels
PTAM	:	Public Transport Accessibility Mapper
RIN	:	The German Guidelines for Integrated Network Design— binding accessibility standards
SAL	:	Structural Accessibility Layer
SNAMUTS	:	Spatial Network Analysis for Multimodal Urban Transport Systems
SNAPTA	:	Spatial Network Analysis of Public Transport Accessibility
SONATA	:	Social Needs And Transport Accessibility
SoSiNeTi	:	Social spatial influences of new transport infrastructure
STAG	:	Scottish Transport Appraisal Guidance
STIT	:	Simulation of Territorial Impacts of Transports
TMfS	:	Transport Model for Scotland
TRACE	:	Retail Cluster Accessibility
TRANSAM	:	Transport Accessibility Modelling
UrbCA	:	Cellular Automata Modeling for Accessibility Appraisal in Spatial Plans
WALC	:	Weighted Access for Local Catchments
WG	:	Working Group
WU	:	Work Unit

GLOSSARY OF ACTION TU1002

Authors: Gennaro Angiello, Ana Amante and Tiago Patatas

The Glossary of the Action ‘Accessibility Instrument for Planning Practice’ was developed in order to create a common language and foster understanding between all participants. To reach this goal, all members of the Action were involved in choosing the terms to be investigated (as well as their associated meanings) in a participatory way.

The Glossary of the Action is not static but a dynamic source of continuous debate. It is the result of a collaborative process that started in the early stage of the Action.

A baseline document for further discussions was proposed during the first stage, in order to better explain the accessibility instruments survey (see Hull et. al. 2012), and it was published on the action website during the first year of implementation. This document received several comments by Action members who suggested adding, modifying or deleting specific terms. Based on this web discussion, a first version of the Glossary was produced and published in the first Report of the Action (Papa and Angiello 2012). As the authors stressed, the first version of the Glossary was not supposed to be a final product, but rather the initial step in a continuous process. Keeping this in mind, in June 2013, during the second Summer Training School in Tui-Valença, the Junior Research Network of the Action launched a debate in order to widen the previous version by including a broader range of new terms. Glossary of Action TU1002 summarises the main conclusions of this collaborative process.

Accessibility (evolution of the definition)

- ‘the opportunity which an individual or type of person at given location possesses to take part in a particular activity or set of activities’ (Hansen 1959);
- ‘the average opportunity which the residents of the area possess to take part in a particular activity or set of activities’ (Wachs and Kumagai 1973);
- ‘the accessibility of a point in a system is a function of its location in space with respect to all other points in the system’ and ‘implies relative nearness either in the sense of a direct linkage or a minimum expenditure of travel cost or time’ (Hack 1976; de Lannoy 1978);
- ‘the consumer surplus, or net benefit, that people achieve from using the transport and land use system’ (Leonardi 1978);

- ‘the ease and convenience of access to spatially distributed opportunities with a choice of travel’ (Xiaoqing et al. 2006);
- ‘the extent to which the land use-transport system enables (groups of) individuals or goods to reach activities or destinations by means of a (combination of) transport mode(s)’ (Geurs and Van Eck 2001);
- ‘the number and diversity of places that can be reached within a given travel time and/or cost’ (Bertolini, LeClercq and Kapoen 2005);
- ‘the ease in meeting one’s needs in locations distributed over space for a subject located in a given area’ (Cascetta, Carteni and Montanino 2013).

Accessibility instrument

It is a tool that aims to provide explicit knowledge on accessibility to actors in the planning domain. It was specifically developed to support planning practice (analysis, design support, evaluation, monitoring etc.) by measuring, interpreting and modelling accessibility. Mostly, it consists of computer models that transfer data/information about urban systems into meaningful knowledge by providing visualization tools, such as maps or numerical indicators. According to Papa and Angiello (2012), accessibility instruments are

- measuring attributes of places or people (e.g., planning tools to identify how to make places more liveable or ways of identifying the opportunities available to people when planning new facilities or destinations);
- analytical methods to apply accessibility principles within planning practice (e.g., parking policy standards based on accessibility criteria or public transport service delivery requirements based on people’s accessibility needs);
- models useful for understanding dynamic effects and connectedness in transport networks, in particular the dynamics between spatial plans and transport investments;
- indicator calculation methods, where indicators are used to audit, monitor or set standards for planning policies.

Accessibility measures

Accessibility measures are used to translate the concept of accessibility into quantitative indicators that take into account both the socio-economic and the transportation systems (Papa and Angiello 2012). Each accessibility measure has a general conception and a general formulation of its accessibility indicator (infrastructure-based measures, contour measures, gravity measures, competition measures, utility-based measures, network measures, time-space measures).

Active accessibility

Active accessibility of a certain zone is a proxy for the level of ease or difficulty of reaching activities located in different zones of the study area for a given purpose (e.g., workplace or shopping centres) (Cascetta 2009).

Competition measures

These measures are able to consider the effects of competition in the origin and/or destination. These effects are usually located in urban areas where competitiveness concerns, such as users seeking opportunities and/or opportunities competing for users, lead to a significant mismatch between the number of users and the range of offered opportunities (Silva 2008). The measure calculates all potential users of an activity in an area as well as all potential activities, trying to balance the relationship between the number of users and activities.

Components of accessibility

According to Geurs and Van Eck (2001) accessibility consists of four components:

- Land use component. The land use system, which consists of the amount, quality and spatial distribution of identifiable opportunities;
- Transportation component. The transport system, expressed as the disutility for an individual to cover the distance between an origin and a destination using a transport mode;
- Individual component. The personal needs, abilities (depending on physical conditions, availability of travel modes etc.) and opportunities (depending on income, travel budget, educational level, etc.);
- Temporal component. The availability of opportunities at different times of the day, and the time available for individuals to participate in certain activities.

Furthermore, these components may be affected by accessibility through feedback mechanisms.

Contour measures

Also known as cumulative opportunities or isochronic measures, they count the number of opportunities/activities available within a given travel time, distance or cost (fixed costs) or measure the (average or total) time or cost required to access a fixed number of opportunities/activities (Geurs and Van Eck 2003).

Decision Support System (DSS)

DSS is a computer-based information system that supports decision-making activities. DSS serve the management, operations and planning levels of an organisation and help to make decisions, which may be rapidly changing and not easily specifiable in advance (Papa and Angiello 2012).

Gravity measures

Based on the concepts of attraction and impedance, these measures assumes that accessibility of a given zone is proportional to the attractiveness of the surrounding destinations (e.g., the distribution of population, employment, income etc.) and inversely proportional to the spatial impedance of the travel required to reach those destinations (e.g., travel time, distance, generalised cost etc.) from all other zones of the study area.

Infrastructure-based measures

These measures mainly focus the characteristics of the infrastructure and analyse the performance of the transport system as a whole.

Marginal Activity Access Cost (MAAC)

The costs for a Community of locating a single new activity in a particular area, as result of the impacts on mobility (e.g. additional generalized travel costs) and on the environment (e.g. the pollutant emissions due to the additional mobility by car) generated by that activity” (Coppola et al. 2014).

Mobility

The mobility concept is understood by the movement (or flow) of people, goods and information (also considered as ‘virtual mobility’) corresponding to relocation needs. This concept assumes that the mere increase of ‘travelling miles’ or speed between two points benefits people, but it neglects the distribution of opportunities in the territory. In this view, mobility and accessibility are considered the ‘yin and yang’ of planning (Ross 2000).

Network measures

This is a group of measures based on graph theory and network analysis that correlate accessibility with topological measures of the transportation network. In some case these measures can include also the land use component of accessibility (Papa and Angiello 2012).

Passive accessibility

Passive accessibility is a proxy for the opportunity for a certain activity located in the zone of being reached by the potential 'users' coming from all the other zone of the study area for a given purpose (e.g., the patrons of a shop) (Cascetta 2009).

Perceived opportunity measures

The number of opportunities an average individual identifies for satisfying his or her needs in the study area is assessed by this measure (Cascetta, Carteni and Montanino 2013).

Place rank measure

The place rank measure is based on the methods used by search engines like Google to rank web pages. This measure assumes that the level of accessibility of a certain zone in the study area is determined based on the number of people coming to this zone to reach an opportunity, with each person contributing to the zone's accessibility level with a different magnitude. The power of the contribution of each person depends on the attractiveness of his or her zone of origin as a final destination (El-Geneidy and Levinson 2006).

Planning

Planning is the making of an orderly sequence of actions, which in turn will lead to the achievement of a stated goal or a set of goals (Hall 2010).

Planning Support Systems (PSS)

PSS is a subset of geo information-based instruments that incorporates a suite of components (theories, data, information, knowledge, methods, tools, etc.) which collectively support a unique planning task (or some specific portions of it) (Geertman et al. 2004).

Spatial separation measures

They measure travel impediment or resistance between nodes, for example origin and destination. Travel impediment measures can include physical (Euclidean) distance; network distance (by mode); travel time (by mode); travel time (by network status—congestion, free-flow, etc.); travel cost (variable user cost or total social cost) and others (Curtis and Scheurer 2010).

Statutory planning

This is the part of the planning process that is concerned with the regulation and management of changes to land use and development.

Time-space measures

Time-space measures assess travel opportunities within pre-defined time constraints (Curtis and Scheurer 2010).

Urban simulation

It uses a wide range of modelling concepts to capture and reproduce any type of physical or socio-economic phenomena observed in urban systems, allowing for the forecast of potential evolutions under controlled conditions, which can assist planning or decision-making processes (Papa and Angiello 2012).

Usability (of an instrument)

It is a qualitative indicator of the extent to which an accessibility instrument is accepted and applied in planning or decision-making process by its end users (Papa and Angiello 2012).

Utility-based measures

They measure the individual or societal benefits of accessibility, for example, in a monetised form (as a measure of economic utility) or as an indicator for sustainability objectives (like social equity). They can also be applied as behavioural indicators that measure the value individuals place on the accessibility of particular activities (Curtis and Scheurer 2010).

References

- Bertolini, L., F. Le Clercq, and L. Kapoen. 2005. Sustainable accessibility: a conceptual framework to integrate transport and land use plan making. Two test-applications in the Netherlands and a reflection on the way forward. *Transport Policy* 12:207–220.
- Cascetta, E. 2009. *Transportation systems analysis: Models and applications*. 2nd ed. New York: Springer.
- Cascetta, E., A. Cartenì, and M. Montanino. 2013. A new measure of accessibility based on perceived opportunities. *Procedia–Social and Behavioral Sciences* 87:117–132.
- Coppola, P., Nuzzolo, A. and Papa, E., 2014. Introducing environmental issues into accessibility concept: development of a new indicator and application to an empirical study. *Journal of Transport Geography* (forthcoming)
- Curtis, C., and J. Scheurer. 2010. Planning for sustainable accessibility: Developing tools to aid discussion and decision-making, *Progress in Planning* 74(2):53–106.
- de Lannoy, W., and D. van Oudheusden. 1978. The accessibility of nodes in the Belgian road network. *Geojournal* 2(1):65–70.

- El-Geneidy, A., and D. Levinson. 2006. Access to destinations: Development of accessibility measures. No. MN/RC-2006-16. 2006.
- Geertman, S., T. de Yong, C. Wessels, and J. Bleeker. 2004. The relocation of ambulance facilities in central Rotterdam, in Stillwell, J., and G. Clarke, eds. *Applied GIS and spatial analysis*. London: John Wiley & Sons Ltd: 215-232
- Geurs, K., and J. van Eck. 2003. Evaluation of accessibility impacts of land-use scenarios: the implications of job competition, land-use, and infrastructure developments for the Netherlands. *Environment and Planning B: Planning and Design* 30(1):69–87.
- Geurs, K., and J. van Eck. 2001. *Accessibility measures: review and applications. Evaluation of accessibility impacts of land-use transport scenarios, and related social and economic impacts*. RIVM Report 408505 006. Netherlands National Institute for Public Health and the Environment. Bithoven.
- Hall, P. (2010). *Urban and Regional Planning*, 4th ed. London: Routledge.
- Hull, A., E. Papa, C. Silva, and A. Joutsiniemi. 2012. Accessibility instruments survey in Hull, A., C. Silva, and L. Bertolini, eds. *Accessibility Instruments for Planning Practice. Report 1*, 205–238. COST Office.
- Hack, J. 1976. *Land use transport interaction – a new approach to accessibility, Development Plans Regional Strategies*. Working Note no 151. 2 Division, Department of the Environment. London.
- Hansen, W. 1959. How accessibility shapes land-use. *Journal of the American Institute of Planning* 25:73–76.
- Leonardi, G. 1978. Optimum facility location by accessibility maximising. *Environment and Planning A* 10:1287–1305.
- Papa, E., and G. Angiello. 2012. Glossary, in Hull, A., C. Silva, and L. Bertolini, eds. *Accessibility Instruments for Planning Practice. Report 1*, 253–266. COST Office.
- Ross, W. 2000. Mobility & Accessibility: the yin & yang of planning. *World Transport Policy & Practice* 6(2): 13–19.
- Silva, C. 2008. Comparative accessibility for mobility management: The structural accessibility layer. PhD thesis, Faculty of Engineering of Oporto University.
- Wachs, M., and T. Kumaga. 1973. Physical accessibility as a social indicator. *Socioeconomic Planning Science* 7:327–456.
- Dong, X., Ben-Akiva, M. E., Bowman, J. L., & Walker, J. L. (2006). Moving from trip-based to activity-based measures of accessibility. *Transportation Research Part A: policy and practice*, 40(2), 163-180.

Chapter 1 USE OF ACCESSIBILITY INSTRUMENTS

Marco te Brömmelstroet

1.1 The potential relevance of accessibility instruments

Travel behaviour, transport networks and spatial patterns have changed significantly in many European cities over the last decades. These changes have led to a number of unsustainable trends, such as increasing average travel distances and increasing levels of car dependence (Banister 2005, 2008; Handy 2002; Jeekel 2011; Lutz and Lutz Fernandez 2010).

This development has resulted in a crucial policy dilemma (Bertolini 2012). Mobility has become an important element of our daily lives, business strategies and the functioning of our cities and region. But, at the same time, we are confronted with a wide range of mobility-related problems that plague our cities (such as congestion, safety issues, noise and air pollution, degraded quality of public spaces and social exclusion).

There is a wide array of policies and strategies that have been developed and a vast number of projects that have been implemented to curb these negative trends. Often, however, these strategies and projects stem from a specific policy sector, which usually does not work together with other sectors—especially not in the early phases of planning. Each of the sectors has a different professional language, different process protocols and a different view of the planning problem itself (Bertolini, Le Clercq, and Straatemeier 2008; Straatemeier and Bertolini 2007; Straatemeier 2008; Te Brömmelstroet and Bertolini 2010; Te Brömmelstroet and Bertolini 2011a). Because of a lack of integration these strategies and projects often fail to achieve synergy or are sometimes even downright conflicting (Bertolini, Le Clercq, and Straatemeier 2008; Holden 2012; Stead, Geerlings, and Meijers 2004; Straatemeier and Bertolini 2008; Te Brömmelstroet and Bertolini 2010). This unresolved discord severely hampers the efforts of cities and regions to resolve the mobility dilemma.

As stated by many academics, the concept of accessibility offers a highly suitable framework to support the development of such integrated strategies (Ferreira, Beukers, and Te Brömmelstroet 2012; Geurs and Van Eck 2001; Geurs and Van Wee 2004; Halden 2003; Handy 2002; Handy and Niemeier 1997; Makrí 2001; Nuzzolo et al. 2010; Nuzzolo, Coppola, and Papa 2013; Silva 2008). Despite the fierce debate on how to exactly define accessibility, in general terms in this report we define accessibility as *an expression of the potential of relevant activities that are within acceptable reach (travel time) of a given place (or people in acceptable reach of an activity)*. Through this definition, accessibility (1) makes the overall goal of the land use and transport system explicit (i.e. supporting interactions between individuals and activities); (2) is relatively easy to model, interpret and understand; (3) correlates closely

with the real-life behaviour of individuals and companies; (4) offers a direct link with the characteristics of flows (i.e. speeds and travel time); and (5) offers a direct link with the characteristic of place (i.e. the number of relevant activities in a given area). Because of these advantages, it offers a potentially powerful guide that planning practitioners can employ to develop and test effective strategies for sustainable cities (Straatemeier 2008). They can learn about the effectiveness of different types of strategies in addressing the mobility dilemma: Do certain interventions enhance access to relevant activities or reduce it? Do the interventions enhance or reduce the negative effects of mobility? By exploring such questions with colleagues from different planning sectors, more synergetic strategies and projects can be developed.

1.2 Limited usability in planning practice

Although both the concept of accessibility and its potential for urban planning practice have been extensively discussed, the translation of these concepts into usable planning instruments is still fairly limited (Te Brömmelstroet 2010a; Te Brömmelstroet and Bertolini 2011b). In urban planning practice the concept of accessibility is often misunderstood, and the instruments that are developed to support planners are seen as complex, inflexible, incomprehensible and rigid black boxes.

This antagonistic attitude towards accessibility instruments is mirrored in the more general debates on the use of knowledge technologies to support planning practices. Planners see such technologies as far too generic, complex, technology-oriented (rather than problem-oriented), narrowly focused on strict technical rationality, and incompatible with the unpredictable/flexible nature of most planning tasks and information needs (Geertman 2006; Gudmundsson 2011; Klosterman 2001; Lee 1973, 1994; Te Brömmelstroet 2012, 2013; Vonk, Geertman, and Schot 2005). Although we have seen significant progress in computational power and in the capabilities of such technologies, they have repeatedly failed to bridge the 'implementation gap' (Vonc 2006).

One of the underlying fundamental problems seems to be a persisting disconnect between the worlds of instrument developers (who aim for scientific rigor and base their views on an abstract understanding of the planning problem and process) and the potential users (that aim for direct relevance, start from the complexity of the real world and often have an antagonistic attitude towards sophisticated external technologies). From these opposing starting points, they often fail to take each other's perspective into account. This mismatch results in technologies that are developed from a distant and abstract idea, instead from a clear shared understanding of the needs and

demands of specific planning contexts. Vice versa, planners often hold unrealistic expectations of what the technology can offer and are often so disappointed by the support provided that they develop an antagonistic attitude towards new technologies (Meadows and Robinsons 2002; Te Brömmelstroet 2010b; Vonk 2006). Bringing these two worlds together holds the promise of substantial progress; first, towards bridging the implementation gap, and second, towards solving some of the most pressing urban mobility dilemmas in cities around Europe by engaging the concept of accessibility.

1.3 Research question

The contradictory state of affairs of accessibility instruments—i.e. showing a great potential for improving planning practice but suffering from persistently low usability—was the inspiration behind the COST Action TU1002. In the first report we carefully mapped the spectrum of available instruments and their characteristics within the Action (Hull, Silva, and Bertolini 2012). In this second report, the central question shifts to the usability of these instruments as experienced by their intended users. The research question is formulated as follows:

How usable are accessibility instruments in supporting urban planning practices across Europe, and how can their usability be improved?

1.4 Guide to this report

The report continues with our methodological considerations. We have combined an experiential case study approach with elements from classical multiple case study design. After presenting the participating cases, we will describe the standardised process protocol and measurement protocol that were followed in all cases.

The main body of the report is formed by the individual reports from all the local workshops and the detailed descriptions of their local planning contexts. After these workshop reports have been introduced, we will present and discuss the patterns in the aggregated data findings. The report will close with a discussion of the main findings on the usability of accessibility instruments and the potential ways forward.

1.5 References

Banister, D. 2008. The sustainable mobility paradigm. *Transport Policy* 15(2):73–80.

- Banister, D. 2005. *Unsustainable transport: City transport in the new century*. London: Routledge.
- Bertolini, L. 2012. Integrating mobility and urban development agendas: a Manifesto. *the Planning Review* 48(1):16–26.
- Bertolini, L., Clercq, F. L., & Straatemeier, T. (2008). Urban transportation planning in transition. *Transport Policy*, 15(2), 69-72.
- Ferreira, A., E. Beukers, and M. te Brömmelstroet. 2012. Accessibility is gold, mobility is not: A proposal for the improvement of transport-related Dutch CBA. *Environment and Planning B: Planning and Design* 39(4):683–697.
- Geertman, S. 2006. Potentials for Planning Support: A planning-conceptual approach. *Environment and Planning B: Planning and Design* 33(6):863–880.
- Geurs, K., and J. van Eck. 2001. *Accessibility measures: review and applications. Evaluation of accessibility impacts of land-use transport scenarios, and related social and economic impacts*. RIVM Report 408505 006. Netherlands National Institute for Public Health and the Environment. Bithoven.
- Geurs, K., and B. Van Wee. 2004. Accessibility evaluation of land-use and transport strategies: review and research directions. *Journal of Transport Geography* 12(2):127–140.
- Gudmundsson, H. 2011. Analysing models as a knowledge technology in transport planning. *Transport Reviews* 31(2):145–159.
- Halden, D. 2003. Accessibility analysis: concepts and their application to transport policy, programme and project evaluation, in Pearman A., P. Mackie, and J. Nellthorp, eds. *Transport projects, programmes and policies: Evaluation needs and capabilities*. Aldershot: Ashgate.
- Handy, S. 2002. Accessibility- vs. mobility-enhancing strategies for addressing automobile dependence in the U.S. European Conference of Ministers of Transport. Brussels.
- Handy, S., and D. Niemeier. 1997. Measuring accessibility: an exploration of issues and alternatives. *Environment and Planning A* 29(7):1175–1194.
- Holden, M. 2012. Is integrated planning any more than the sum of its parts? Considerations for planning sustainable cities. *Journal of Planning Education and Research* 32(3):305–318.
- Hull, A., C. Silva, and L. Bertolini. 2012. *Accessibility instruments for planning practice*. Porto: COST Office.
- Jeekel, H. 2011. *De autoafhankelijke samenleving [The car-dependent society]*. Delft: Eburon Uitgeverij
- Klosterman, R. 2001. Planning support systems: a new perspective on computer-aided planning, in Brail, R. and R. Klosterman, eds. *Planning*

- Support Systems: integrating geographical information systems, models and visualization tools*, 1–23. New Brunswick: ESRI.
- Lee, D. 1994. Retrospective on large-scale urban models. *Journal of the American Planning Association*, 60(1), pp. 35-40.
- Lee, D. 1973. Requiem for large-scale models. *Journal of the American Planning Association* 39:163–178.
- Lutz, C., and A. Lutz Fernandez. 2010. *Carjacked: The Culture of the Automobile and Its Effect on Our Lives*. Hampshire: Palgrave Macmillan.
- Makrí, M. 2001. Accessibility indices: A tool for comprehensive land-use planning. Lund University.
- Meadows, D., and J. Robinsons. 2002. The electronic oracle: Computer models and social decisions. *System Dynamics Review* 18(2):271–308.
- Nuzzolo, A., P. Coppola, U. Crisalli, and A. Comi. 2010. Mobilità e Qualità delle Aree Urbane. Napoli: Guida Editore.
- Nuzzolo, A., P. Coppola, and E. Papa. 2013. Marginal Activity Access Cost (MAAC): a new indicator for sustainable Land Use/Transport (LUT) planning. *Procedia Social and Behavioural Sciences*, (forthcoming).
- Silva, C. 2008. *Comparative accessibility for mobility management—the structural accessibility layer*. Oporto University.
- Stead, D., H. Geerlings, and E. Meijers. 2004. *Policy integration in practice. The integration of land use planning, transport and environmental policy-making in Denmark, England and Germany*. Delft: Delft University Press.
- Straatemeier, T. 2008. How to plan for regional accessibility. *Transport Policy* 15:127–137.
- Straatemeier, T., and L. Bertolini. 2008. Joint accessibility design: A framework developed for and with practitioners to stimulate the integration of regional land-use and transport strategies in the Netherlands. *Transportation Research Record* 2077:1–8.
- Straatemeier, T., and L. Bertolini. 2007. Planning for accessibility: Helping policymakers to develop integrated regional land-use and transport strategies in the Netherlands. 21 AESOP Conference.
- Te Brömmelstroet, M. 2013. Performance of Planning Support Systems: What is it, and how do we report on it? *Computers, Environment and Urban Systems* (41):299–308.
- Te Brömmelstroet, M. 2012. Transparency, flexibility, simplicity: From buzzwords towards strategies for real PSS improvement. *Computers, Environment and Urban Systems* 36(1):96–104.
- Te Brömmelstroet, M. 2010a. Equip the warrior instead of manning the equipment: Land use and transport planning support in the Netherlands. *Journal of Transport and Land Use* 3(1):25–41.

- Te Brömmelstroet, M., 2010b. Making Planning Support Systems matter: Improving the use of Planning Support Systems for integrated land use and transport strategy-making. PhD diss. Amsterdam: University of Amsterdam.
- Te Brömmelstroet, M., and L. Bertolini. 2010. Integrating land use and transport knowledge in strategy-making. *Transportation* 37(1):85–104.
- Te Brömmelstroet, M., and L. Bertolini. 2011a. A transition towards sustainable strategy-making: Integrating land use and transport knowledge types, in Van Nunen J., P. Huijbregts, and P. Rietveld, eds. *Transitions towards sustainable mobility: new solutions and approaches for sustainable transport systems*, 19–40. Heidelberg: Springer.
- Te Brömmelstroet, M., and L. Bertolini. 2011b. The role of transport related models in urban planning practice. *Transport Reviews* 31(2):139–143.
- Vonk, G. 2006. *Improving planning support: The use of planning support systems for spatial planning*. Utrecht: Nederlandse Geografische Studies.
- Vonk, G., S. Geertman, and P. Schot. 2005. Bottlenecks blocking widespread usage of planning support systems. *Environment and planning A* 37:909–924.

Chapter 2 METHODOLOGICAL CONSIDERATIONS

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2.1 Introduction

In this chapter we will describe in detail the methodological set-up of our research. Based on the foundations discussed in Chapter 1, we will first explore the applied research design: the experiential case study. Then, the cases that are included in the research will be shortly introduced. The last three sections will present the protocol that was followed in each of these cases, the data collection method and the data analysis. To understand the outcomes, it is crucial that the reader is aware of the methodological choices made in all these steps.

2.2 Research rationale: Reflection in Action¹

In this report we seek to examine the views on usability of accessibility instruments from a user perspective. Following Pawson and Tilley (1997), we argue that 'realistic evaluation' should be based on hands-on experience with the instruments. To illustrate this point, let us take the example of designing a new board game. The designer could collect a wide range of wishes and demands by interviewing potential users or administering a survey. However, these expressed wishes would not be based on the actual experience but on an abstract idea of the board game. If several families play with a prototype version of the game and then share their views, the reflections on how the game can be improved are much more concrete and relevant.

In our effort to engage with the intended users of accessibility instruments and solicit their experiences and reflections, we follow the methodological insights from the pragmatism school. In a recent paper, its central notions of 'learning-by-doing', 'reflection-in-action' and the 'reflective practitioner' were translated into an experiential case study research design by Straatemeier, Te Brömmelstroet, and Hoetjes (2010). Here, we will shortly outline how this approach is applied in our research.

The relationship between knowledge and experience was a core concern of American pragmatism. Central to American pragmatism in general, and to the work of John Dewey in particular, is the notion that practical knowledge can only be generated through actual experience. According to Dewey (1960, 1964) human practices are based on more dimensions of 'knowing' than the merely cognitive sort of knowledge typically contributed by experts. He pointed

¹ The text of this paragraph is partly duplicated from Straatemeier, T., L. Bertolini, M. te Brömmelstroet, and P. Hoetjes. 2010. An experiential approach to research in planning. *Environment and Planning B* 37(4):578–591.

at dimensions such as 'reflection', 'values', 'experience', and 'emotions'. Dewey further ascertained that human knowledge is always incomplete and imperfect, even in its richest forms. The knowledge of the acting subjects is by definition a simplification of the practices they are engaged in. As a result, one cannot truly cope with the complexities of practice solely from an external, spectator position (e.g., interviews or case observation). One can only learn the real meaning and value of knowledge by trying and probing it in action.

This key pragmatist notion has been further articulated and made operational in the field of education by Kolb and Fry (1975), in the theories and methods of 'experiential learning'. Experiential learning unfolds through an iterative sequence of interlinked activities, with a continuous shift between reflection and action, with one nurturing the other. In this continuous learning cycle, the observation of and reflection on concrete experience leads to the *forming of abstract concepts*, which are then *tested in new situations*, eventually resulting in the adaptation of existing practices (i.e. *concrete experience*) (see Figure 2.1).

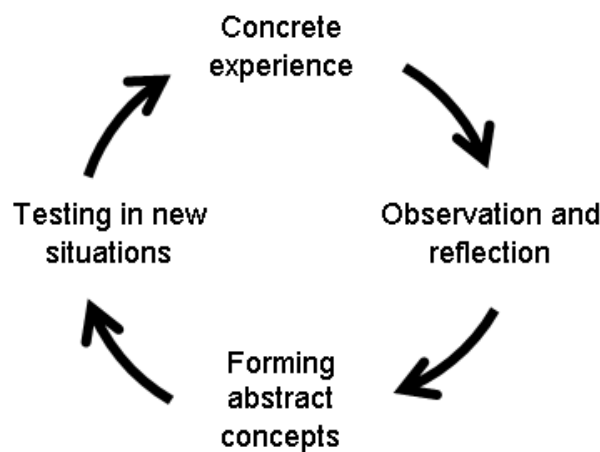


Figure 2.1: The experiential learning cycle (adapted from Kolb and Fry 1975)

The experiential learning cycle can also provide a useful framework to characterise planning research, planning practice and their potential relationship. These four activities are, of course, already present in current planning research and practice; however, and this is the core of our argument, they are often not linked, at least not systematically or directly. Our contention is that a more direct and systematic link between these different activities (and the people and organisations involved) would significantly improve learning processes and thus knowledge development in planning research and practice. Achieving this goal requires changes at both ends of the usability continuum.

Researchers need to engage more in practical applications (i.e. 'concrete experience'), while practitioners need to engage more in reflective activities (i.e. 'forming abstract concepts'). In today's highly specialised world, it is difficult to expect an individual or even a single organisation to be equally capable in all these activities. Therefore, practitioners and researchers (as well as their respective organisations) have to engage more with each other: the former providing 'food for thought' the latter 'thought for food'.

This type of reasoning is, of course, already present in the planning community, and it is directly inspired by the general notion of 'reflective practice' and specific ideas of the types of research that can support it (see Schön 1983, 207–325 in particular). We share with Schön the conviction that this is the obvious model for knowledge development in general and thus also in planning. It is a conviction that is also increasingly echoed in other fields and debates, for example, in the contention that science's 'codified' knowledge and practitioners' 'tacit' knowledge must be intimately combined to achieve innovation (Friedmann 1973; Nonaka and Takeuchi 1995; Polanyi 1967), or that knowledge development in science, technology and society needs to be integrated to successfully tackle complex societal problems (Gibbons et al. 1994; Nowotny, Scott, and Gibbons 2001; Thompson Klein et al. 2001).

2.3 Multiple one-off experiential cases

The experiential case study research design requires a series of cases that allow lessons from the first case to be included in the second case and so on. Such a design spiral builds on concrete experiences and gradually enhances the relevance of theoretical improvements for planning practice. This COST Action does not permit such a time consuming set-up for each accessibility instrument in each local setting.

We retained the core principle of experiential case studies, the collection of the experiences of the intended users with the accessibility instruments. However, because of time constraints, each local WU was asked to perform only one analytical loop and was encouraged to continue the experiential learning process outside of the Action. On the other hand, and differently from the single-instrument, single-context examples discussed in Straatemeier et al. (2010), we were able to replicate the exercise for a variety of instruments and in a variety of contexts. This approach leads to a research design (illustrated in Figure 2.2) that also uses elements of a classical multiple case study. Through this each accessibility instrument is used and analysed within one local planning setting while the findings are compared across different settings (Yin 1994).

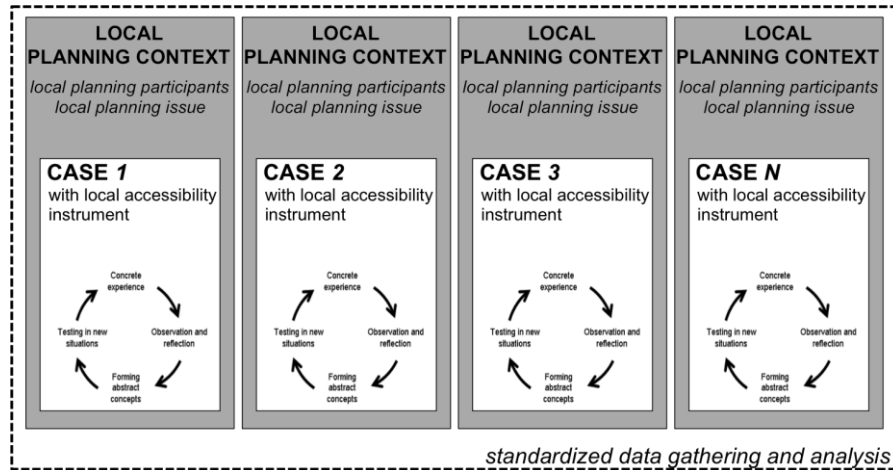


Figure 2.2: Combining multiple case studies with experiential case study elements

The combination of experiential cases in a multiple case study design has a number of specific characteristics, which need to be considered for a more complete understanding of the research and its findings:

- In an experiential case study design, the researcher does not only observe but also actively intervenes in the planning practice. Guided by theoretical understandings regarding how the practice can be improved, the researcher develops an intervention, applies it in a case, reflects on its effectiveness and (if needed) improves both the theoretical understanding and the intervention.
- An experiential case is not real-life planning practice. In an ideal situation an intervention would be tested in a real-life context, but because of the distinct focus on reflection (by the researcher and the participants), some distance needs to be created. This distance notwithstanding, the researcher still aims to replicate real-life planning as closely as possible.
- In this COST Action, each accessibility instrument is considered to be one unique intervention, which is tested. Due to time constraints, each of these instruments will perform only one experiential case study.
- By following a standardised process and measurement protocol in each of these cases (see sections 2.4 and 2.5), we can compare the observations and findings, and develop a more general understanding of the usability characteristics of accessibility instruments. Although we follow an experiential logic within each single case, we also combine this approach with the strengths of the classical multiple case study design, to allow for comparison between cases.

2.4 Study cases

COST Action TU1002 is a European network of accessibility instrument developers who are interested in understanding and improving usability in planning practice. Since this is a voluntary, bottom-up network, we did not organise control groups for the cases that are included in this research (a fundamental characteristic of case study research, according to Yin 1994). Therefore, we do not claim inclusivity or the benefits of random sampling. Our study provides valuable insights, without the aim to generalise the findings on the entire population of accessibility instruments.

To understand the background of our study, we present here all cases that are included in the analysis. The 17 cases represent a total of 15 countries across Europe and one case from Australia. The details are presented in Table 2.1.

Country	COST Partner	City of application	Accessibility instrument
Australia	Curtin University	Adelaide	SNAMUTS
Cyprus	University of Cyprus	Limassol	ASAMeD
Finland	Aalto University	Helsinki	Himmeli
Germany	TU Munich	Munich	Erreichbarkeitsatlases
Greece	University of Thessaly	Volos	SpatialistLines (MoSC)
Italy 1	University of Rome	Rome	GraBAM
Italy 2	Politecnico di Torino	Turin	InViTo
Netherlands	University of Amsterdam	Breda	Joint-Accessibility Design
Poland	Cracow University of Technology	Krakow	GDATI
Portugal	TU Oporto	Porto	Structural Accessibility Layer
Slovenia	University of Ljubljana	Ljubljana	ATI
Spain	University of Madrid	Madrid	IMaFa
Sweden	University of Gothenburg	Gothenburg	Accessibility Atlas
United Kingdom	Herriot Watt University	Edinburgh	SNAPTA
Turkey	Çukurova University	Izmir	Cittaslow
France	Université Paris-Est	Paris	Contactability
Norway	University of Stavanger	Stavanger	(no workshop, interviews only)

Table 2.1: Study cases and their accessibility instruments

2.5 Workshop template

In order to undertake analogous workshops in each country it was necessary to develop a common protocol to cover the procedural aspects of the workshop and ensure a shared methodology and analytical framework. It was designed to be flexible enough to cope with the different accessibility tools, the different national planning contexts and cultures as well as the different planning questions relevant for that locality. A core component of the workshop was evaluating the use and usability of the employed accessibility tool. For this purpose, a common suite of evaluation instruments was designed (described in detail in section 2.4 below).

The local workshop was set up as a short stepwise planning exercise, to closely mirror real-life planning practice. The four-step structure is based on a well-established body of literature on learning and knowledge management. The aim was not to develop strategies, but to play with the instrument in a next-to-real-life exercise. The protocol outlined the most desirable preparation, performance and evaluation for the local workshops. This consisted of an online or telephone preliminary conversation with the end users, followed by two meetings of half a day. The possibility to simplify the approach to meet the specifics of the local context was also offered.

All 17 WUs that organised a local workshop received a detailed guideline how to set up this workshop. This workshop template was based on earlier experiences at the University of Amsterdam (Straatemeier 2008; Straatemeier and Bertolini 2008; Te Brömmelstroet and Bertolini 2010). To get all WUs acquainted with the workshop template, the Junior Research Network of the COST Action administered an initial test in Naples and a subsequent pilot version in Breda. These experiences were shared and thoroughly discussed in the Amsterdam MC meeting (July 2012). A second pilot and discussion was organised in Munich (January 2013), after which the template was finalised.

The workshop template follows a four-step logic in which developers of the accessibility instrument and planning actors (be it planners, real estate developers, citizens or NGOs) go through a structured mutual learning process. Step-by-step the planning actors engage with the concept of accessibility and link it to their policy concerns (see Figure 2.3). By actively using the instrument as a support tool while developing concrete urban interventions, the planning actors experience first-hand what the accessibility instrument can and cannot do. After the session, they can give constructive feedback on the usability of the tool and on how it can be improved.

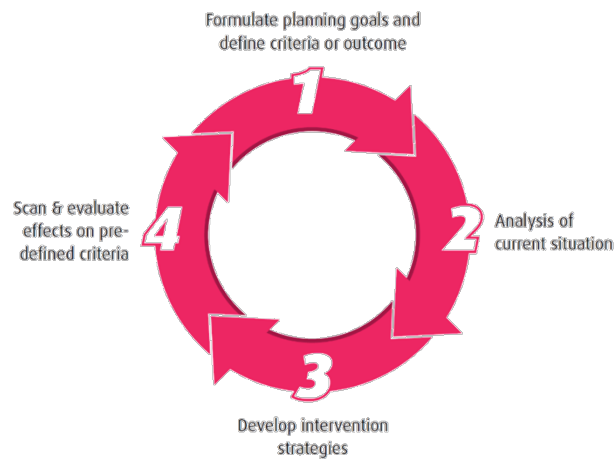


Figure 2.3: Four-step workshop template for use and testing of accessibility instruments
(developed by Goudappel Coffeng)

Once the protocol was developed it was tested, along with the evaluation instruments, in two pilot workshops: in Breda, the Netherlands (July 2012) and in Munich, Germany (February 2013). Following the pilot testing, local workshops commenced in spring 2013 and were completed by November 2013. Since no significant changes were made to the instruments, the pilot workshops are also included in this report as local workshops. Next, we describe how the four steps were prepared and executed in practice.

Preliminary conversation (pre-Step 1)

After the end user had agreed to participate in the local workshop, he or she was contacted by the local Work Unit (by phone or email). In this initial conversation the end user was introduced to the accessibility instrument. Also, they were asked what kind of accessibility-oriented planning question they were interested in. Based on the expressed preferences, they were asked to express an opinion on a number of fundamental choices within the accessibility instrument (e.g. transport modes, travel times, and activities to be considered). This information was collected for each end user and was used as the input for the first physical meeting.

Step 1: Formulate economic, social and spatial planning goals and define accessibility criteria

The planning actors had to agree on a strategic planning question and to discuss how indicators from the accessibility instrument can support them in their exploration of this planning question. Such questions included: How can the problem be translated into accessibility terms (e.g., accessibility to what, by

what transport modes, within how much travel time)? How should the indicator be presented (e.g. thematic maps, tables and numbers)? This was done within the limitations of the specific instrument(s). The goal of this step was to translate individual and group thinking regarding the planning question into a shared language of accessibility, for example:

- If the planning goal or problem deals with *the strengthening of regional economic clusters*, this may be translated into accessibility needs in terms of access to jobs; markets (inhabitants, firms); knowledge (people, companies, institutions); other economic clusters; main ports (harbour, airport); and supplies (goods).
- If the planning goal or problem deals with *the revitalizing of existing urban areas*, this may be translated into accessibility needs in terms of multimodal access to jobs and daily services (education, health care, shops, recreation) on a local level (lower-income groups) and on a regional level (higher-income groups).

Step 2: Collectively mapping, measuring, interpreting and analysing current accessibility

The developers of the accessibility instrument then produced the desired accessibility output (e.g. maps, tables and numbers) and presented it to the end users. In this presentation they had to explain the output, what the analyses show and what kinds of consequences regarding the planning question can be drawn from it. The goal was to create a shared understanding of the current accessibility situation and potential intervention pathways. Critical questions for the developer of the accessibility instrument were the following:

- How can the accessibility problems or goals identified in Step 1 be interpreted and represented appropriately (in terms of mapping, calculations, statistics etc.)?
- Do all of the workshop participants understand these presentations? How can the accessibility model be made sufficiently clear, focused and accessible without sacrificing the necessary qualities of the model as a representation of a complex urban system?
- Are the necessary data and modelling technology and skills available?

One example is the ‘Strengthening of the knowledge cluster in the Rotterdam/The Hague region’, where accessibility in each area of the region was measured by combining the following:

- Firms in the field of creative industries within 15 min travel time by bicycle;
- Cultural and catering services within 15 min travel time by bicycle;

- Higher education and knowledge institutions within 30 min by car and 45 min by public transport;
- Labour with higher education within 45 min by car and 60 min by public transport;
- Rotterdam Harbour and Schiphol Airport within 45 min by car and 60 min by public transport.

Step 3: Develop intervention strategies to understand the sensitivity of accessibility in interventions

The planning actors were invited to develop different sets of planning interventions to maintain—or if possible to improve—the accessibility situation as presented in Step 2. This could be done as a plenary group or in smaller groups. Each group could also choose between finding optimal planning and realistic interventions or pursuing more extreme approaches. The developers of the accessibility instrument then presented to the participants the effects of these interventions on accessibility. The goal of this step was to develop a shared understanding of the sensitivity of accessibility in planning interventions. The accessibility instrument was used as a tool for probing collectively different intervention scenarios in terms of their effect on accessibility. The instrument, thus, served to enhance the participants' understanding of the accessibility dimension of different planning alternatives.

Step 4: Scan/evaluate the effects of the intervention strategies on designing integrated planning solutions

Based on the shared understanding of the accessibility situation and responsiveness to planning interventions, the group of planners could then agree on a set of interventions for the planning question in Step 1. The goal was to allow the end users internalise the accessibility language into their individual understanding of the planning question, and translate this new understanding in adaptations of existing plans.

2.6 Organisation into physical meetings

Each local WU was required to invite a small group of end users (three to ten persons), consisting of local planning actors who deal with urban planning and strategy-making on a daily basis (professionals, agencies, advocacy groups, citizens). We also required that the participating users come from diverse disciplines (at least two), in order to test the usability of accessibility instruments as a professional language between planning disciplines (i.e. land use, transport, environmental planning). We expected to find the highest added value of our instruments among such diverse groups.

First physical meeting (Step 1)

The first meeting with the local planning participants provides the opportunity to introduce the project and the thematic that will be covered in the course of the workshop. More specifically, the primary aim of the first contact with the local planning participants is the following:

- To translate individual thinking on the planning question into a shared language of accessibility.

The planning actors who will attend the workshop are contacted four weeks before the workshop. In this meeting the first step is performed: the planning actors have to agree on a relevant planning question and on how the available accessibility instruments and indicators have to be set up and presented to support their exploration of this question.

The planning actors have to agree on a strategic planning question and discuss how indicators from the accessibility instrument can support them in exploring this planning question. The following questions need to be answered:

- How can the problem be translated into accessibility terms (e.g. accessibility to what, with which modes, within how much travel time)?
- How should the indicator be presented (e.g. thematic maps, tables and/or numbers)?

These steps need to be accomplished taking into consideration the limitations of the instruments that are discussed by the accessibility instrument developers.

Second physical meeting (Steps 2, 3 and 4)

During the second physical contact with the participating planning actors, the meeting was structured with the following goals in mind:

- To present the accessibility instrument's output to the planning actors;
- To allow end users to 'play' with the instruments in order to create a shared understanding how responsive the accessibility outputs are to planning interventions;
- To allow the planning actors to 'internalise' accessibility language into their individual understanding of the planning question.

2.7 Data collection

In total, five data collection instruments were designed for the local workshops (see Figure 2.4 below).

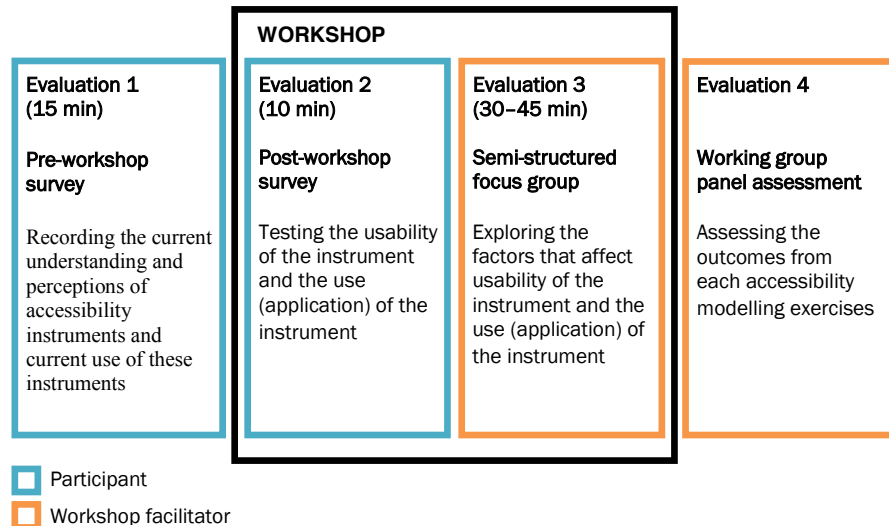


Figure 2.4: Data collection instruments

Pre-workshop survey

Each participant was invited to complete a pre-workshop questionnaire (see Appendix A). The aim of this survey was to gain insight into the current state of practice in the use and understanding of accessibility tools/models.

Workshop evaluations

During the workshops two evaluations took place.

First, each individual participant filled out a 'post-workshop survey' (see Appendix B), which had two primary aims:

- To understand how the participants experienced the process (use of the accessibility instrument);
- To interpret if there was any significant increase in understanding of the use of accessibility instruments by the participants.

Further goals were to collect opinions on how the workshop was organised, the results of the accessibility intervention, the utility of the accessibility tool and the potential barriers to its adoption in planning practice. The idea was for the local WU to address any potential weaknesses in order to improve the

experience for future users, with the ultimate goal to see an integration of scientific knowledge on accessibility tools in everyday planning practice.

Second, a debriefing session was conducted between the developers of the accessibility tool and the workshop participants. This took the form of a semi-structured focus group session, usually directly after participants had completed the post-workshop survey. The idea was to exchange opinions and impressions about the workshop and the accessibility instrument using the following prompts:

1. Are you satisfied with the accessibility modelling session?
2. Do you think the session offered a credible alternative to your usual approach?
3. Did the session offer you alternative insights into your planning problem?
4. Did you understand the assumptions used in the model? Did you agree/disagree with them?
5. Do you understand the language used in the session or did you learn some new terminology?
6. Do you think that there was consensus or a shared understanding of the problem because of the use of an accessibility model?
7. Do you have a better understanding of the goals of the other participants in this planning problem because of the use of an accessibility model?
8. What is your opinion about the accessibility instrument used in the workshop?
9. What is your opinion about the process of the workshop?
10. What is your opinion about the applicability of the instrument in your professional work?

All participants were then asked to make a summary statement on the workshop and on the focus group session.

Post-workshop evaluation

The final evaluation was conducted by all COST members (not the workshop participants). The discussion used the same key points from the participant debriefing, moderated by the same person when possible. The following questions were used to guide the discussion:

- Do you think that the participants were satisfied with the accessibility modelling session?
- Do you think the session offered a credible alternative to the participants' usual approach?
- Do you think the session offered the participants an alternative insight into the planning problem?

- Do you think the participants understood and agreed/disagreed with the assumptions used in the model?
- Do you think the participants understood the language used in the session, or do you think they learned some new terminology?
- Do you think that there was consensus or a shared understanding of the problem because of the use of an accessibility model?
- Do you think the participants have a better understanding of each other's goals in this planning problem because of the use of an accessibility model?
- Do you think the participants understand the concepts accessibility and mobility?
- Do you think the participants would be able to use the instrument in their professional work?
- Do you think that the use of the model and the introduction of the concept of accessibility was beneficial to improving the understanding of accessibility in planning?
- What is your opinion about the process of the workshop?

2.7 Data analysis

We conducted a two-level analysis to assess the practitioners' understanding of the potential or barriers/difficulties/limits of using accessibility instruments. It also helped us gain deeper insight into the possible orientation that further development of the instruments should take, in order to be better adapted to user needs. Specifically, we focused on three key areas: (1) organisational factors that limit the use of accessibility models; (2) the way that an organisation has used accessibility models in the past; and (3) the importance of the specific dimensions of an accessibility model.

First, each local WU produced a report describing the accessibility instrument used in the workshop, the preparatory activities, the process, and the main lessons learned regarding the usability of the instrument. The report relied on the feedback collected during the semi-structured focus groups with the participants and the local WU panel assessment (see Chapter 3 for these individual reports). The reports were centrally collected and subject to an internal review process. Each report opens with a table that summarises the socio-demographic and professional profile of the participants as well as their

views on selected questions of the post-workshop survey, covering the session and the accessibility instrument.²

Second, we analysed the results of the post-workshop surveys of all countries that returned a complete survey after the workshop (see Chapter 4 for this analysis). We first analysed the socio-demographic and professional profile of all participants and then looked deeper into (a) the perceived quality of the process and (b) the perceived usability of the instrument. For each of these two themes, we analysed the aggregated results of all relevant questions and the responses on selected questions according to city, socio-demographic and professional characteristics of the participants. In all stages of our analysis, we used divided stacked bar charts to show the distribution and to compare the frequency of the Likert scale responses between groups. Mann-Whitney U Tests were used to identify statistically significant differences in the responses between groups.

2.8 References

- Dewey, J. 1964. *Reconstruction of Philosophy*. Boston: The Beacon Press.
- Dewey, J. 1960. *The Quest for Certainty*. 11th ed. New York: Putnam's Sons.
- Friedmann, J. 1973. *Retracking America: A theory of transactive planning*. Garden City, N.Y.: Anchor Press/Doubleday.
- Gibbons, M., C. Limoges, H. Nowotny, S. Schwartzman, P. Scott, and P. Trow. 1994. The new production of knowledge. The dynamics of science and research in contemporary societies. London: Sage.
- Kolb, D., and R. Fry. 1975. Toward an applied theory of experiential learning, in: COOPER, C. ed. *Theories of group processes*. New York: John Wiley and Sons.
- Nonaka, I., and H. Takeuchi. 1995. *The knowledge-creating company: how Japanese companies create the dynamics of innovation*. New York: Oxford University Press.
- Nowotny, H., P. Scott, and M. Gibbons. 2001. *Re-thinking science: knowledge and the public in an age of uncertainty*. Cambridge: Polity.
- Pawson, R., and N. Tilley. 1997. *Realistic Evaluation*. London: Sage.
- Polanyi, M. 1967. *The tacit dimension*. New York: Doubleday.

² Questions 1, 5, 7, 11 and 14 assessed the session for usefulness, insight, understanding, shared language and vision. Questions 18 and 22 assessed the instrument for appropriateness and insight.

- Schön, D. 1983. *The reflective practitioner: How professionals think in action*. London: Temple Smith.
- Straatemeier, T. 2008. How to plan for regional accessibility. *Transport Policy* 15:127–137.
- Straatemeier, T., and L. Bertolini. 2008. Joint Accessibility Design: a framework developed for and with practitioners to stimulate the integration of regional land-use and transport strategies in the Netherlands. *Transportation Research Record* 2077:1–8.
- Straatemeier, T., L. Bertolini, M. Te Brömmelstroet, and P. Hoetjes. 2010. An experiential approach to research in planning. *Environment and Planning B: Planning and Design* 37(4):578–591.
- Te Brömmelstroet, M. and L. Bertolini. 2010. Integrating land use and transport knowledge in strategy-making. *Transportation* 37(1):85–104.
- Thompson Klein, J., W. Grossenbacher-Mansuy, R. Häberli, A. Bill, R. Scholz, and M. Weit. 2001. *Transdisciplinarity: Joint problem solving among science, technology and society: An effective way of managing complexity*. Basel: Birkhäuser.
- Yin, R., 1994. *Case study research: design and methods*. 2nd ed. London: Sage publication

Chapter 3 LOCAL WORKSHOP REPORTS

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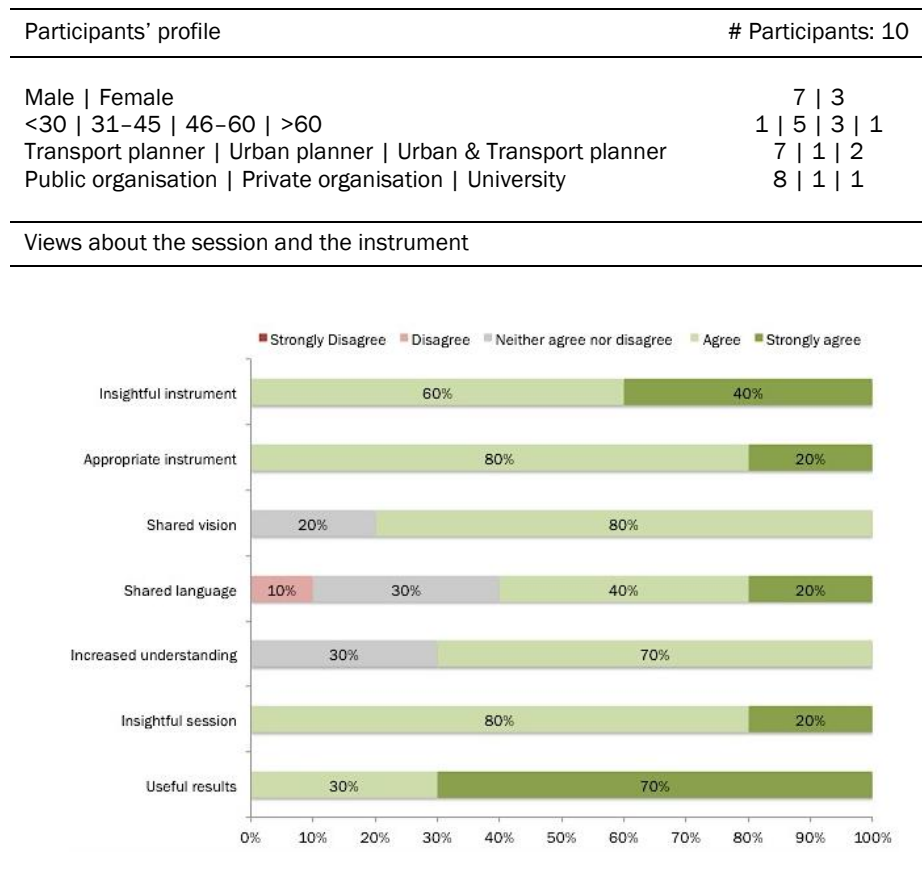
AUSTRALIA

SNAMUTS FOR METROPOLITAN STRATEGIC PLANNING: ADELAIDE 2040

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SNAMUTS

SNAMUTS is an accessibility tool that functions as a trans-disciplinary communication instrument, capable of demonstrating the integration (or lack of) between land use and public transport at the spatial level of the metropolitan system. The design of the tool is from the perspective of the individual and how they make their daily travel choices, usually deciding between car and public transport. From this perspective the core variables are

- ‘How can I get there?’ (taking into account travel time, service frequency of public transport and transfer possibilities, compared to travel time by car);
- ‘What activities are available at a given location?’ (taking into account the employment opportunity and number of residences).

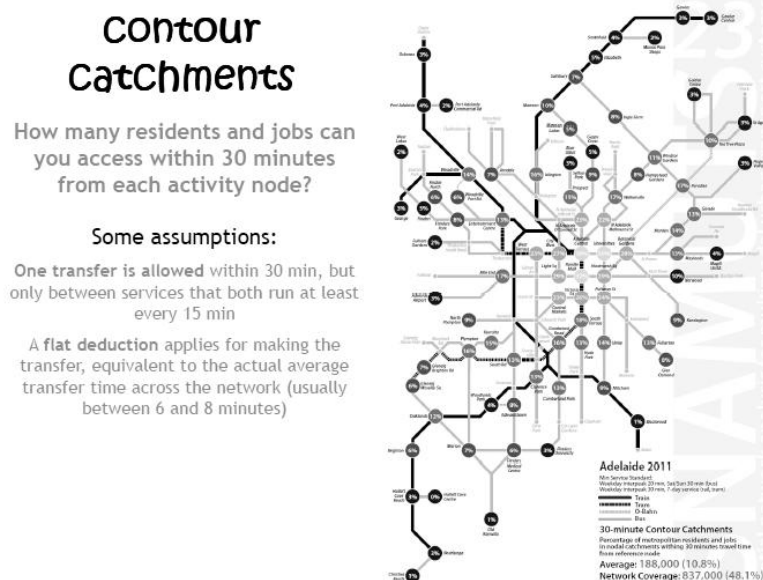
The tool has been designed and applied in planning practice to enable the testing and group deliberation of scenarios for future land use development and public transport investment at the metropolitan level. In this way the tool has assisted in developing and/or refining practitioners’ conceptual understanding of land use transport integration for sustainable mobility. Seven indicators of accessibility provide the possibility to measure and compare across scenarios such attributes as closeness between places, transfer penalties, transport network structure and potential network stress, and land use opportunity. A composite indicator utilising a mix of these indicators provides a visual map, thus enabling the practitioners to easily focus on trouble spots and areas of opportunity for use in a group discussion.

The tool utilises publically available public transport timetables to measure the supply of public transport across the network. Data for population, employment and road speeds is sourced locally from public agencies and census data. The interactive nature of the workshops provides the opportunity for practitioners to input local knowledge and internally held ideas about future developments—the accessibility instrument enables such interactivity. The use of maps and the dissemination of the accessibility measures in a visually well-presented medium is intended to significantly enhance the practitioners’ understanding of transport and land use interventions. Thus, it contributes towards a productive discourse on future directions for urban form and mobility. Usability is also enhanced through the open discussion of the tool’s underlying assumptions for accessibility and opportunity for adjustment.

Setting the scene

The participants of the workshop represented a relatively even composition of planning academics and planning practitioners from Adelaide. The participants were identified and invited by the local WU, according to the Action protocol, in

order to ensure a good mix of urban land use planners, public transport planners and transport planners. The academics were representatives from the University of South Australia–School of the Built and Natural Environment, ranging from an Emeritus Professor to urban and transport planners and a PhD research scholar. The planning practitioners were drawn primarily from the South Australian Department of Planning, Transport and Infrastructure (a state government agency with integrated responsibility for metropolitan land use planning, transport planning and public transport). Their representatives included an executive director, several transport analysts, and the manager of network design and communications. The other participants were two transport planners from the Adelaide City Council and two planners from different private sector transport consultancies.



and land use transport integration. The metropolitan planning instruments recently adopted by the state government are focused on improving accessibility by public transport, enhancing public transport infrastructure and fostering transit-oriented development. This policy direction sets the groundwork for some understanding of land use transport integration.

Describing the workshop

Given the SNAMUTS focus on metropolitan strategic planning, the SNAMUTS team, in consultation with the Adelaide academics, utilised the recently published '30-year Metropolitan Plan for Greater Adelaide' as a starting point for focusing the discussion towards determining future land use and transport investment decisions. The work team planned a two stage workshop (half a day each) with a day between the two workshops. Two half days planned close together was deemed appropriate, bearing in mind the need to ensure participation by practitioners who find it difficult to take a whole day out of their schedule, and to allow some time for their reflections on the accessibility tool and concepts before reconvening. The aim for day one was to develop a collective understanding of accessibility and of the SNAMUTS indicators; to define and agree on the planning problem; and to define the planning interventions envisaged by the group. The purpose of day two was to present the intervention outputs to the workshop for group evaluation and discussion. In addition the COST evaluation was conducted. The workshops were organised with a one-day break between day one and day two, to allow time for the team to input the interventions (changes in the public transport network and land use by activity centres) and produce outputs for day two. This was a test for the accessibility tool—to determine if it was possible to produce outputs in this short space of time—the closest we thought we could get to testing the real-time capabilities of the tool.

Steps 1 and 2

The SNAMUTS team had recently produced an analysis of the current accessibility of metropolitan Adelaide as part of an Australian Research Council project examining the accessibility of 25 international cities (ARC-D 110104884). This work provided outputs for the full suite of SNAMUTS accessibility indicators for Adelaide. In this way the outputs provided a multi-purpose resource serving to present our conceptual understanding of accessibility; to present and explain each indicator to the group (including the assumptions behind the indicator and what it can measure); to provide our overview of the current state of play of accessibility for metropolitan Adelaide. Showing the indicators by using Adelaide as the place-based case was designed to aid usability for the group.

Prior to the workshop, and accompanying the invitation to participate, the following overview of Adelaide's accessibility at 2011 was presented by the WU together with a set of potential planning questions prepared by the team with the aim of stimulating the discussion.

Key findings from the SNAMUTS analysis:

- Adelaide has the highest proportion of network coverage (residents and jobs within walking distance to public transport) at a minimum service frequency standard of 30 minutes (weekday inter-peak in conjunction with 7-day operation) among all Australian cities.
- Adelaide provides for the highest operational input to population (vehicles or train sets in simultaneous revenue service) for all Australian cities.
- Adelaide has a CBD surface network that is second only to Melbourne among Australian cities regarding connectivity and provision for multidirectional movement (though it remains less legible due to the greater dominance of buses over trams in Adelaide).
- Adelaide's uncomplicated urban geography between the coastline and the Adelaide Hills facilitates the provision of a well-connected network across most of the urbanised area (however, low service frequencies on rail lines as well as on orbital and secondary radial bus links impact negatively its transfer friendliness).
- The modal hierarchy between trains, trams and buses remains relatively flat, and efficient task-sharing between modes of different performance (e.g. buses feeding rail) remains patchy and underdeveloped.
- The network is even more dependent on channelling movement through the CBD area than any other Australian city, resulting in the highest measure of central city network stress in Australia.

Possible issues to be investigated in a SNAMUTS workshop:

- What effect will the current upgrade and expansion plans for Adelaide's rail and tram network have on public transport accessibility in the metropolitan area?
- How can Adelaide mobilise further efficiency gains in public transport network configuration by establishing better task sharing and integration between rail and bus modes?
- How does Adelaide's public transport network need to change to enable more travel paths to be deflected from the central area and thus make room for patronage and mode share growth?
- What is the role urban intensification in non-CBD areas can play in this process (cf. TOD concept in metropolitan strategy)?

Day one of the workshop started with a presentation by the team that defined accessibility, explained the assumptions embedded in SNAMUTS, and presented the SNAMUTS indicators for Adelaide in 2011. Questions regarding the indicators were addressed during the presentation; each participant was also provided with a paper copy of the presentation, including the SNAMUTS maps and outputs. One participant questioned the process by which the SNAMUTS team selected the activity centres, and it was confirmed that the selection was based on the metropolitan strategy centres and in-person site visits to assess whether or not the level of activity was appropriate in relation to SNAMUTS assumptions. Following the presentation the team worked with the participants to develop a consensus on the existing planning problem in Adelaide. Although numerous issues for Adelaide were easily identified, the most prominent was the considerably higher level of accessibility within the Central Business District (CBD) and relatively low level of accessibility everywhere else in the city. This was seen to result from lack of integration of rail infrastructure with the well-defined and separated CBD. A question was raised as to whether this was a side effect generated by the tool, but it was confirmed that this was a key unique theme in Adelaide, not present in other Australian cities.

Step two was organised by discussing each of the indicators and exploring their suitability to the problem in Adelaide as well as their ability to identify specific issues (e.g., network composition or organisation, frequency, mode, type of land use intensity and integration with transport). No indicators were considered by the group to be inapplicable for accessibility analysis of the land allocations and the network proposed in the 30-year plan. Notably, the composite indicator output was identified by the participants as key to demonstrating the accessibility problems in Adelaide. The other indicators were identified as an appropriate way to explore the composition of accessibility in a particular location in more detail and to define the specific reason behind the low accessibility at that location.

Step 3

Step three was organised by requesting the participants to discuss ideas for interventions in Adelaide in conjunction with those already set out by the 30-year plan. The participants—in particular a transport analyst from the Department for Transport, Planning and Infrastructure—communicated a number of ideas for transport intervention and expanded on those indicated within the 30-year plan where specific interventions were not listed in detail.

Step 4

The final step of evaluating the interventions was carried out on day two. First a presentation of the completed interventions for Adelaide 2040 was provided for each SNAMUTS indicator, followed by a group discussion. The participants were slow to become actively engaged until their attention was captured upon viewing the third indicator—network coverage (who gets access). This is presented in a highly visual map using traffic light colours to depict accessibility across the network. This type of visual approach appeared to generate interest, and from that point onwards the discussion gained a lot of momentum. The questions asked during this process clearly indicated that the participants, after seeing the results, were convinced that this tool could be useful. Questions were focussed on clarification of the assumptions made for population and employment and definitions of ‘walkable distance to public transport’, as participants considered the outputs. Toward the end of the workshop the questions were directed toward the SNAMUTS outputs for other cities, with expressed interest in hearing best and poor practice examples.



Figure 3.2: Setting of the Adelaide workshop

Lessons on usability

During the workshop we learned that the type of people we are communicating with are keen to learn more about the instrument and to utilise the instrument in some of their workplaces as well. It was apparent that while there was a perceived policy imperative for sustainable accessibility in Adelaide, the state and local governments lacked an appropriate accessibility tool to assist them in their planning deliberations. Despite the lack of accessibility tools it was apparent that the group had a good conceptual understanding of accessibility and land use transport integration. They were quick to develop planning questions in relation to accessibility. We were made aware that several

participants had pre-prepared by reading our web-site and publications prior to attending day one. This no doubt assisted in the usability and strong participation in the session.

During the presentation it was evident that the array of indicators available had the possibility of constituting an information overload. Notably, there were no comments on the 'betweenness indicator', one of the more complex ones. This may be an indication that the participants did not understand the indicator sufficiently to question it. Our use of both presentation and handouts of slides and maps served to assist users. The application of the indicators to a place the group knew well assisted them in being able to explore and question the assumptions behind the indicators and the outputs. The summary of indicators and uses (see figure below) was clearly a useful aide memoire for participants trying to engage quickly with the different indicators—this was not only observed as valuable but also commented on by the group. While most of the group found the composite indicator as the most useful, stating that it was easy to comprehend and a great way to visually communicate the plan to the public, not all agreed. Some felt that also the individual indicators were needed to make sense of the composite indicator, thus enabling an examination of specific land use or network problems.

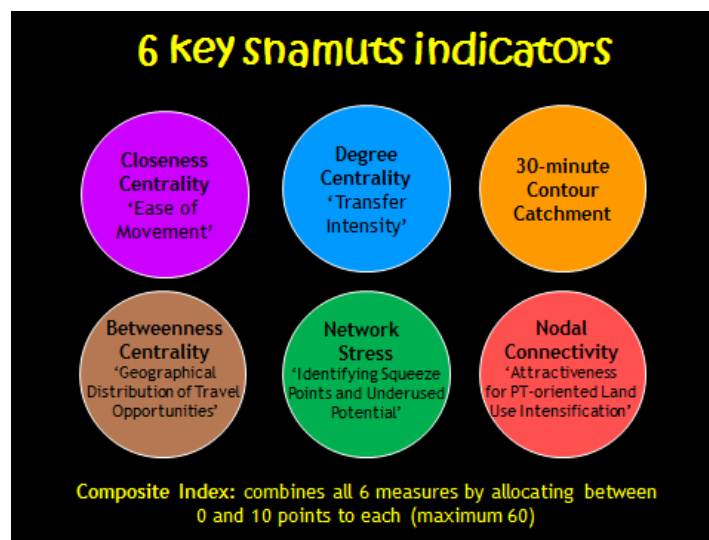


Figure 3.3: SNAMUTS Indicators

Our analysis of current accessibility and future accessibility as a result of interventions highlighted that a small change (previously un-considered by the practitioners) to the network within the central city could achieve significant improvements in metropolitan wide accessibility—in particular for some new

suburban land releases in the northwestern metropolitan fringe. In addition such a network change highlighted the potential for redevelopment of old industrial sites within the middle suburbs. Furthermore, the group commented that they had never thought that the southern side of the metropolitan area was so left out of public transport accessibility in the future. It was clear that these were new ideas to the group that caused considerable interest. We also provided the evidence base to confirm the group's understanding that some of the more peripheral urban land releases at the urban fringe would fail to achieve accessibility by public transport without substantial investment.

The usability of the tool is limited by the inability to incorporate real-time interventions to create SNAMUTS maps. Our approach confirmed that the minimum time to complete changes was 24 hours since the detailed changes to each link and node across the entire metropolitan area have to be inputted manually. Nevertheless, the outputs were quickly grasped and held in high regard by the users.

As a result of the workshop we learned that we still have more work to do in enhancing the descriptors of each indicator and our explanations for the sort of planning questions each can answer, particularly for our 'betweenness indicator'. The pre-preparation, both in terms of good intelligence on current planning issues in the city by the SNAMUTS team and the familiarisation by the participating group with our tool and applications, was critical for the success of the workshop under a tight schedule. It was also confirmed that public transport accessibility is rarely considered at the metropolitan scale beyond a simple policy aspiration. Our tool has shown potential users what sort of infrastructure and land use changes might be needed to achieve policy implementation.

3.2

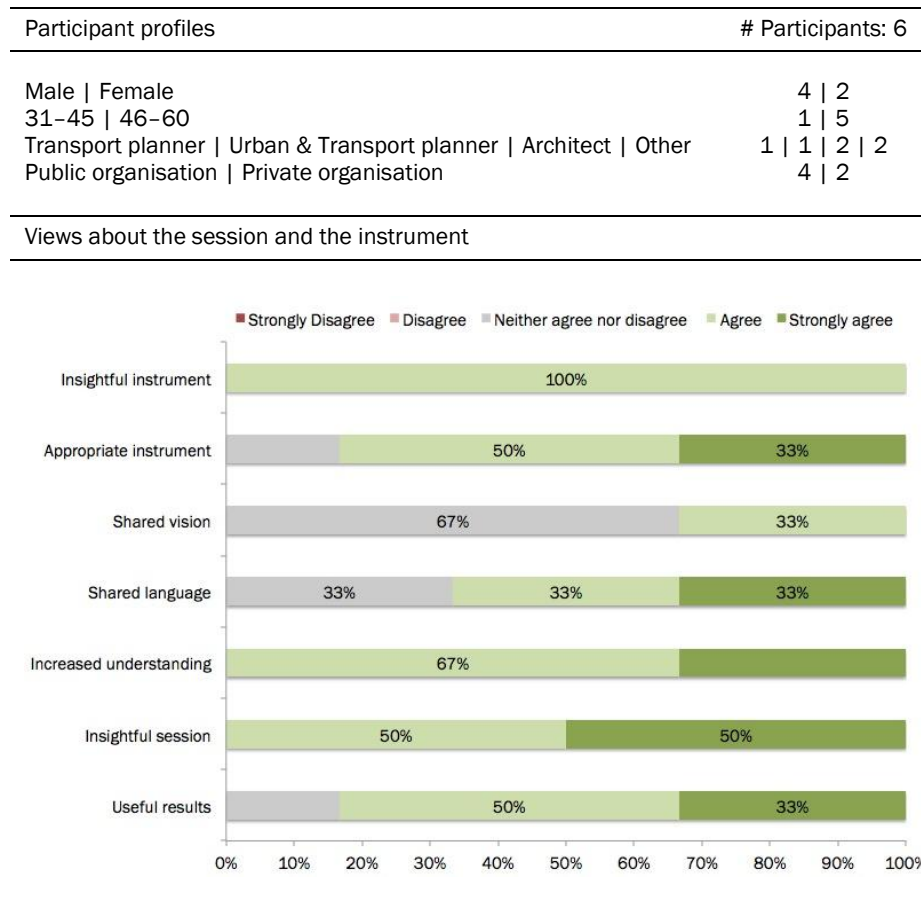
CYPRUS

SPACE SYNTAX – ASSESSING MULTIPLE URBAN DEVELOPMENTS IN LIMASSOL – FROM A TRAFFIC PLACE TO A PEOPLE PLACE

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Space Syntax

Space Syntax is both a *theory* of urban planning and design as well as a software-based *technology*. It is an evidence-based approach, which provides a spatial analysis of the aspects and structure of space, and helps to describe social activities and human behaviour from a spatial configuration perspective (Jiang et al. 2000). Space Syntax has been used to estimate the connectivity and, consequently, accessibility of architectural or urban spaces (i.e. buildings, open spaces, streets and cities) (Hillier 1996). It is also able to define movement patterns and degree of difficulty in mobility. Moreover, the tool can be used for other applications including land use distribution, criminal activity, estate prices and other spatial characteristics.

Space Syntax methodology seeks to quantitatively measure 'spatial accessibility' by analysing the movement network. This approach utilises graph theory indices of accessibility, which measure spatial separation. The key focus is to describe the spatial impedance factors that separate locations, without considering the nature of the activities separated. Also it measures accessibility from a particular location to either all other locations in the study area or to all other locations that fall within a certain distance from the location under study. All destinations are accounted as equals and land uses are not considered during the initial analysis. Three different types of distance calculation can be considered in accessibility analysis by using Space Syntax: metric (shortest), topological (fewest turns) and geometric (least angle change).

Space Syntax addresses a number of issues relevant to the formation of a land use strategy and location considerations: promotion of economic growth, revitalisation of central areas, increase of social sustainability and enhancement of cycling and pedestrian access. The instrument offers an evidence-based approach to decision-making by informing on the accessibility and walkability of an urban area, and by helping to test strategic interventions and design proposals. The value of the instrument in the planning outcome and in the decision-making process is that it gives a scientific and objective tool to test and evaluate proposals regarding spatial accessibility and pedestrian movement (as well as their effects on land use). The information that the instrument produces can be relevant for planning practitioners on several points. First, it can inform them on the constraints and opportunities of urban areas, with regard to the street network and how it can attract or deter pedestrian movement (allowing for adjustment of the land use strategy). Second, it offers insights into how the area can be optimised regarding its commercial viability, the potential for retail, the design of sustainable development, and the creation of vibrant and lively urban spaces. Third, it offers the possibility to test different strategic guidelines and design proposals.



Figure 3.4: Limassol's integration (light grey – less accessible; dark grey – easily accessible)

Setting the scene

The workshop was organised in Panos Solomonides Cultural Centre, in Limassol on 8 July 2013. The local organising committee invited a small group of seven participants to join the local workshop, in an attempt to facilitate an in-depth interface and understanding of the usability of Space Syntax by planning practitioners (as well as gather insight on ways to improve it). An attempt was made to include practitioners involved in a number of planning disciplines, in order to ensure a diverse view on the usability of the instrument, with a twofold aim:

- to invite participants involved in local planning who deal with planning issues, strategies and decision-making on a daily basis;
- to invite participants from a number of disciplinary backgrounds, in order to test the usability of Space Syntax as a professional language between the different planning disciplines.

Consequently, the invited participants included urban planners, transport planners and architects/urban designers.

The workshop

Pre-step 1

Initially, potential users were invited to participate in the workshop by email or telephone. Following acceptance, the local WU contacted each participant by telephone and/or personal visits to their place of work. During this first contact, each end user was introduced to the aims of the workshop, the accessibility instrument proposed, and was invited to complete the pre-workshop survey. The results of this survey facilitated the collection of information from each end user: their background, their familiarity with accessibility instruments and indices, the kind of accessibility-oriented question that are of interest, and their opinion on a number of issues related to accessibility instruments.

Step 1

Three weeks before the workshop, a meeting took place with most of the end users present (two end users were unable to attend and were contacted before the meeting by phone). During this first physical meeting, a discussion took place in relation to a relevant planning question to be addressed during the forthcoming workshop. The end users also discussed with the local WU the presentation of the accessibility instrument (Space Syntax) so that it can support the exploration of the planning question to be addressed.

The end users highlighted the problem of many, simultaneous and abrupt changes in the centre of Limassol, with the respective changes to accessibility due to rapid planning developments—all approved by the town planning authority of Limassol. The common concern/question raised was whether or how the cumulative impact of individual urban developments on the city's urban form in relation to accessibility could be assessed by the planning authorities before they grant approval. The urban/planning challenge at hand was the possible application of a suitable accessibility instrument to assess urban change and developments. A thorough discussion took place, which was necessary for translating this issue into accessibility terms and deciding on the appropriate presentation means. Accessibility was defined in this case as 'spatial accessibility', measured from a particular location to either all other locations in the study area or to all other locations that fall within a certain distance from the location under study (in this case the urban centre of Limassol). Space Syntax methodology will be utilised to analyse the movement network (both vehicular and non-motorised) and to quantitatively measure and describe the spatial impedance factors that separate locations (without considering the nature of the activities separated). The spatial indices derived from such an analysis reflect the extent to which a space (or node) is integrated and connected with other spaces (or nodes) in the studied area.

In order to measure accessibility in Space Syntax, the transport network and the associated lengths of the network links need to be drawn in the form of axial lines. Axial lines are lines of unhindered movement used in measuring accessibility, and they are defined as the least number of longest straight lines. This is illustrated with a connectivity graph where axial lines are represented as nodes and line intersections as links. The results are then presented in the form of maps (in several scales of colours showing different ranges of accessibility values) and in tables with relevant numbers.

All participants agreed that ongoing redevelopments in the centre of Limassol could then be analysed; a forecast could be attempted regarding the way the city will react to them in terms of accessibility; and consideration could be given to the authorities' rationale for approving the developments.

Step 2

During the actual workshop day, the local WU presented to the participants maps and tables with the current syntactical characteristics of Limassol city centre, assessing its spatial properties, the way this urban form is functioning and the problems it currently faces. In other words, the current accessibility situation was represented and explained to the end users in an attempt to create a shared understanding and to facilitate discussion and decisions on future urban interventions. The maps presented in several scales of colour facilitated a relatively 'easy' understanding of the accessibility problems under study. All workshop participants understood the representations in the form of maps; most had a difficulty to understand them in the form of tables and numbers. The local WU thus focused on providing representations utilising axial maps rather than tables and statistical measures.

Step 3

Following the assessment and analysis of the existing accessibility situation, a plenary discussion took place in relation to new urban developments, either ongoing, or proposed and already approved by the planning authorities. Since most of the participants were involved in these planning decisions, they were familiar with these proposals and welcomed the opportunity to forecast/assess their possible impact on the city's urban form in terms of spatial accessibility. The plans of three important proposed developments were presented in the forms of both printed maps and digital projected images, and were overlaid on the map presented in step 2 (existing accessibility situation). Ongoing redevelopments were then analysed, and the effects of the planning interventions on spatial accessibility were presented. The analysis revealed that the cumulative impact of new and/or proposed developments caused improvement of local accessibility, but despite this slight increase in connectivity increased slightly global integration decreased. As a result, the system as a whole became even less accessible by cars and pedestrian visitors. These observations—shared and understood by all participants—further highlighted a) the potential of the accessibility instrument to serve as an impact assessment tool, which can enhance understanding of the accessibility dimension of different planning alternatives; and b) the necessity an analytical framework to support planning decisions. The spatial accessibility analysis facilitated an understanding of the initial question/problem dilemma: Did the local authorities consider the existing situation and the developments cumulatively in terms of whether they would have a beneficial impact on the urban configuration? or Did they only considered how each development would perform individually within its own boundaries, regardless of the impact on the

existing city, the interaction with other areas (hence disregarding a holistic view of the impact of their planning decisions)?

Sep 4

Land use maps were also presented after the spatial analysis in order to facilitate understanding of the possible relations between the spatial characteristics of locations (in terms of axial lines/spatial accessibility) and activities. Participants proposed possible alternatives to overcoming the problem that each new/proposed development was shown to function as a separate entity, despite a token attempt to connect the old port and the marina through a small pedestrian bridge. All participants agreed on the opportunity to use the redevelopment in the Limassol marina to improve the linkages between the centre and the promenade. Despite many connections, they are separated by a major vehicular road, and the pedestrian crossings are not aligned with the streets perpendicular to the promenade. The segment analysis clearly showed that, despite the vicinity of the promenade to the local integration core, it is disconnected from the town centre and remains so after the developments. The participants, thus, proposed perpendicular connections or crossings aligned with the vertical streets between the promenade and the city centre, in an attempt to improve 'local to global' accessibility. The proposed interventions by the end users revealed that they understood the changes in accessibility that resulted from the changes in the urban form.



Figure 3.5: Setting of the workshop in Limassol

Lessons on usability

The workshop provided a valuable experience to the participants. The local WU had the opportunity to reflect on the usability of the accessibility instrument and its potential to support planning decision-making in practice. At the same time, it gave the opportunity to local stakeholders involved in planning decisions to experiment with accessibility instruments and understand how such instruments can help them in their daily planning work. These tools can

meet the need for evidence-based guidance in dealing with the complexity of the spatial, social and political context as well as the potential long-term cost of incorrect planning decisions.

Space Syntax methodology proved to be a valuable and user-friendly tool for quickly assessing the impact of multiple developments with overlapping timescales in real time, which is valuable in all cases where fast redevelopment is occurring at different scales and time. However, in order to develop a strategic master planning system, the application of the tool should be enhanced by close consultation with relevant stakeholders, in order to compare and enhance the results of the analysis. Possible interpretations of spatial phenomena need to take into account additional information that is not readily available through configurational analysis alone.

The whole process highlighted the difficulty of performing such a task. First, more time is needed in order to develop a shared language and understanding of accessibility terms, since participants with different backgrounds have different understandings of accessibility terms. Second, an effective interface between different stakeholders may be difficult to establish, since objectives in urban development differ and sometimes there is conflict between different stakeholder groups. Third, appropriate knowledge and tools are needed in order to be able to analyse and assess urban developments, including enhancing the understanding of relevant stakeholders of the impact of the changes to the spatial configuration and accessibility of a city, which is necessary for informed, constructive urban development.

3.3

FINLAND

HIMMELI FOR COMPREHENSIVE TRANSPORT PLANNING AND DEVELOPMENT PLANNING

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Raine Mäntysalo** and Simo Syrman**

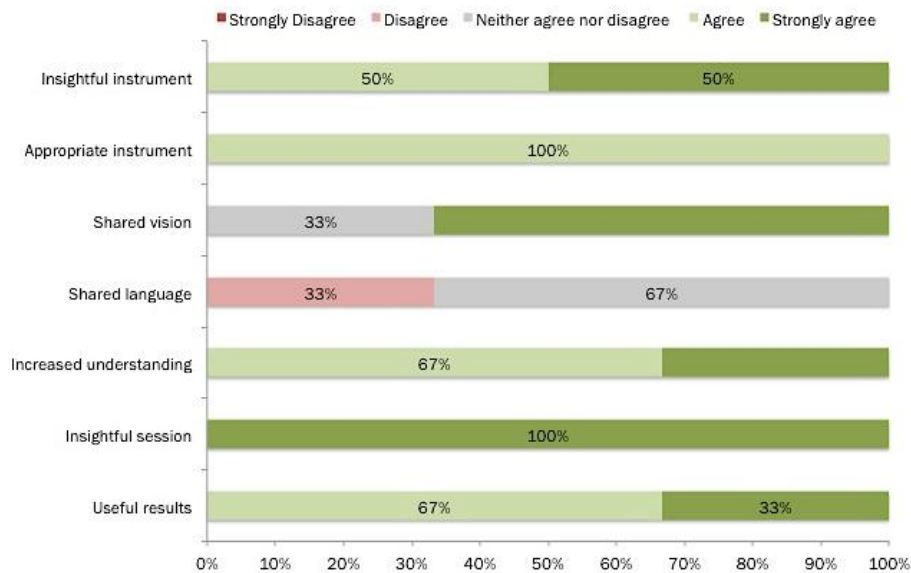
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Participants' profile	# Participants: 3
Male Female	2 1
31–45 46–60	1 2
Transport planner Urban planner	2 1
Public organisation	3
Views about the session and the instrument	



HIMMELI

The focus of the modelling tool is to observe how transportation infrastructure-based accessibility factors influence the spatial organisation of retail units, and how this process can be simulated by using agent-based modelling methodologies. The model emphasises the spatial aspects of the self-organising phenomena, particularly the accumulation of the effects of accessibility factors through manifold mechanisms on locations of retail services. These assessments are related to the network city theory, with the following overall model structure. The simulation model comprises all three level elements of a concept of network urbanism, as developed by Gabriel Dupuy (1991): infrastructural networks, networks of production and consumption, and agent level networks. However, these elements are reduced in the retail model; with households (as level three operators) creating the connections between the operators on level two by forming their spatial territories.

The model consists of two major modules: an initialisation module and a simulation module. The initialisation module includes all functions that read all the input data for the model. The input data includes information concerning households, retail services and transportation system. The actual processing of the data then happens in the simulation module, which runs the given number of simulation cycles.

The model increases the knowledge about the relationship of retail dynamics and the structural properties of the urban physical environment (e.g. transportation networks). The simulations produce a series of different development paths of spatial self-organisation of retail units. These development paths can reveal the phase transitions that are related to the boundary conditions defined in the model. The model enables the observation of factors behind the location choice that take into account consumers' shopping strategies as related to the urban structure. Thus, it enables observation of how the distribution of retail units emerges from individual agents' decisions, which are based on several accessibility measures.

The model also helps the assessment of planning scenarios (e.g. how new road alignments or new residential growth affect service locations). Generally, the tool helps planners approach their task of steering development as a process, instead of attempting to define the end result without knowing the process.

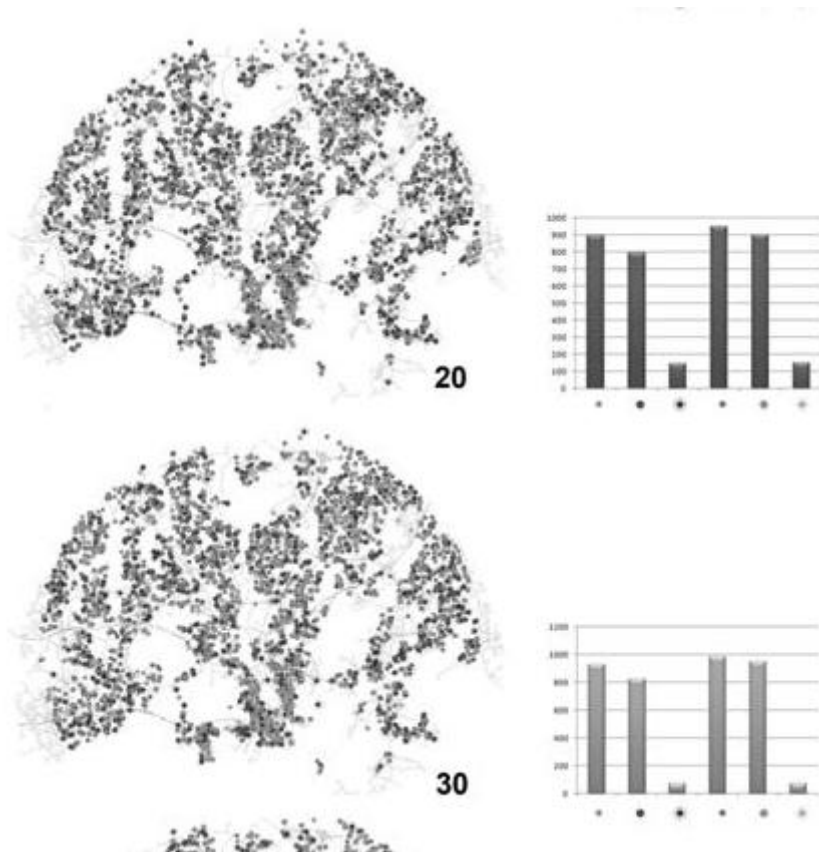


Figure 3.6: Part of HIMMELI output as transferred to print (the actual output is an animation)

Setting the scene

The participants came from very different positions: a senior project manager, a senior academically inclined consultant and a young transport planner. Two planned participants were absent from the workshop: a consultant dealing with accessibility/mobility planning for several planning institutions, and a planner who utilises an accessibility instrument in region-integrated LUT planning.

As an unintended consequence of the absences, the participants had little experience in accessibility planning per se, but some in mobility planning/transport modelling and GIS-based land use planning. Therefore, the concept was novel but the approach and visualisations relatively easy to comprehend. Nevertheless, they were not familiar with the actual instruments.

Considering the developmental stage of the main instrument (experimental, with limited capacity to adjust the instrument to address new planning issues),

the team chose not to define a planning problem, but to discuss the use of accessibility instruments in more general terms. This resulted in the decision to also explore other accessibility models, eventually deciding to present MCA. The composition of the workshop followed this logic: half of the participants using one or more of the accessibility instruments, while the other half had less knowledge and no use experience.

Describing the workshop

Step 1

The team chose not to define a planning problem, but to discuss the use of accessibility instruments in more general terms. The experimental nature of both the instrument and the workshop meant that not many persons were interested to spend the time and effort for a purely hypothetical planning problem (even when based on real-life issues); thus, the decision was taken to adopt a more general approach. In the region, all of the planning authorities and consultancies utilise accessibility instruments. As HIMMELI is still in its experimental phase, it was thought that getting points of view from a range of practitioners, in order to improve HIMMELI, was the best option. However, in the workshop itself, the researchers did use specific planning problems, thus providing focused information and examples to the participants.

Step 2

First, the two-day course before the workshop, when the accessibility instruments, theory and practical applications were presented, provided the participants (four out of five participated) with a prolonged introduction to the workshop discussions. Second, the workshop timetable was reorganised to enable more discussions on each participant's own practice and how various accessibility instruments and concepts relate to their daily work. In the workshop, the participants indicated that it would be possible to agree on a collective understanding if presented with a real-life planning problem; as an extension of this necessary hypothetical understanding the models were first discussed as tools; their outputs were critiqued; and the understanding of their abilities and limitations was discussed. Next, the models were discussed in relation to each participant's own current planning problems, with the other participants providing additional points of view.

Step 3

Since neither of the tools work in real time, step 3 could not be completed with full accuracy. Nevertheless, in the flow of the workshop step 3 was a seamless continuation of the previous step, in relation to the participants' planning

problem discussions. This was done through questioning and explaining the variables, parameters and underlying assumptions of the model(s). However, for the MCA tool, several intervention-type options had also been modelled for the presentation, and these provided an account of the effect of the interventions. The changes were examined by qualitatively producing the approximate results when introducing changes into the models, indicating the direction (+/-) and strength of the effects in each intervention.

Step 4

In the discussions concerning the interventions, the viability/usefulness of the interventions was approached in relation to the participants' own past experiences on how to develop such interventions without accessibility tools and with real-life problems; it was noted that the types of interventions discussed in the workshop could provide alternative knowledge and new ideas to existing practices. The evaluation was carried out in this way, thus not purely in the context of the tool(s). Strategy development was limited, mostly because the altered workshop schedule stressed the previous steps, and because, due to the absence of the accessibility experts, more time had to be used for building up step 2.

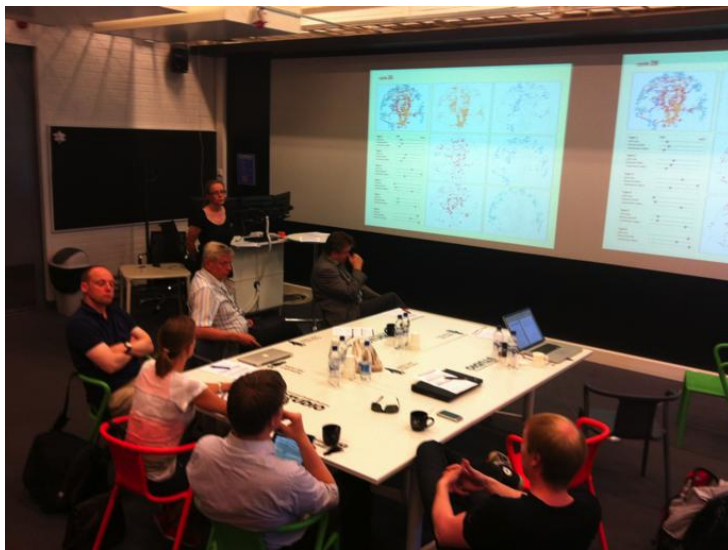


Figure 3.7: Workshop discussing HIMMELI

Lessons on usability

In addition to what this documentation shows, the general feeling was that the usability of an instrument is much more related to how creatively it is adapted

to the planning process: 1) at what stage (e.g. early, if the results provide for visions, alternative realities, etc.; on time, if the tool is geared for specific problem-solving; at crucial points, if the outcomes point at choices needed in decision-making); 2) with whom (between professionals of similar knowledge, in interdisciplinary/sectoral discussions, with decision-makers, with the public); and 3) for which purpose (common goal setting, mutual understanding, overall efficiency/optimisation, system development, problem solving, political decision-making support, public acceptance, etc.).

HIMMELI is at this point intended to be developed as a modelling experiment, to be expanded later as a strategic tool for developing ideas and visions of changes in accessibility through self-organisation. It needs a user-friendly interface to reach broad usability. Nevertheless, the basic idea was well received in the workshop because its agent-based dynamic and self-organising method, which connects with and illustrates the explanatory power of the network urbanism model, provide a novel view into accessibility issues.

Real-time capabilities are limited at the moment; while improvements could be made, the investments in computing power would have to be substantial. However, the instrument is not intended as a play-tool in real-time situations, but as an expert tool for understanding how self-organising principles form different development paths in relation to changes in underlying assumptions and conditions (real-life). It is useful for producing knowledge concerning the feedback loops and causal relations between changes in infrastructural or other attributes and the reactions or the behaviour of urban actors (from individuals to institutions).

In the workshop, several suggestions were made, including the development of a user-friendlier interface that would provide slider-like controls for changing (and visualising) the parameters and boundary conditions.

References

- Dupuy, G. 1991. Les Réseaux pour un Nouvel Urbanisme: Éléments de Théorie, in Dupuy, G: *L'Urbanisme des Réseaux: Théories et Méthodes*, 107–126G. Paris: Armand-Colin.

3.4

EMM ACCESSIBILITY ATLAS FOR INCREASING HOUSING DEMAND

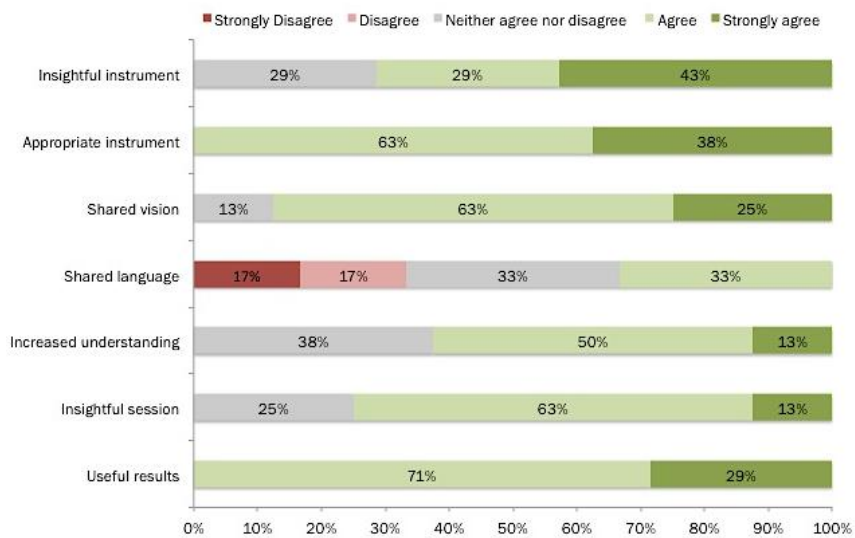
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Participants' profile	# Participants: 8
Male Female	6 2
<30 31–45 46–60	2 1 5
Transport planner Urban planner Urban & Transport planner Regional planner Geographer	3 1 1 2 1
Public organisation	8
Views about the session and the instrument	



EMM Accessibility Atlas

This multimodal GIS instrument offers a wide range of thematic analyses on different scales within the Munich Metropolitan Region. Hence, the EMM Accessibility Atlas is capable of analysing the accessibility to public transportation stops by network-based isochrones of non-motorised modes of transport on a district level as well as calculating gravity-based accessibility indicators, e.g. number of potential customers (inhabitants) within private car range of a regional shopping centre.

New structural and network data can easily be included and modified; thus, multiple planning issues of varying spatial dimensions can be tackled with the help of this instrument.

Good and transparent visualisation provides a proper platform for interdisciplinary discussion. The maps produced by the EMM Accessibility Atlas are included in regional policy and strategy papers as well as in reports about mobility costs, climate protection and spatial development. An online web tool contains the basic functions and data, which is publicly accessible and free of charge. Individual calculations regarding public transportation and car accessibility can be performed within the Munich Metropolitan Region.

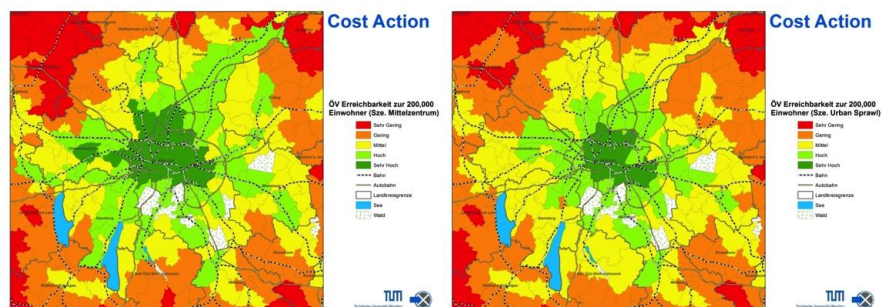


Figure 3.8: Typical EMM maps

Setting the scene

The Munich Metropolitan Region is known for its active and open exchange of ideas concerning transport and land use planning within different initiatives and forums. Correspondingly, an interdisciplinary group has been chosen to participate in the workshop. Eight practitioners working in the fields of transport planning, land use planning, regional planning, public transportation as well as governance gathered to talk about the increasing housing demand and its consequences within the Munich Metropolitan Region.

They had varied knowledge and experience with using accessibility indicators. Most of them were already familiar with the EMM Accessibility Atlas, and some were even in charge of the Munich transport model. On the other hand, others did not have any experience with accessibility indicators. Hence, it was important to explain the accessibility indicators and the analysis used, so that everyone could participate in the discussion.

Describing the workshop

Step 1

The planning problem was discussed and defined in a meeting in October, three months before the second workshop. The practitioners were asked to name regional planning issues that could be analysed by the EMM Accessibility Atlas. A wide range of different problems and topics on different scales were debated. However, after a fruitful discussion, the growing housing demand turned out to be the most significant issue in the Munich Metropolitan Region. Through a brief presentation of the previous work done with the accessibility instrument, the practitioners got familiarised with the accessibility indicators used and which ones would be needed for their specific planning problem.

Step 2

Due to the split of step 1 and steps 2 & 3 into two meetings, the maps concerning the planning problem could be produced beforehand. In the course of the second meeting the maps of the current accessibility situation regarding housing were briefly presented to the practitioners. Through a discussion the attendees developed a collective understanding of the instrument as well as of the data and accessibility indicators.



Figure 3.9: Participants at the Munich workshop

Step 3

With the aid of the maps of the current status that were distributed, the practitioners discussed several options for allocating the needed housing supply among municipalities and locations within the region. The impacts of the suggested allocations were also examined during the exchange of ideas.



Figure 3.10: Participant using EMM map to clarify a point

Step 4

The prepared maps that contained three different scenarios in line with the suggested interventions were presented to the experts in the room. A lively discussion on the consequences took place. By taking into account the impacts on accessibility shown in the intervention maps, strategies concerning proper allocation were debated and written down on a flipchart.

Lessons on usability

The needs of the stakeholders in the room need to be carefully considered. The progress and speed of the workshop also depends on the profession and the land use and transport knowledge of each attendee. For the success of the workshop, it is crucial to explain the instrument or map in detail, so every stakeholder is fully aware of the data used and type of analyses. The objective is to give everyone the same level of information, so that the stakeholders will feel comfortable sharing their viewpoints. If the discussion gets stuck, strong moderation skills are needed to facilitate an exchange of opinions.

During the workshop it became clear that the EMM Accessibility Atlas is a very good instrument to visualise transport and land use development as well as

highlight the impact of structural changes and policies. Furthermore, the instrument turned out to be a suitable basis for facilitating discussions between experts and decision-makers from different disciplines. It was observed that the accessibility maps inspired planners to develop strategies for the future of land use and transport. However, the selected accessibility tool should be easily understandable for all participants, so that not too much time is spent on explaining the examples. It became clear that the number of maps and examples prepared in advance for the workshop was too high. Once the tool is being used, the complexity has to be reduced. One interactive map on public transport accessibility to jobs would have been enough.

It turned out that a dynamic accessibility instrument would be very helpful and handy to scan and evaluate the intervention strategies and policies that have been developed during the workshop. Preparing analysis and maps for the suggested intervention strategies takes some time and needs to be based on assumptions, because unforeseen suggestions cannot be modelled during the workshop itself.

3.5

GREECE

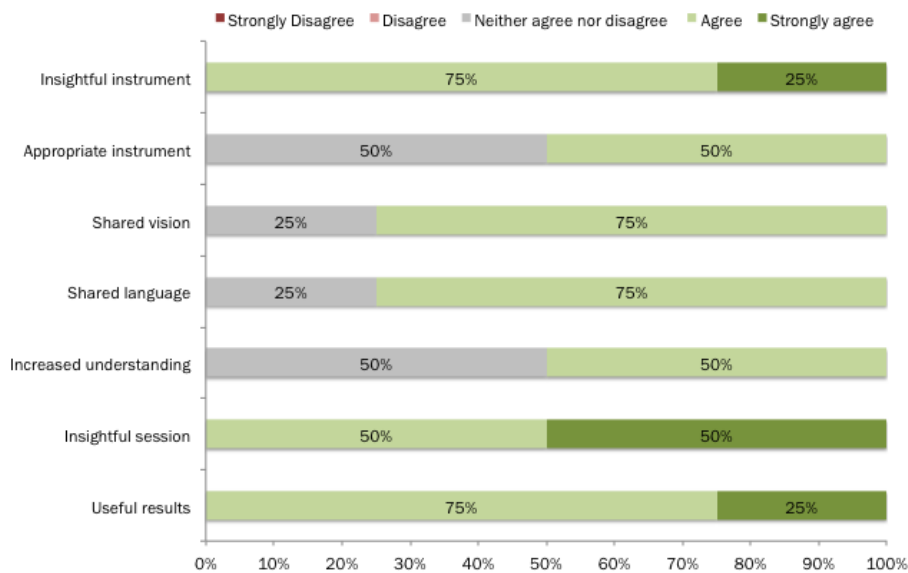
SPACE SYNTAX–EVALUATING SPATIAL ACCESSIBILITY OF THE CITY OF VOLOS

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Participants' profile	# Participants: 4
Male Female	3 1
31–45 46–60	3 1
Transport planner Urban planner Surveying Engineer	1 2 1
Public organisation Private organisation	2 1
Views about the session and the instrument	



Space Syntax – angular segment analysis by metric distance

The instrument used is Angular Segment Analysis (Hillier and Iida 2005; Charalambous and Mavridou 2012). It belongs to the wider theoretical and methodological field of Space Syntax, developed originally in the Space Lab of University College London (Hillier and Hanson 1984).

Space Syntax focuses on the role of spatial networks in shaping patterns of social and economic transaction. Through a configurational analysis of street networks, the Space Syntax methodology investigates relationships between the spatial layout and a range of social, economic and environmental phenomena (Carpenter and Peponis 2009; Chiaradia, Hillier and Schwander 2009; Legeby 2009). Research using the Space Syntax approach has shown that pedestrian movement patterns in cities are powerfully shaped by the street network (Hillier 1996; Hillier et al. 1993). Pedestrian flows are related to patterns of security, to land use development, and to the dynamics of urban life. Space Syntax methodology analyses the movement network to quantitatively measure 'spatial accessibility'. This approach utilises graph theory indices of accessibility, which measure spatial separation. The key focus is to describe the spatial impedance factors that separate locations, without considering the nature of the activities separated. Also it measures accessibility from a particular location to either all other locations in the study area or to all other locations within a certain distance from the study location.

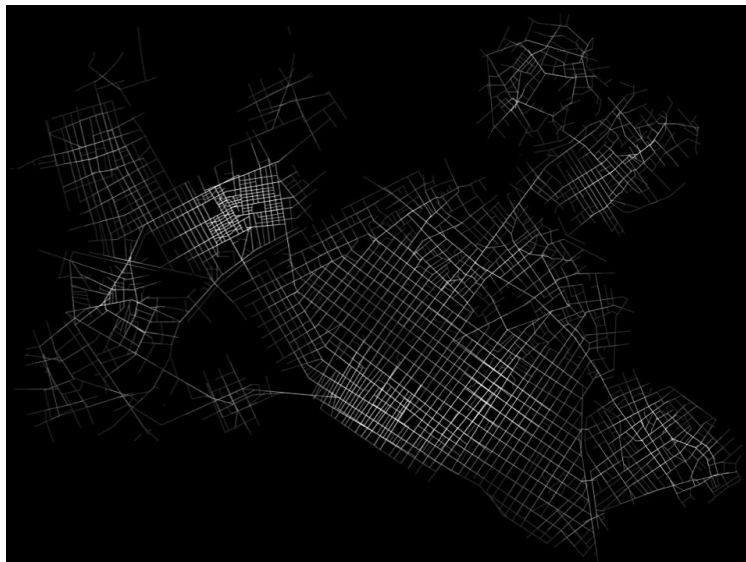


Figure 3.11: Angular segment analysis by metric distance of Volos

The instrument offers an evidence-based approach to supporting decision-making by providing information on the accessibility and walkability of an urban area and by helping to test strategic interventions and design proposals (Karimi et al. 2007). The value of the instrument in the planning outcome and in the decision-making process is that it gives a scientific and objective tool by which the proposals could be tested and evaluated regarding spatial accessibility and pedestrian movement and how these attract land use.

Describing the workshop

The workshop took place in the Volos on 19 September 2013. The city itself was the case study of the working process. We have decided to include both professionals from the municipality directly involved in planning or decision-making as well as freelance planners. We invited professionals who did not know the instrument beforehand so that all participants would have the same level of understanding of the indicators and the results. We discussed whether to include the freelance planners who are involved with the city (i.e. are working on current planning problems) and decided against this idea, in order to avoid any previous personal or professional conflicts of interest affecting the workshop process. Four professionals participated at the workshop:

- N. M. (male, 31–45 years old) a lawyer, with a master's degree in urban planning, the vice mayor who supervises the Municipal Department of Planning;
- Y. P. (male, 45–60) surveyor engineer, head of the Municipal Department of Construction and Development;
- K. K. (male, 31–45) transport planner, working at the Municipal Department of Sustainable Mobility;
- X. K. (female, 31–45) urban planner, freelance professional.

None of them had worked before with specific accessibility instruments. They deal with accessibility mainly empirically, based on personal experience and public participation methods. Some of the participants referred to the analysis of existing geometry, to distribution of population and land uses analysis.

The workshop process started with an introduction to the basic theoretical ideas and academic research findings that guided the development of the instrument. We considered this phase as an important initial step towards understanding the context and the assumptions of the instrument. Then we presented four case studies where the instrument was tested on a professional level. The first two case studies were the restoration of the central historic core of the city of Jeddah (Saudi Arabia) and the urban extension of the city to the north (2006). The third was the design of the King's Cross area in London (2001). All three projects had an urban scale and were presented on a master

plan level. The fourth was a smaller scale project of the urban redesign of Trafalgar Square in London (2001) (all projects can be consulted on the Space Syntax website, www.spacesyntax.com). Special emphasis was given to the consultation process, which had been a crucial part in all four projects and to the design ideas produced after the implementation of segment analysis.



Figure 3.12: The Volos workshop in progress

After presenting the basic theoretical ideas and the relevant case studies we moved on to explain the representational and technical aspects of segment analysis as well as the necessary input data. Special care was taken not to use special or complicated terms.

The third phase focused on the specific case study, the city of Volos. We had already completed the analysis for the whole city beforehand, and we had prepared a basic set of visual maps showing the results of the analysis. We explained the blue–red colour spectrum of visual representation of accessibility (blue for the less accessible, less integrated spaces; and red for the most accessible, most integrated ones). We took special care not to present all the possible outputs and the variety of indicators and constraints that one can introduce into the analysis process. Then, we proceeded by introducing some changes and presenting the impact they could have on the overall urban grid in terms of accessibility. The city of Volos is traversed by the Krafsonas River. The bridges that connect the two banks enable pedestrian and vehicle traffic. We showed the participants that bridging gaps through the construction of more bridges could affect the overall grid in general. Segment analysis can help us choose which bridges would maximise accessibility effects.

After the completion of the main presentation, we moved to the next step of evaluating interventions and developing strategies. We had decided not to deal with a specific urban problem (although that was our original intention) but to invite the participants to discuss what kind of current planning issues could be

dealt with angular segment analysis. This process proved to be immensely successful. The participants started immediately to examine specific projects with reference to their accessibility. The location of the new Court of Justice was the first issue put forward by the vice mayor for discussion. How accessible should this kind of facility be? Should it be equally accessible by public transport, private vehicles, and pedestrians? Should it be located somewhere centrally (higher pedestrian accessibility) or in the periphery (higher vehicle accessibility)? Are there political implications when locating such a public service in a highly accessible area? The head of the Municipal Department of Construction and Development introduced a similar problem referring to the location of the Police Headquarters. Should it be in a central area where pedestrian accessibility is high, but vehicle accessibility is constrained, or in the periphery? Are there political considerations in the centre-periphery dilemma? A more accessible location could enable protests and picketing in case of police violence, for example.

The vice mayor brought forward a third issue. The city's master plan still contains a number of streets that have not been completed due to incomplete land expropriations. How should the municipal council decide which street receives priority status? The absence of a coherent evaluation system makes the decision-making process vulnerable to political pressures. Accessibility measures, as produced by the instrument, could provide a convincing argument for choosing where to invest under current financial constraints.

Lessons on usability

Two main issues emerged during the workshop. First, information outputs should be kept to a minimum. Even though, an instrument may be able to process many different parameters, indicators, visualisations and levels of analyses, only two or three main important elements should be presented. The participants need to understand the basic concepts behind the instrument and the way it visualises the findings. Additional information complicates things, derails understanding and can potentially jeopardise the entire process.

The second issue refers to the visualisation of the outcomes, which seems to be its most important aspect—both for the success of the workshop and for the usability of the instrument. The angular segment analysis visual outputs are easy to understand, not only by professionals but also by ordinary citizens (as confirmed by participant comments). Therefore, it could be a useful and convincing tool with a broad application potential.

The use of angular segment analysis in a workshop setting seemed to be quite successful, as the tool is easy to grasp, easy to visualise and easy to experiment with. Although the real-time capabilities of the instrument are also

very satisfying (as confirmed in similar settings), they were not explored in the workshop. The participants seemed to be overloaded with information even before the real-time presentation of the tool started; therefore, we considered that it would be better not to include it in the workshop.

The participants were interested in using the instrument immediately in their work, and they started reflecting on cases where it can be used. It was very interesting that they felt that it would be suitable for persuading politicians and citizens during the public participation stages of a project. The freelance professional felt also felt that it would be useful in both testing design proposals (selection of best possible solution).

References

- Carpenter, A., and J. Peponis. 2009. Poverty and Connectivity: Crossing the tracks, in Koch, D., L. Marcus, and J. Steen. eds. *Proceedings of 7th International Space Syntax Symposium*, Stockholm.
- Chiaradia, A., B. Hillier, and C. Schwander. 2009. Spatial Economics of Crime: Spatial Design Factors and the Total Social Cost of Crime against Individuals and Property in London, in Koch, D., L. Marcus, and J. Steen. eds. *Proceedings of 7th International Space Syntax Symposium*, Stockholm.
- Legeby, A. 2009. Accessibility and Urban Life: Aspects on Social Segregation. in Koch, D., L. Marcus, and J. Steen. eds. *Proceedings of 7th International Space Syntax Symposium*, Stockholm KTH.
- Charalambous, N., and M. Mavridou. 2012. Space Syntax: Spatial Integration Accessibility and Angular Segment Analysis by Metric Distance, in Hull, A., C. Silva, and L. Bertolini. eds. *Accessibility Instruments for Planning Practice*, COST Action TU 1002, Portugal: Classica Artes Graficas SA.
- Hillier, B., and J. Hanson. 1984. *The Social Logic of Space*. Cambridge: Cambridge University Press.
- Hillier, B., A. Penn, J. Hanson, T. Grajewski, and J. Xu. 1993. Natural Movement: or configuration and attraction in urban pedestrian movement. *Environment and Planning B: Planning and Design* 20(1):29–66.
- Hillier, B. 1996. Cities as movement economies. *Urban Design International* 1(1):41–60.
- Hillier, B., and S. Iida, S. 2005. *Network and Psychological Effects in Urban Movement*, in Cohn, A., and A. Mark. eds. *COSIT 2005*, LNCS 3693, 475–490. Berlin: Springer-Verlag.
- Karimi, K., A. Amir, K. Shafiei, N. Raford, E. Abdul, J. Zhang, and M. Mavridou. 2007. Evidence-based spatial intervention for regeneration of informal settlements: the case of Jeddah central unplanned areas, in *Proceedings of 6th International Space Syntax Symposium*, Istanbul.

3.6

ITALY 1

GRAVITY-BASED ACCESSIBILITY MEASURES (GRABAM) FOR SUSTAINABLE DEVELOPMENT OF ROME'S URBAN AREA

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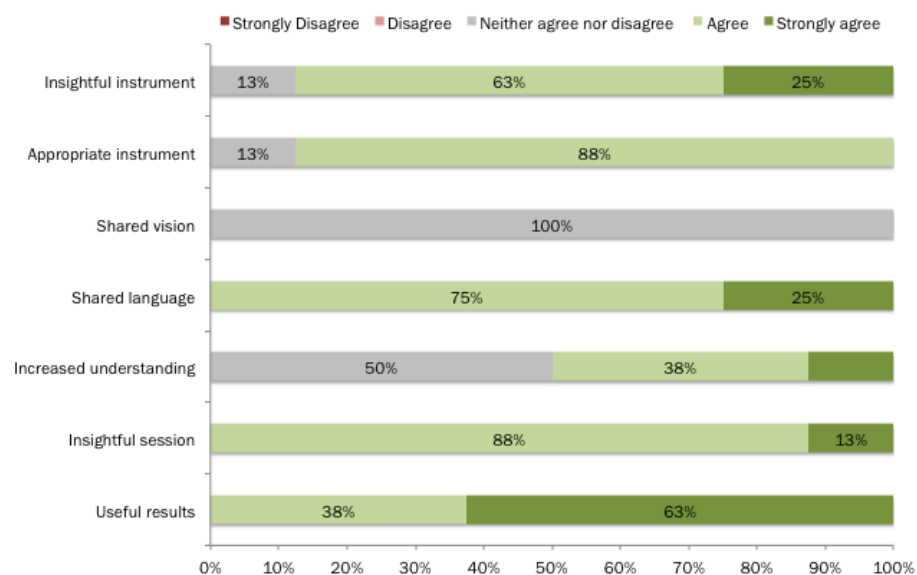
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Transport planner Urban planner Urban & Transport planner	5 2 1
Public organisation Private organisation University	4 2 2

Views about the session and the instrument



GraBAM

The accessibility instrument GraBAM (Gravity-Based Accessibility Measures) can be used to answer the following planning question: Who reaps the benefits from investments in the transport system, and where are these benefits localised? It can be applied in a variety of operational planning and public involvement activities of transport agencies. The tool can identify the interrelations between transport infrastructures (changing zonal accessibility) and the spatial distribution of the impacts on socio-economic activities. GraBAM can also assist urban planners in identifying optimal locations for new development areas. Moreover, it can also support the analysis of the real estate market dynamics. In fact, GraBAM 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 (Nuzzolo and Coppola 2005).

GraBAM is based on gravity-based accessibility measures (Hansen 1959), which are based on the spatial distribution of activities within the study area (e.g. residents and jobs) and on the travel times and costs between zones. Two different accessibility measures have been considered, 'active' and 'passive' accessibility (Cascetta 2009). The active accessibility of a given zone i is a proxy for the ease of reaching the activities and opportunities located in different zones j of the study area for a given purpose. Here we considered the active accessibility of residents towards workplaces:

$$A_{act,i} = \sum_j E_j^{\alpha_1} \cdot \exp(-\alpha_2 \cdot C_{i,j}) \quad (1)$$

$E(j)$ is the number of jobs in zone j ; $C_{i,j}$ is the generalised travel cost, derived by the weighed sum of the travel time and travel costs on different modes of transport between zone i and zone j ; α_1 and α_2 are estimated parameters (Coppola and Nuzzolo 2011).

The passive accessibility of a zone i is a proxy of the opportunity or an activity located in a given zone i to be reached from the potential users coming from all the other zones j of the study area for a given purpose. Here we considered the passive accessibility of services and commerce with respect to the residents in the study area:

$$A_{pas,i} = \sum_j Res_j^{\gamma_1} \cdot \exp(-\gamma_2 \cdot C_{j,i}) \quad (2)$$

$Res(j)$ is the number of people residing in zone j (i.e. the potential users of the economic activities in i); $C(j,i)$ is the above generalised travel cost; γ_1 and γ_2 are estimated parameters (Coppola and Nuzzolo 2011).

The feature that makes GraBAM usable for planning practice is first of all its flexibility: accessibility can be calculated for private transport and/or for public transportation system, for different trip purposes (home-to-work and home-to-other purposes), and for different aggregation of Traffic Analysis Zones (TAZ). Another characteristic of this kind of measure is that it can be easily represented using thematic maps in a GIS environment.

The tool has already been used in several applications and different contexts: in transport planning decision-making processes, in feasibility studies for transport infrastructure assessments, and for the evaluation of master plans at different scales (urban, provincial and regional). One of the latest applications is the assessment of the Transport Plan of Rome (Nuzzolo and Coppola 2008).

Setting the scene

The local workshop involved a panel of experts in the fields of Land Use and Transport planning; the goals were to evaluate LUTI policies for the sustainable development of the metropolitan area of Rome and to test the usability of the GraBAM tool (Papa and Coppola 2012).

The workshop took place in Rome in May 2013 and involved twelve participants: eight practitioners from different backgrounds and from different cities (Naples and Rome) plus four members of the WU: two as observers and two moderators. The practitioners had similar ages (30–45 years old) and professional positions. Some of them already knew each other, which produced a more informal and comfortable atmosphere and facilitated the discussion.

To guarantee 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 organise three ‘customised’ pre-workshops with selected groups of participants in Rome and Naples. The organisation of different pre-workshop was necessary because participants had dissimilar backgrounds and experiences in using accessibility in their daily practice. Some of them were not familiar at all with the use of accessibility tools, while others had used basic accessibility measures, such as isochrones and contour measures. Only the academics were already familiar with the GraBAM tool and the other accessibility-related concepts.

Moreover, the participants had a different level of knowledge. In some cases it was necessary to describe in details the case study, i.e. the transport networks and the policies adopted by the public administration of Rome.

Describing the workshop

The 4-step protocol was administered in two main stages, the customised pre-workshops and the workshop itself. During the pre-workshops we carried out the first two steps of the protocol.

The pre-workshops

Step 1

The first step aimed at creating shared understanding of accessibility concepts and a common language to define and identify sustainable planning strategies. The land use and transport system was presented with the aid of thematic maps, describing current and future socio-economic scenarios and displaying the planned interventions of the master plan. We identified and discussed with the participants the main threats and opportunities (i.e. high concentration of jobs in the city centres, unsustainable auto-oriented transportation system, urban sprawl, etc.) and asked them to suggest strategies to tackle these problems towards more sustainable urban development. The goal during this session was to translate individual thinking on the planning question into a shared accessibility language.

Step 2

In this step, the definitions of 'active' and 'passive' accessibility were given to the participants, stimulating discussions on the meanings and definitions of 'accessibility' and 'mobility'. Then, GraBAM accessibility maps were shown, focusing the attention on their potential usability in the evaluation of LUTI plans.

The pre-workshops ended with the submission of the pre-workshop questionnaires. Assisting participants in filling in the survey was very useful to get people more involved, to tackle new issues that did not emerge previously, and to clarify further questions.

From the pre-workshops to the workshop

After the pre-workshops, several strategies based on the participant's proposals were identified to achieve sustainable urban development in Rome. Most of them dealt with integrated LUTI policies, only a few, mainly proposed by transport planners, focused on transport network interventions. Such scenarios were simulated and represented with the use of accessibility maps. Since GraBAM requires computation times that were not compatible with the real-time simulation during the workshop, scenario setting and simulations runs were carried out in advance (i.e. before the workshop). In the time

between the pre-workshops and the workshop, the tool developers produced the accessibility outputs, using LUTI models and GIS.

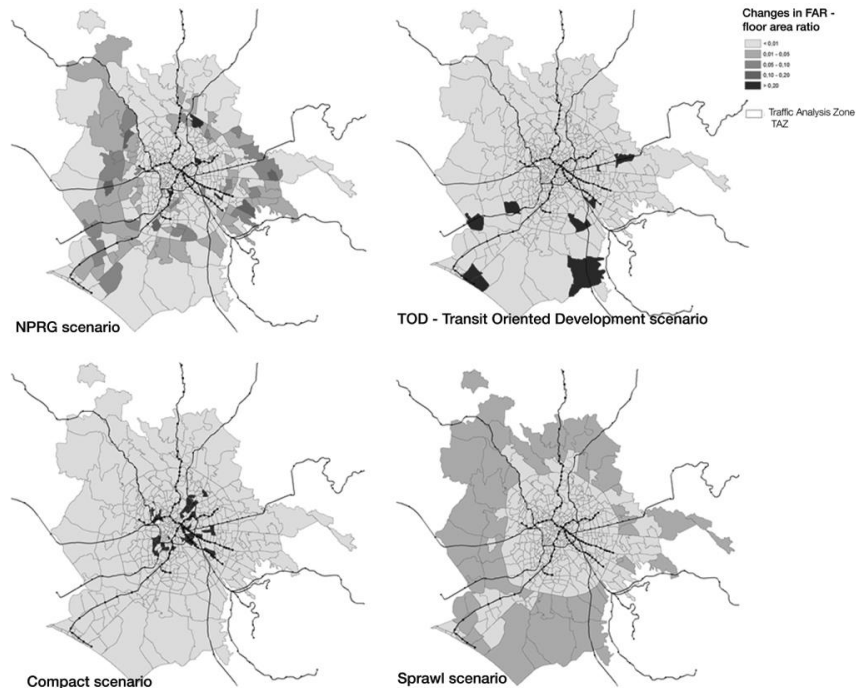


Figure 3.13: Development strategies for the urban area of Rome proposed by the participants

The workshop

The local workshop was held in Rome. After a brief presentation of the simulated scenarios, resulting from the different strategies proposed during the pre-workshops, the accessibility maps with the outcomes were displayed and discussed.

A crucial issue in this phase was how to make the presentation of accessibility sufficiently simple without losing the necessary qualities of the model simulation. Due to the large number of outputs resulting from the simulation and the different presentation options, more than 30 thematic maps were produced. So much information might lead to misunderstanding and confusion. For this reason, only a few maps were shown to get the debate going; the other maps were presented upon request by the participants.

The accessibility maps showed how the levels of accessibility were affected by the interventions on the transport and land use system (see figure below). To provide a better understanding of the outcomes, accessibility maps were compared to thematic maps of more familiar indicators, such as travel times

and distances, commonly used by the practitioners. What participants clearly understood from this comparison was that while mobility indicators focus only on the ease of movement over the network, accessibility indicators take into account both the transport network performances and the spatial distribution of activities. This concept emerged when accessibility and mobility levels of peripheral areas targeted by new development were compared.

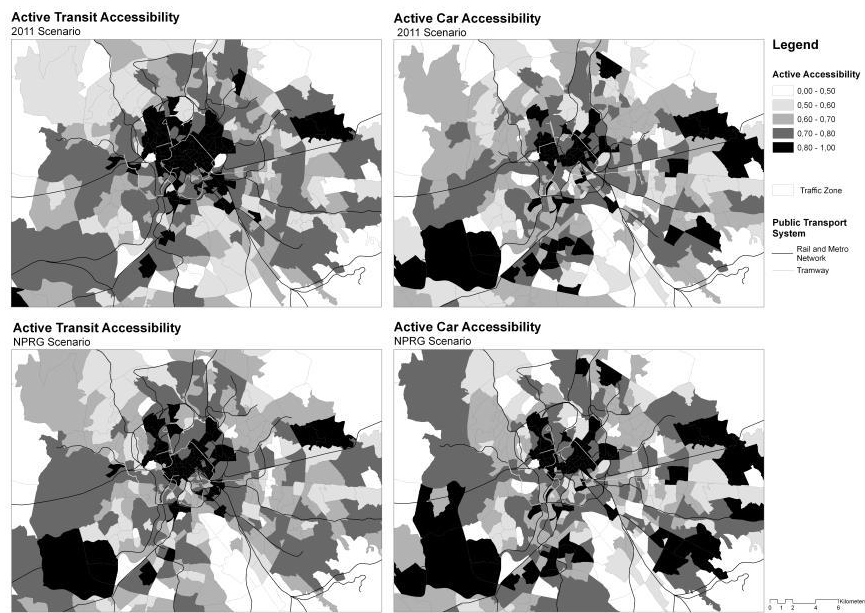


Figure 3.14: GraBAM outputs: comparing car and transit active accessibility in different scenario: 2011 scenario vs. NPRG scenario (i.e. the Master Plan of Rome)

Step 4 was held in a plenary session, during which the group of planners agreed upon a set of interventions for Rome, based on the simulation results and the maps presented. This phase was marked by a stimulating discussion on the possibility to apply the instruments in planning practice. Many participants found that the tool can offer new insights for their daily practice. Furthermore, some participants identified specific projects in which they would like to use the instrument to evaluate alternative scenarios.

Lessons on usability

Despite accessibility being acknowledged as a key concept in describing the relationships between land use and transport systems, it is still difficult to fully understand and apply it in planning practices. During the selection of the main characteristics of the study area, it became evident that different disciplines have different perception of accessibility and concepts of mobility.



Figure 3.15: Measuring, interpreting, analysing accessibility and designing integrated solutions

Although the participants were satisfied with the workshop because of the high degree of interactions with each other, in some cases transport and urban planners seemed to speak a different language: the former were more interested in issues such as modal split, while the latter in the 'relation between green areas and urban structures'.

Transport planners demonstrated stronger theoretical background knowledge of accessibility measures, asking very detailed and technical questions (e.g. 'the influence of zoning on the measure'). On the other hand, land use planners were more interested in potential application of the instrument in their daily practice. In this regard, transport planners perceive accessibility measures as complementary to other usual assessment indicators, while urban planners see the use of these measures as a new way for tackling recurring planning problems, in particular in decision-making on optimal activity locations.

While there was a general agreement on the potential of the instrument, there was still some uncertainty about its use in current practice. Transport planners, for instance, saw accessibility as 'too ambiguous' to be used for evaluating plans, while land use planners found it 'difficult to be measured'.

GraBAM proved to have good usability, but low real-time capability. In order for it to integrate a LUTI model and carry out a simulation of one or more land use-transport scenarios, it has to complete an update of the databases, run the model, and present the results in thematic maps. These operations cannot

be performed in real-time, which is an important limitation in these kinds of workshop settings. To improve the usability of the tool it would be necessary to increase its real-time interactivity. This could be done by developing a user interface for viewing, interacting and playing with the tool in real time.

References

- Cascetta, E. 2009. *Transportation System Analysis Models and Applications*. Berlin: Springer.
- Coppola, P., and A. Nuzzolo. 2011. Changing accessibility, dwelling price and the spatial distribution of socioeconomic activities. *Research in Transportation Economics* 31:63–71.
- Nuzzolo, A., and P. Coppola. 2008. Infrastrutture di trasporto e assetto territoriale nell'area metropolitana di Roma, in Marescotti, and Mussone eds. 'Grandi infrastrutture per la mobilità di trasporto e sistemi metropolitani: Milano, Roma e Napoli': 29–53. Milano: Libreria Clup.
- Hansen, W. 1959. How Accessibility shapes land use. *Journal of American Institute of Planners* 25(2): 73-76
- Nuzzolo, A., and P. Coppola. 2005. STIT.: a system of mathematical models for the simulation of land-use and transport interactions. Proceedings of the European Transportation Conference Strasbourg (France). AET associates.
- Papa, E., and P. Coppola. 2012. Gravity-Based Accessibility measures for Integrated Transport-land Use Planning (GraBAM), in Angela H., S. Cecilia and L. Bertolini eds. *Accessibility Instruments for Planning Practice*: 117–124. COST Office.

3.7

ITALY 2

INVITO FOR MEASURING ACCESSIBILITY OF NEW DEVELOPMENT AREAS IN NORTHERN TURIN

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Male | Female

5 | 2

46–60 | >60

5 | 2

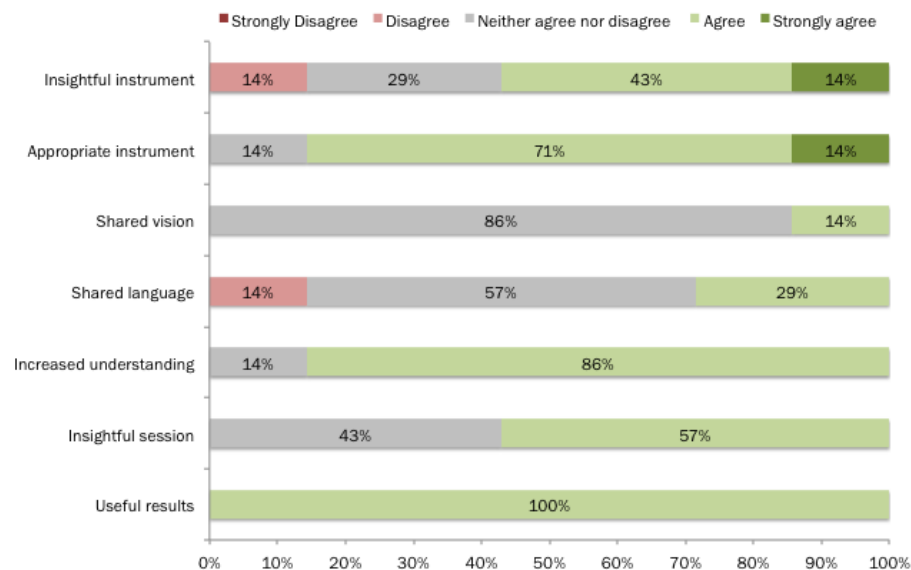
Transport planner | Urban planner | Architect

3 | 2 | 2

Public organisation | Private organisation

5 | 2

Views about the session and the instrument



InViTo

The Interactive Visualisation Tool (InViTo) is a decision-support instrument that uses visualisation in real time to explore geo-referenced databases, in order to assist decision-makers in understanding the spatial effect of their choices. It invites users to configure various indicators to define planning choices and generate new spatial maps. The output maps are displayed in real time, so that users can easily comprehend the connections between their choices and the corresponding spatial effects. Furthermore, these outcomes can be combined with a versatile range of two- and three-dimensional visualisations, which can be again modified through interaction with users.

The instrument tested during the workshop is a new web-based version (InViTo 2.0), developed with the free Google API (Application Programming Interface). This web platform makes it user-friendlier and more intuitive compared to the previous version. It increases, as requested by users, the freedom of the individual users in choosing the spatial elements to be analysed. For example, users can choose to analyse only a transport mode or can modify the importance (weight) of a railway station. At the same time, it is more flexible in managing GIS data and improves interactive features, as users can now individually decide the setting of spatial parameters. It is also compatible with various data collection methods and multi-criteria analysis.

The purpose of the instrument is not to compete with other instruments based on GIS or transport models, but to collect and synthesize different elements in order to create maps based on the concept of accessibility. In particular, it aims at facilitating the discussion and the acquisition of information during decision-making. By calculating different scenarios, the tool provides a simple visual interface for the comparison of alternative planning options.

The tool is particularly useful in decision-making processes because it displays real-time data (collected during the discussion) and visualises the effect of the participants' choices—thus facilitating the discussion and the exchange of information among the participants. InViTo allows for the creation of a common mental model through visual communication. In fact, it shares information in the common language of maps, thus overcoming the difficulties linked to the different levels of technical skills among decision-makers.

Setting the scene

The local workshop carried out by the WU took place in Turin on 10 July 2013, with the participation of twelve land use and transport experts, supported by four members of the WU.

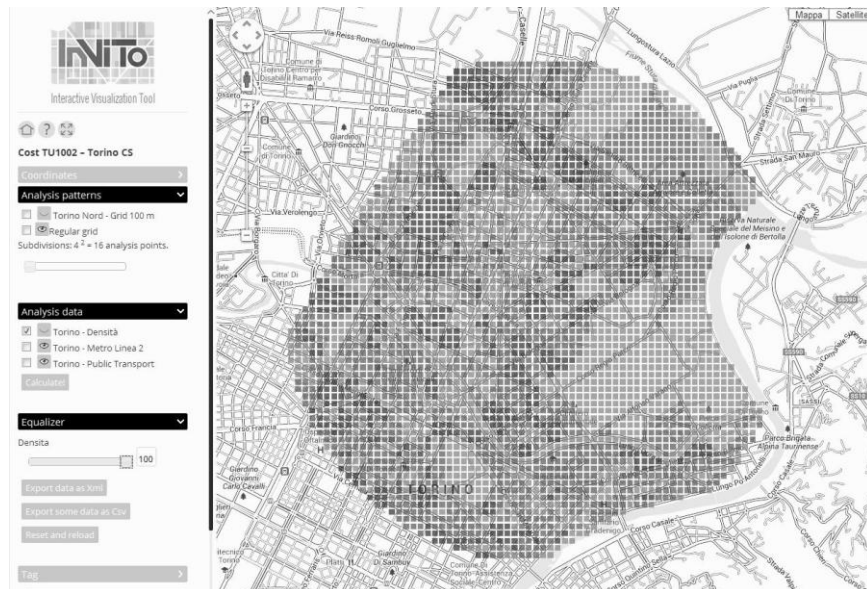


Figure 3.16: screenshot of InViTo

The participants were chosen based on their background and expertise. In order to guarantee a mix of public and private practitioners, half of them were selected because of their experience in urban planning and the other half because of their experience in transport planning. The participants are all high-level practitioners, used to being involved in decision-making processes and aware of the issues considered in the workshop. As the case study selected is in the northeast area of Turin, at the border with another municipality (Settimo Torinese), both municipal administrations were invited. The expert panel consisted of the following participants:

- Enzo Corrado Bason, transport planner, Turin Metropolitan Mobility Agency;
- Antonello Camillo, Urban Planning Director, Municipality of Settimo Torinese;
- Mario Carrara, transport expert, former President of Turin Airport;
- Franco Corsico, urban planning professor, former City Planning Commissioner;
- Daniela Grognerdi, Urban Planning Executive, Municipality of Turin;
- Domenico Inaudi, transport models expert, consultant at SiTi;
- Cristina Pronello, transport planning professor and COST TUD Chair;
- Matteo Robiglio, urban planner, professor at Polytechnic University of Turin.

Prior to the workshop, only some of the participants had experience with accessibility indicators in their daily work. The participants with a

transportation background know accessibility indicators well and use them in their daily work; they were more focused on studying the issue from a mobility point of view. At the same time, urban planners were seen to be more concerned with the concept of connections and relations, but not in relation to specific numerical indicators about accessibility.

Playing with the instrument in a next-to-real-life exercise, the workshop aimed at evaluating the impact of new infrastructure (a metropolitan railway system, a new subway line, etc.) on accessibility in the northeast quadrant of Turin, with respect to the revitalisation of old industrial areas.

Describing the workshop

The idea of running the workshop on the northeast area of Turin is due to the plans and projects for revitalisation of the area, two main urban infrastructure projects in particular: the second line of the underground mobility system and the Metropolitan Railway System. These projects have a big potential impact on the urban, metropolitan and regional system. They involve transportation and urban planning problems in a large part of the metropolitan area of Turin, and thus present an interesting case study for examining accessibility issues in urban planning practice. Also, it is a hotly debated topic in Turin, engaging various—often conflicting—opinions and interests. As a multi-faceted problem, it requires the contributions of different experts and stakeholders.

To discuss the planning topic by means of accessibility terms, different scenarios have been proposed. In particular, three different routes for the second underground line have been investigated in order to understand which one could fit the accessibility needs for the entire city better.

Since the planning problem was concerned with the public transport system, the accessibility indicators used to tackle the issue were defined on the basis of public transport facilities in relation to residential areas, according to places frequented on a daily basis (i.e. schools or primary needs facilities), on a weekly basis (such as shopping malls or urban parks) and occasional basis (as leisure parks). The accessibility indicators used in the workshop were based on distance, the basis measurement of the new version of InViTo. Currently, calculations of distance are made on linear distance and not on the length of the road network because of strict use limitations by Google Maps.

The indicators work on metric distance of places of interests from public transport access points and stops, classified in buses and trams stops, urban railway stations and future possible underground stations.



Figure 3.17: The setting of the Turin workshop

During the first hour of the workshop, the WU explained the research, the planning question, the concept of accessibility used to tackle the problem, and the instrument to be used for assessing accessibility. This introduction provided for the sharing of possibilities and limitations given by the InViTo tool in calculating accessibility. The presentation of the tool prompted a discussion on the concept and measures of accessibility (defined in different ways). Most of the participants defined accessibility in terms of time, so that the distance-based setting of the new version of InViTo was seen as incomplete. This step was very useful for thinking about new methods for calculating accessibility, and the participants showed their interest in contributing to the definition of new formulas to be used in InViTo. Since InViTo does not intend to provide numerical responses and is flexible to be adjusted in different ways, the participants accepted the distance-based setting and used the tool.

In the second part of the workshop, the participants used these indicators to create, in real-time, a number of maps, which were used to support the discussion about the alternative project options. The theme of the chosen planning question generated debate on some key issues strictly connected to Turin. It demonstrated the natural dynamics of real-life decision-making processes, but also highlighted the usefulness of interactive maps in supporting or dispelling arguments. Thus, the discussion returned again to the usability of accessibility indicators, highlighting the differences in disciplinary backgrounds. Transport planners showed a strong interest in formulas and numerical values in the accessibility calculations, while urban planners focused on the resulting urban system. The discussion continued regarding the outcomes given by the accessibility analysis, the resulting maps and their impact on the planning question. In this sense, InViTo showed its effectiveness in translating individual thinking into a shared model and in providing a way to flatten the different opinions and enable a discussion.



Figure 3.18: Participant with InViTo map

Lessons on usability

InViTo proved both useful and usable during collaborative decision-making sessions. The participants expressed their satisfaction with the possibilities given by the instrument, which were seen as suitable for communication with stakeholders, policymakers and persons who are not technical experts. The Graphic User Interface (GUI) was quickly understood and implemented.

The tool was particularly successful in supporting decision-making processes, by providing a shared and common way to analyse the urban problem. The real-time capabilities of the tool proved fundamental for providing information to the participants. The ability to quickly visualise the effects of planning choices greatly improved the knowledge exchange among the participants. The concept of accessibility has been investigated and improved. Most of participants expressed interest to support the development of both the tool and the accessibility concept, measures and formulas.

Besides comments on the usability of the instrument, also useful suggestions for improving the instrument were collected:

- Prioritising public transport stops according to the number of lines and their frequency;
- Including urban quality as an element to be considered in the model;
- Integrating public transport with the bike sharing service;

- Including cost and time as parameters, seen as better indicators than distance when accessibility is measured as a generalised weighted cost on activities;
- Develop the tool on two different levels: a first level, easily understandable for anyone, in which the outcomes are already filtered by the experts; and a second level, more technical, with more detailed outputs to be used by experts.

3.8

NETHERLANDS

JOINT ACCESSIBILITY DESIGN FOR STRATEGIC URBAN DEVELOPMENT PLAN 'BRED A 2030'

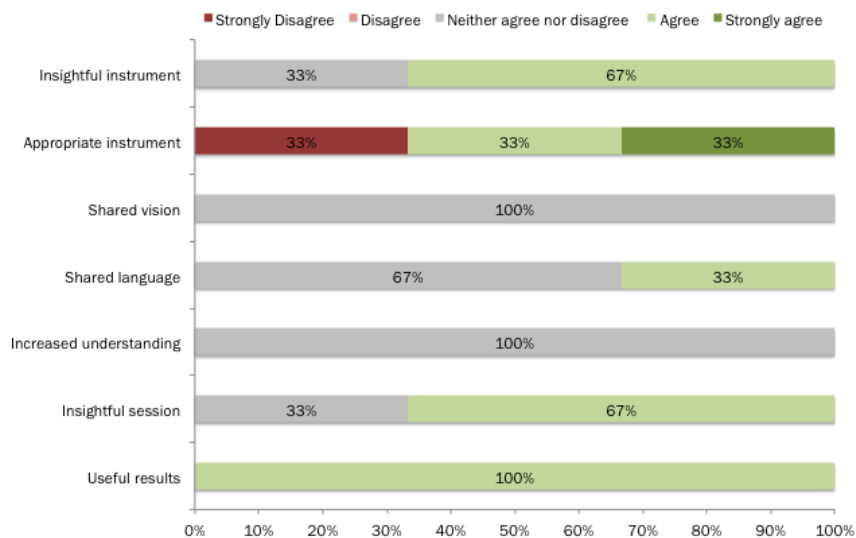
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46–60	3
Transport planner Urban planner	1 2
Public organisation	3

Views about the session and the instrument



Joint Accessibility Design

The Joint Accessibility Design framework consists of a methodology that uses accessibility mapping to enhance coherent decision-making between urban and mobility planning. Accessibility maps depict the accessibility of specific locations within a city or region, considering one or more specific modes of transportation, time of day and target group. In order to create the right maps, the framework uses four steps to guide planners in the process:

1. Translating social goals into accessibility criteria

First, the social issues to be addressed by policymakers are translated into accessibility criteria, by asking stakeholders to give a clear view on what kind of accessibility measure is important for their discipline. These include mode of transport, travel times, type of services or target groups which should be reached and times of day.

2. Assessing current quality of accessibility

The second step is the analysis of the maps of the current situation. We ask the participants what insights the maps show them. Also, we ask the participants whether the current situations or future likely situations (based on trend projections) fit with their specific policy goals.

3. Designing strategies and identifying strategic choices

The next step is to develop strategies to improve the situation in order to meet the policymakers' goals. The strategies include both spatial and infrastructural interventions, which are translated into accessibility maps, producing outputs along the same criteria as the maps from step 2.

4. Evaluate interventions on predefined goals

In a last step we evaluate the effects and further improve the strategies.

Some interesting benefits of using accessibility maps as a concept to design integrated transport and land use strategies are

- Accessibility strengthens the knowledge about the geographical distribution of opportunities and how these are influenced by interventions in the transport and land use system. It increases awareness about the development potential of locations and how well different activity patterns can be served in a particular location.
- Accessibility can lead to different transport and land use strategies, as opposed to planning processes which only do mobility impact analyses.
- Accessibility makes it easier to relate transport policies to wider societal goals. It is important to have a multidimensional perspective since

accessibility can differ quite a lot depending of the mode of transport or type of opportunities considered.

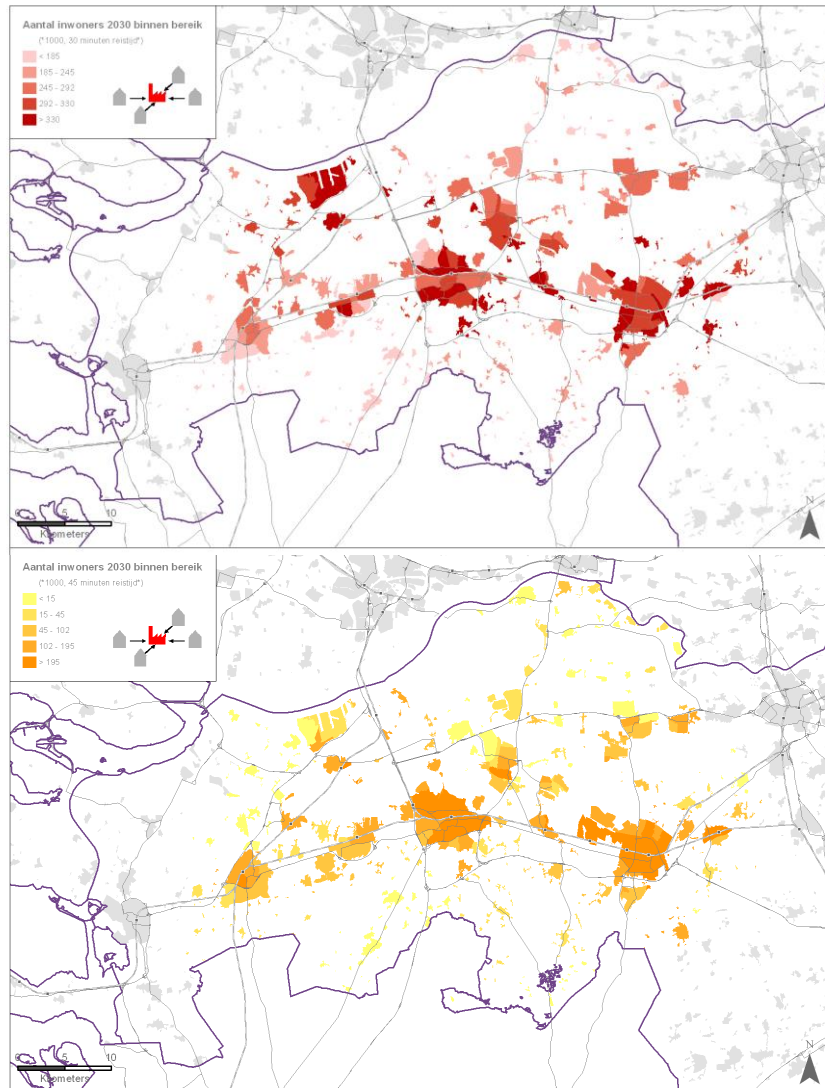


Figure 3.19: Accessibility maps used for the Strategic Urban Development Plan 'Breda 2030'

The upper map shows the number of inhabitants within 30 minutes travel time by car in peak hours towards a specific zone. The darker colours indicate that more inhabitants can reach that place within 30 minutes. Areas near highways are generally more accessible, rural areas less. Within cities, the centres are generally less accessible due to car regulations and low speed limits. The outer areas near highways have a better accessibility. The map shows both the effect

of urban density and policy regulations that discourage inner city car accessibility. The lower map shows the public transport accessibility within 45 minutes of travel time. Urban areas have better PT accessibility as can be seen. Here the ‘borrowed size’ effect is clearly seen: dense areas profit from each other’s density through better train infrastructure.

Setting the scene

We had two workshops in the Municipality of Breda, one pilot workshop (July 2012) and a second workshop (April 2013). The participants of both workshops included policymakers from the Municipality of Breda from several backgrounds, such as urban planning, transportation planning, economic development, architecture and public transport. These participants had been informed about accessibility planning in the pilot workshop. The participants were selected not only according to their background but also based on their eagerness to learn from new insights, the so-called early adopters.

The pilot workshop coincided with the start of the Strategic Urban Development Plan ‘Breda 2030’. The information deriving from the pilot workshop, therefore, could be used—and indeed was used—in making decisions on urban redevelopment. For example, Breda chose to develop the northern part of the train station area, consisting of a multimodal corridor. The maps showed this part was the most accessible (in terms of spatial accessibility).

The timing of the second workshop was not as good as the participants were busy with final preparations of the spatial plan. Also, many spatial decisions had already been made, thus usability was lower, even though the participants stated that the workshop was useful in subsequent policymaking.

Describing the workshop

Step 1

As we did not receive all pre-workshop surveys for the second workshop (due to the lack of time), we started the workshop with a quick round on defining the planning issues (*step 0*). We used the ‘Why-How-What’ model by Simon Sinek; in order to guide the participants in this phase, three questions were asked:

- Why is accessibility important for your work?
- How does this need follow the priorities of the City of Breda, specifically in your field of expertise?
- What question would you like to have answered in this workshop?

In order to guide the participants, we asked them to choose one of the following viewpoints (provided by the Municipality as relevant policy issues in the new spatial plan) on the city for policy development:

- 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 explain their planning questions:

- Type of destinations (offices, inner city, educational areas, housing, etc.);
- Target groups (business, logistics, students, elderly, tourists, etc.);
- Travel time (20, 30, 45 minutes);
- Means of transport (car, cycling, public transport, walking, train, etc.).

We collected the individual answers and clustered these according to the corresponding themes: (1) urban diversification, which included differentiation in accessibility environments (multimodal/high access vs. slow mobility/low access); and (2) regional economic accessibility, which serves the economic sectors of Breda that are operating on a interregional geographical level.

A third planning question was defined before the workshop and focused on the regional accessibility of Breda by public transport after completing the (not yet planned) railway line between Breda and Utrecht. We pre-calculated the accessibility effects of this railway on regional accessibility (45 minutes travel time) for both the total population and the working population (aged 20–65).

Step 2

We continued the workshop by collectively explaining the concept of accessibility mapping and showing a few pre-fixed maps on a screen. This 'collective learning' gave all participants an equal level of knowledge on both the concept ('What do I see on the screen?') and the content ('What does it mean for my city?'). Also, it gives the workshop moderator the opportunity to question intermediate conclusions made by participants.

Step 3

Regarding the planning question of the new interregional railway, we were able to prepare accessibility maps by pre-calculating the effects with transport models and GIS analysis. Therefore, we could show the participants the effects collectively and discuss the implications for their specific field of expertise. Then, we divided the group into two sub-groups (3 to 4 participants), each focusing on one of the two other planning question ('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 to share with us their conclusions (i.e. 'What do you see?') and policy recommendations for infrastructure, the economy or spatial planning

(i.e. 'What would you do?'). In order to guide the participants, we asked them again to choose one point of view from the four different views on the city (living, working, education and recreation). After 30 minutes we asked each group to shortly present their findings on the lessons learned.

Step 4

As we were not able to calculate any interventions between step 3 and 4, we were not able to evaluate these. Instead, we asked the participants which lessons they had learned, both in this workshop and the preceding pilot workshop, specifically focusing on content ('Does the planning instrument correspond to your planning information needs?') and process ('What should be improved regarding the workshop?').



Figure 3.20: Pilot workshop Breda (July 2012)



Figure 3.21: 2nd Workshop Breda (April 2013)

Lessons on usability

Because we were able to hold two workshops, it is valuable to see if there were any differences between the two workshops. The following are the key lessons learned from both workshops:

The timing within the 'policymaking phase' is important.

The maps shown during the pilot workshop were actually used in order to make choices for the new spatial policy in Breda. The information provided during the second workshop (April 2013) was less valuable as the spatial decisions already had been made.

The planning question(s) should be carefully defined.

Having a clear goal on the planning questions and information needs of the participants improves the usability of the instrument. This might include specific accessibility criteria, focused on a specific group of users (economic, educational, etc.). But it should be kept simple. Each participant should be asked a basic (real-life) planning question that can be translated into criteria that the model can handle. In case of the logistical planning issue from the second workshop, it was hard to translate it into criteria useful for accessibility mapping.

Limit the number of steps within one workshop.

The development of intervention strategies consists of a creative thinking phase—which requires sufficient time. If there is not enough time for two workshops or a full-day workshop, choose between

- Working out a planning question and criteria; or
- Analysis of maps and strategy-making.

The timing of workshop is important.

The second workshop was planned on the same day when the participants were finalising the main urban policy document. This meant that they had very little time to prepare for the workshop (and fill in the surveys). It is essential to check the participants' schedules to avoid potential commitment conflicts.

Collectively analysing one or two maps enhances the process.

Before starting the strategy-making exercise, we looked at the maps as a group. This sped up the process of reaching collective understanding, both on the concept and the content of the accessibility maps. Participants tend to 'see what they want to see', which carries the risk of misinterpretation (or misuse) of the maps according to their own agendas.

3.9

POLAND

GDATI FOR PLANNING IN KRAKOW

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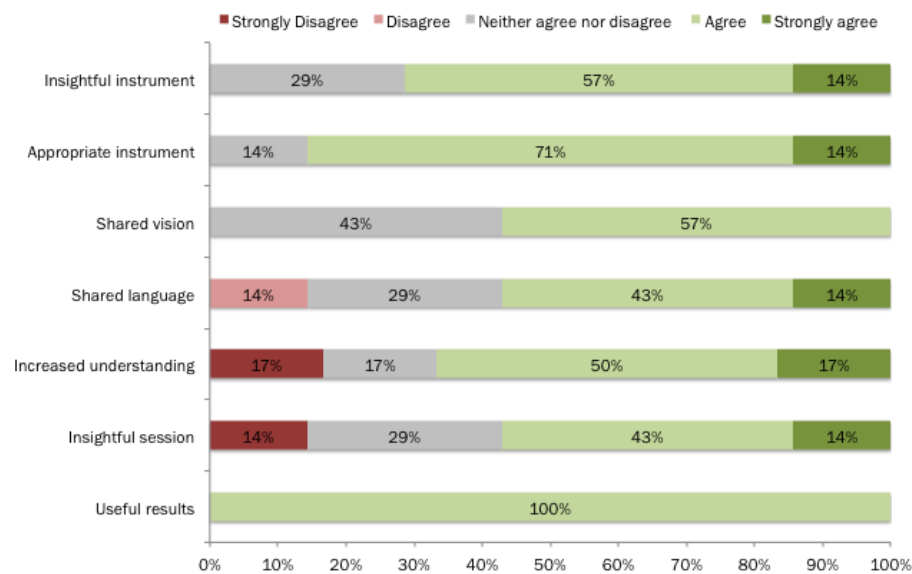
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Participants' profile

Participants: 7

Male	7
31-45 >60	5 2
Transport planner Housing developer Manager	5 1 1
Public organisation Private organisation	4 3

Views about the session and the instrument



GDATI

The Geographic/Demographic Accessibility of Transport Infrastructure GDATI instrument assesses the public transport system in relation to its features (such as number of stops, length of routes), and to the area where it operates and the number of inhabitants that should be served by this system. The accessibility measure was assessed based on the previously recorded demographic and geographic indicators of settings and public transport operation factors. In this case the accessibility of public transport systems, it is defined as a density measure, and it relates the number of stops or length of public transport routes to the area or number of inhabitants. The division of urban areas of a town into smaller sub-areas that are gathered around the elements of public transport infrastructure allows it to provide a comparison of the levels of accessibility to public transport infrastructure for different locations. In this way the GDATI instrument can point out sub-areas of low accessibility and those that are attractive in terms of accessibility.

The utility of the accessibility measure (as a density measure) has been expanded by including data that describe the levels of public transport service, such as frequency, number of bus or tram lines, etc.

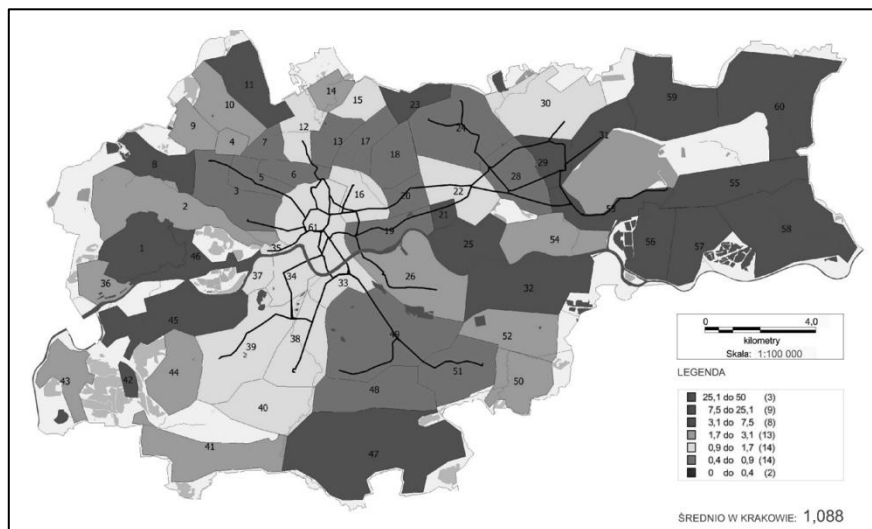


Figure 3.22: GDATI density of PT stops

The evaluation of existing public transport systems in urban areas and sub-areas provides the assessment of conditions and level of service at the given moment. In relation to planning practice, this includes not only the foreseeable investment in public transport infrastructure or current offer but also the

developments in land uses. In the areas where weak geographical and demographical accessibility is detected, policy measures should be enhanced in order to increase the level of accessibility (more PT routes, more PT stops, better PT service offer). In the areas where good accessibility is identified, the planned investments and land development may be introduced, without fearing a decrease in overall accessibility to public transport.

The GDATI instrument is based on data that describe, on the one hand, settings such as area and population, and, on the other hand, public transport infrastructure and operation details. The planned investments in land use, population changes or public transport development can be inputted in the model, thus arriving at the new level of PT accessibility.

Setting the scene

Seven practitioners were invited to the workshop. Three were representatives of the different departments of the Municipality of Krakow responsible for public transport affairs. Two were managers of housing developers companies. There was also one representative from the municipal transport operator and the manager of a private company that cooperates with the Municipality on various projects connected with the planning and designing of transport systems. The following transport and planning professionals took part in the workshop:

- Stanislaw Albricht (Laboratory for Planning and Designing of Transport Systems – ALTRANS) from a private company that cooperates with the Municipality in various projects connected with the planning and designing of transport systems and their elements;
- Kazimierz Goras (Biuro Planowania Przestrzennego, the Planning Office of the City of Krakow) from the body responsible for land use planning, strategic planning of roads and public transport;
- Adrian Obuchowicz (MPK S.A. w Krakowie) from the local public transport operator;
- Lukasz Szewczyk (Biuro Infrastruktury, the Office for Infrastructure of the City of Krakow) from the body responsible for the strategic planning of roads, public transport, infrastructure and non-motorised transport;
- Grzegorz Sapon (ZIKIT, Management of Infrastructure and Transport in Krakow) from the body responsible for the planning of transport services, organising public transport system and traffic management;
- Mariusz Bryksy (Bryksy Group) manager of the private housing developer;
- Marcin Zemanek (Convector Development) manager of the private housing developer.

Only the representatives from the housing developer companies use measures related to accessibility in their daily work. They commission analyses of pedestrian travel time to the nearest PT stop from the location of a planned housing estate. The other workshop participants do not use any accessibility measures. Their daily routines is concentrated primarily on mobility measures as well as the level of PT service and such quality features like punctuality, frequency and comfort.



Figure 3.23: Setting of Krakow workshop

Describing the workshop

Step 1

Approximately five weeks before the start of the workshop the first telephone contacts were made. Each end user was introduced to the main goals of the workshop and was asked for final confirmation of their attendance. Also they were asked for the preferred time and place of the first face-to-face meeting, when the planning questions they are interested in would be selected. Before the first face-to-face meeting the pre-workshop survey questionnaire was sent by email. Three weeks before the date of the local workshop the first physical meetings were carried out. The end users were informed about the workshop, its aims and tasks, and they had the opportunity to describe the daily/usual problems they face in their work and would like to address. All end users agreed that an accessibility instrument would be useful in their work but, up to now, they have not used any instruments to support their professional activities and their knowledge of accessibility. Also, the pre-workshop surveys were collected from all end users.

Step 2

The local workshop was held on 14 May 2013 in the City Council Hall of Krakow. The moderator of the local workshop, Prof. Wieslaw Starowicz (a MC member), greeted all participants and introduced the WU team, giving a short presentation on the COST Action and in particular on COST TU1002. He explained the idea of accessibility and emphasised the concept of the GDATI instrument, focusing on how this instrument can be used to assess PT accessibility. For the purpose of the local workshop, the area of the city of Krakow within its administrative borders was divided into 60 regions. Then, the geographical and demographical measures used in the GDATI instrument were evaluated for each of regions and visualised on GIS maps. The sets of maps and tables containing the GDATI measures were distributed among all participants. They took some time to familiarise themselves with the maps and tables, and to evaluate whether these maps and tables were understandable and provided new insight on accessibility and the sensitivity of the instrument.

Step 3

Taking into account the possibilities of the GDATI instrument, the participants were asked to formulate interventions that it could assist. Their proposals were written down on small yellow sticky notes. All sticky notes were collected, stuck on the board and divided into themes. Based on these thematic groups, two interventions were selected. The first intervention proposal was to connect the new tram route to the region of low accessibility (upgrading life quality through better accessibility to public transport). The second one was to support the decision on the new location of a housing estate (activation of new areas).

Step 4

The evaluation of the proposed interventions and strategies developed was processed right after step 3. The assisting materials (maps and data) were prepared before, as a result of the first face-to-face meetings. The participants pointed out the possible locations where additional accessibility knowledge could be useful. The proposed interventions in public transport development were placed in the area where the housing estate could be erected.

Conclusions

The participants were satisfied with the performance of the GDATI instrument and with the workshops. The GDATI instrument outputs were seen as relevant for the interventions and helpful in the development of strategies. The researchers were satisfied with the process of workshop and with the discussion and knowledge exchange among the participants. The end user

remarks provided added value for the further development of the GDATI instrument. A final observation is the unequal level of activity among participants during the discussion. It is important to engage the participants and facilitate a dynamic discussion and exchange of opinions.



Figure 3.24: Krakow participants with maps

Lessons on usability

The researchers have collected some ideas on which other data and factors should be used to strengthen the possibility of describing and assessing the public transport service level in terms of GDATI measures.

Because the GDATI instrument is interactive, it allowed for responsive adjustments according to changes proposed by the end users. However, there are many additional operational details that should be explored and integrated in the model, in order to improve the way it responds to changes.

The most important lesson to improving usability of our GDATI instrument is to include not only the number of services on each public transport line but also the capacity of vehicles carrying transport passengers on each line.

The final lesson refers to the need to connect accessibility to employees or work places in each region (not only to number of inhabitants). In the end, the workshop participants felt that it is necessary to work out one complex accessibility measure that would allow defining and assessing accessibility in every region in one common value.

3.10

PORTUGAL

SAL FOR THE EFFECTS OF IMPLEMENTING THE URBANISATION PLAN OF ALTO DO LUMIAR

Tiago Patatas, Cecilia Silva and Ana Amante

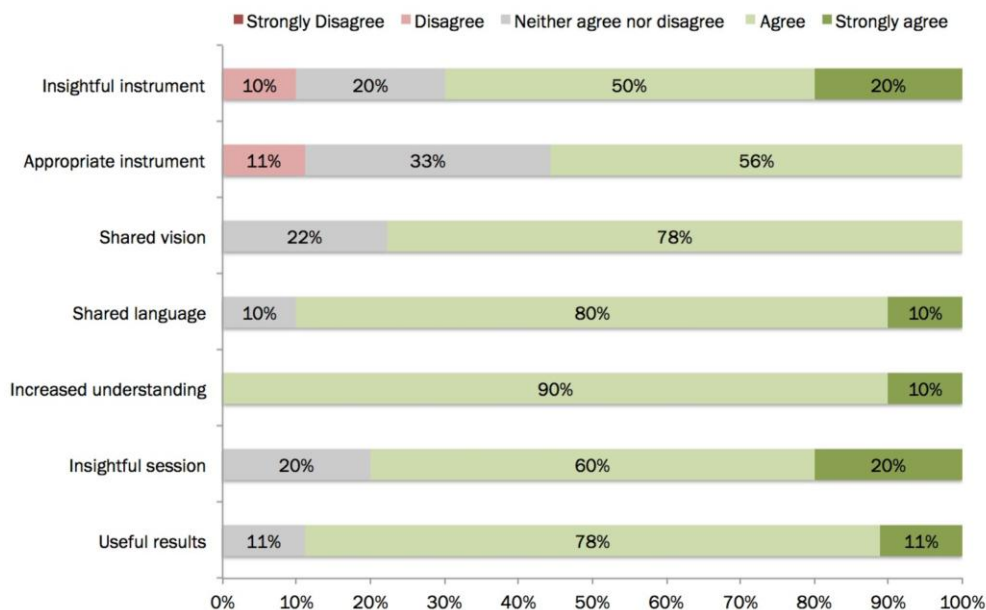
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Participants' profile	# Participants: 10
Male Female	5 5
31–45 >60	4 6
Transport planner Urban planner Architect	2 6 2
Public organisation	10
Views about the session and the instrument	



Structural Accessibility Layer (SAL)

The SAL tool is a geographical representation of comparative accessibility levels by types of transport modes to different types of opportunities generating travel. It is based on the concept of accessibility, defined as the extent to which the land use and transport systems enable individuals to reach different types of opportunities. More specifically, SAL proposes the concept of 'structural accessibility' for assessing how urban structures constrain travel choices. In other words, it provides foresight on how specific land use and transport policies enable or limit particular choices of the inhabitants.

The main outcomes of the SAL are the diversity of activity index maps for each transport mode and the cluster map (comparing accessibility levels for all transport modes). These maps identify small-scale variations in accessibility conditions across different census tracts of the study area. Diversity of activity maps provide important information on availability and service level and quality of each transport mode across the territory. This information provides insight on the spatial inequalities regarding land use and transport opportunities. Its utilisation potential is strong: in the development of public service standards for public transport; in the identification classification of the hierarchy of urban centralities; or in the definition of priorities for mixed development strategies. The cluster map provides the baseline information on potential mode choices, categorising relative competitiveness of different transport modes and, thereby, identifying areas where inhabitants clearly have no competitive alternative to personal vehicles (see figure below).

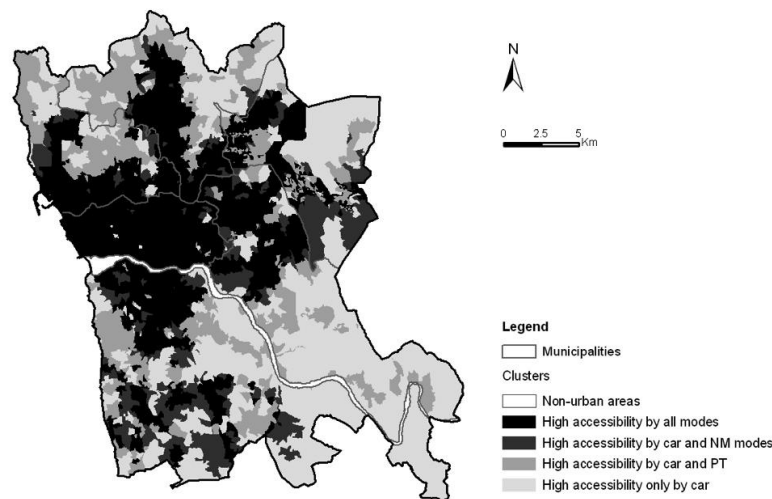


Figure 3.25: Clusters of accessibility in Greater Oporto

SAL was built with usability and the 'rigour-relevance' dilemma in mind. An important choice within the rigour-relevance dilemma is the use of a simple accessibility measures (contour measures), a tool that is easy to communicate and understand. This choice is balanced with the high disaggregation level of analysis, which enhances the understanding of the urban structure conditions but at the same time limits the simplicity of the tool. In turn, the complexity introduced by the high disaggregation level is reduced through the introduction of an aggregate measure that synthesises much of the dispersed information and provides a framework to facilitate the development of objectives and the testing of different scenarios. Finally, SAL is highly adaptable to local conditions since it leaves a large number of issues to be defined and fine-tuned locally, during the calibration of the case specific SAL. However, this adaptability and the disaggregation level of the tool are highly dependent on the availability of data, which may limit its use.

Setting the scene

The workshop was developed in the Municipality of Lisbon. The invited participants came from different departments of the respective city council. Different participants attended the two meetings. The second was attended by four staff from the Urban Rehabilitation Department; four staff from the Land Use Planning Department; and two staff from the Transportation Department. Apart from one participant, who was the head of a sub-division of the Land Use Planning Department, all the remaining attendees were approximately at the same hierarchical level, mainly working on technical planning tasks.

Among the diverse backgrounds of the ten attendees, only a few participants had previous experience with the presented accessibility perspective. The exception was the limited experience with mobility patterns concepts, especially by the Transportation Department members.

Description of the workshop

Step 1

The first step of the workshop was distributed between the first and second meetings. Due to some context-dependent restraints, the meeting's scope and planning problem as well its solution were introduced by the moderator during the first meeting. The planning issue revolved around the impact of the implementation of the Urbanisation Plan of Alto do Lumiar. The second meeting started with the presentation of the accessibility instrument and its planning problem-related features.

Many participants were also part of the team that developed the Urbanisation Plan; thus the researchers' intention was to test the individual and collective thinking on a specific accessibility perspective that was not addressed in the development of this project. This thought-provoking perspective proposed a comparison between the two scenarios, no implementation of the Urbanisation Plan vs. its full execution.

The results of two opposing scenarios were shown to the participants. On the one hand, SAL was carried out on the current situation in Lisbon. The application of SAL in this baseline scenario was particularly focused on the Lumiar parish along with its surrounding parishes. On the other hand, SAL was applied in the scenario of full implementation of the Urbanisation Plan of Alto do Lumiar. In this regard, both scales were analysed (the results at city scale and at the Lumiar-centred parish framework), with a particular focus on the latter. Numeric values were also presented, representing the gain/loss of accessibility in both scales.

The indicators presented included both sectoral and holistic approaches. The prior included the diversity of activity index by non-motorised modes; diversity of activity index by public transportation; and the diversity of activity index by car. The latter contained the accessibility clusters including non-motorised, public transportation and car. All these indicators tackled a wide range of activities/opportunities within a defined time period: 10 minutes for walking, 20 minutes for public transport and 20 minutes for car (the time limits were selected considering reasonable travel times within the inner city illustrative of local/neighbourhood accessibility levels). They were divided into six groups, including schools, leisure/entertainment, shopping, health, employment and other activities.

Step 2

The output chosen for the discussion (in the form of maps) included the diversity of activity index by non-motorised modes and the diversity of activity index by public transportation. Most participants were not familiar with this approach, except with the accessibility notions associated with mobility patterns. Indeed, methodologies of this kind were scarcely used before by the departments represented in the meetings. Hence, the presented measures were challenging for the participants to comprehend and internalise. However, after a questions and answers session, the first group discussions denoted an initial understanding of the main concepts, with some of the more informed participants clarifying the map interpretations to the others. This process continued throughout the meeting.

Steps 3 & 4

With the single workshop format, steps 3 & 4 were simplified. The participants were directly shown the expected effects of the existing Urbanisation Plan of Alto do Lumiar on accessibility levels (resorting to SAL and comparing accessibility levels before and after the interventions proposed by the plan) and asked to discuss the expected accessibility improvements brought by the plan based on the SAL results. Thus, the strategies evaluated were not developed based on the input provided by SAL (analysing the baseline situation regarding local/neighbourhood accessibility levels in Lisbon) but had been developed prior for the referred Urbanisation Plan. The sectorial analyses of the diversity of activity index by walking (within 10 minutes) and by public transportation (within 20 minutes) were the main backdrop for the debate.

Given the context of the meeting and the simplification of some of the steps in the workshop process—most notably considering that the planning problem had not been chosen by the participants and that the strategy, although chosen by them, had been defined without prior knowledge of the accessibility evaluation of the SAL—some participants were sceptical about certain issues of the walking and public transport accessibility. In fact, various methodological issues were repeatedly addressed during the meeting. In this regard, some participants questioned the assumptions of the accessibility instrument, as they did not match the main concerns of the practitioners' group (for instance, the time necessary to reach the city centre's activities with periphery parishes as the point of origin, or the frequency of public transportation). With the help of the moderator, the discussion was briefly focused on these issues, which were often clarified among the participants themselves, without intervention by the moderator.

Another interesting observation revealed that the scenarios shown through the lens of accessibility were not considered during the conceptualisation of the project in discussion. Due to this premise, the acceptance of these new ideas was severely impeded. However, as the dialogue between the participants intensified, intrinsic ideas became more permeable and the internalisation of different concepts became easier. While in the beginning of the meeting, the accessibility perspective was nearly unknown to the majority of the group, the discussions during the latter part of the meeting demonstrated a considerable shift towards understanding such notions. Furthermore, the accessibility changes based on the direct comparison between the two scenarios were debated and progressively being better understood.

Lessons on usability

Although there was an evident effort to make presentations and ideas comprehensible to the whole group (and the debate among the participants denoted an increasing understanding of the accessibility notions), there was a noticeable variation in terms of acceptance of the accessibility instrument between the participants. While the attendees with a mobility background were more willing to accept the methodologies in the scenario analysis, the remaining participants (mainly with a land use background) showed strong resistance towards the application of SAL. This disparity may be explained by the evident segregation between the departments and their respective concerns. In fact, during the focus group discussion, various participants acknowledged the lack of integration between divisions.

Accordingly, while a sizeable range of participants seemed interested in using the accessibility instrument in other projects—most notably when focusing the scenario analysis processes on the small scale and even referring the potential of the instrument as a connector between the different departments' concerns and aims—only a few participants would be actually able to use it. At the technical level, only the Mobility Department participants would have the required computational skills for an adequate implementation of SAL. In a broader perspective, the fact that the participants' concerns did not match the accessibility instrument's aim and the divergence in expressed concerns of the different parties would be the main impediment for an integrated use of the accessibility instrument. Still, it is worth stressing that the partial implementation of the protocol (namely, the distribution of step 1 between the first and second meetings, the *a priori* definition of the planning problem and solution, and the merging of steps 3 and 4) may have biased some of the standpoints, shifting the debate at times from the usability of the instrument to certain methodological issues and potentially distorting the results of the workshop.

Regarding the usability of SAL, a significant improvement would be the reduction of the processing time. Taking into account the context in study, a shorter processing period would allow for a more interactive debate and, consequently, an easier comprehension of the approached concepts. At the formal level, the major improvement of this accessibility instrument would be the development of a more user-friendly platform for its application. By avoiding the use of specific extensions of ArcGIS, a much wider range of users can be reached. At the conceptual level, a more resilient character that allows for a plainer approach may be useful for audiences with weaker knowledge of accessibility concepts.

3.11

SLOVENIA

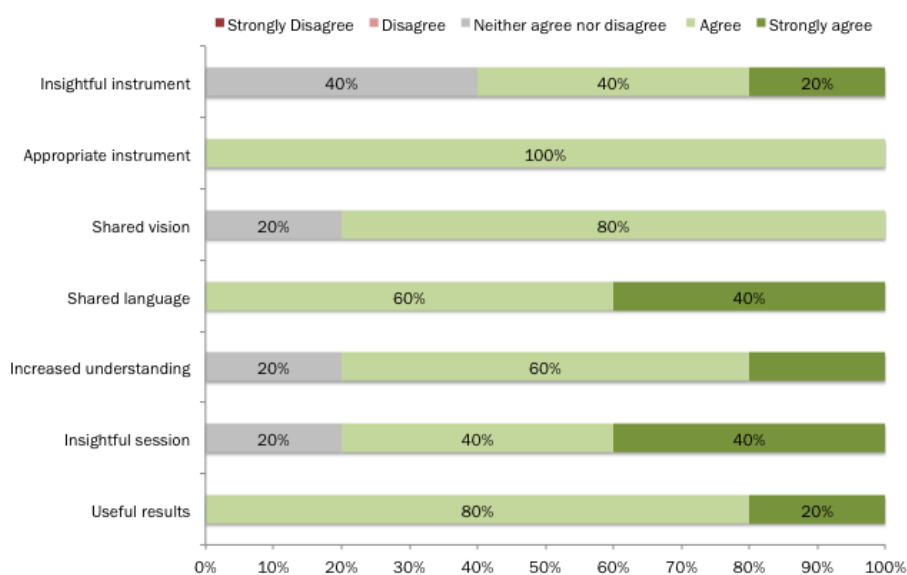
ATI FOR ACCESSIBILITY TO TECHNICAL INFRASTRUCTURE DURING THE SELECTION OF APPROPRIATE PLANNING ZONES FOR RESIDENTIAL LAND USE

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Participants' profile	# Participants: 5
Male Female	2 3
31–45 >60	4 1
Urban planner Municipal engineer	2 3
Public organisation Private organisation	2 3
Views about the session and the instrument	



ATI – from accessibility to land development potential

The proposed instrument defines the accessibility to technical infrastructure at the strategic level of spatial planning. 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. However, the final goal of the instrument is to define the cost accessibility to the technical infrastructure as well. The aspect of cost accessibility has not been included in the workshop.

The instrument is based on spatial analysis, produced in a GIS environment. The physical accessibility to technical infrastructure is defined using the fuzzy logic method. The result is shown on a raster map as a degree of accessibility, ranked between 0 (low) and 1 (high).

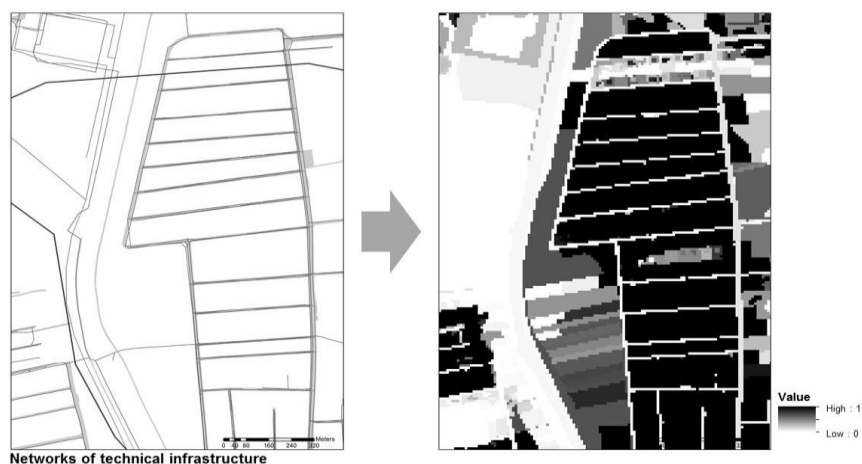


Figure 3.26: The logic of ATI

The results can be presented separately (e.g. as a map showing accessibility to water services) or combined (e.g. a map showing accessibility to water services and also accessibility to energy services, public roads, etc.).

The drafting of the technical infrastructure design generally follows the implementation of the spatial plan. Then, it is often already too late to introduce effective and sustainable planning. The proposed instrument defines the costs and benefits of providing technical infrastructure at the strategic planning level. The instrument offers a new dimension for planning practitioners. Instead of maps showing technical infrastructure networks, the

instrument indicates the degree of accessibility to technical infrastructure using different shades of colour (brighter for lower accessibility and darker for higher).

Legal provisions and practice in Slovenia do not promote the assessment of the actual costs of the technical infrastructure in the planning and implementation phase of land development. Therefore, it is necessary to improve the situation and to analyse the accessibility to technical infrastructure as described above. The proposed instrument is an attempt to achieve this goal. The final result of the ATI will provide the expertise basis to help stakeholders in the field of spatial planning to determine the appropriate planning zones for residential land use. In order to define specific spatial interventions (e.g. the construction of an additional section of the water supply network) the results have to be presented in a very transparent way.

Setting the scene

The group was composed of 5 participants from two bodies, the Municipality of Domžale and the Urban Planning Institute of Ljubljana. Representatives of the municipal administration of the Municipality of Domžale included

- one participant from the Department of Spatial Planning, who mainly works in the field of urban open space;
- one participant from the Department of Spatial Planning, who works on spatial planning with some background in transport accessibility.

Representatives from planning practice from the Urban Planning Institute of Ljubljana included

- the Head of the Planning Department for technical infrastructure, who has many years of experience in planning practice;
- The other two participants mainly work on programmes for the supply of technical infrastructure and spatial analysis regarding technical infrastructure in a GIS environment;

The participants from the Municipality of Domžale were familiar with the concept of accessibility, but mainly in the field of transport accessibility. Accessibility indicators are not used regularly in their daily work. They did, however, stress that if future spatial legislation requires the use of accessibility indicators when preparing spatial planning acts, they will certainly use them. The representatives of planning practice from the Urban Planning Institute of Ljubljana were much more familiar with the concept of accessibility and the different ways to apply it. They are most familiar with transport accessibility and mobility. Accessibility indicators are not yet widely used in their work, but

the concept of accessibility to technical infrastructure shown in the workshop seemed relevant for their daily work.

Describing the workshop

Step 1

The initial step was done in person with each workshop participant. The pre-workshop survey was conducted at those separate physical meetings. This format made it easier to explain the content of the proposed accessibility tool and to identify areas of interest for each participant. The findings were used when preparing the simulation for the workshop.

The actual planning problem presented in the workshop also covered the instrument developers' interest to answer the question whether physical accessibility to technical infrastructure could be one of the suitable accessibility indicators already at the strategic level of planning. In that context, the defined planning problem was formulated as follows: Where should the new planning zones for residential land use within the Municipality of Domžale be located?

The accessibility indicator used to determine the appropriate planning zones for residential land use was physical accessibility to technical infrastructure.

Step 2

In order to ensure the smooth running of the workshop process, several interventions (scenarios) were developed before the actual workshop. We took into account the wishes expressed by the representatives from the Municipality of Domžale (Department of Spatial Planning). Their wish was to show interventions not only with regard to existing but also with regard to planned technical infrastructure. The interventions were shown on raster maps projected on the screen and were also printed in workbooks, which were distributed to each participant.

The representatives from the Urban Planning Institute of Ljubljana did not have any specific wishes regarding the interventions. Taking into account their prior knowledge of the accessibility models, they were very keen to understand the model and its limitations. The presented scenarios helped them to understand the model (meaningfulness of input data in the model) and to ask more specific questions regarding its limitations. Their thinking was that if they could understand the changes shown as different scenarios on maps then they could in turn use these types of maps when presenting different scenarios to policymakers and decision-makers during the spatial planning process.

Steps 3 & 4

As mentioned above, some scenarios were prepared before the actual workshop. The model in its current form can be used to develop interventions but not in real time; in order to ensure the possibility of real-time interventions more programming in a GIS environment is needed. As the evaluation of interventions and development of strategies was not part of the workshop, the different scenarios were shown only as a method to enable better understanding of input and output of the proposed instrument.



Figure 3.27: The setting of the Ljubljana workshop

Lessons on usability

One main finding from the workshop was that with some additional key parameters the model can be very useful for the purpose of spatial planning. The addition of cost accessibility is particularly useful as it can show not only physical accessibility to technical infrastructure but also the cost consequences of different planning scenarios from a technical infrastructure point of view (for example, the cost of a new settlements area).

From the civil engineering point of view, the separate maps showing accessibility to only one type of technical infrastructure (e.g. the water supply network) are essential. However, from the spatial planner point of view combined maps (showing accessibility to all types of technical infrastructure) are more usable.

In terms of usability, several interventions (scenarios) developed before the actual workshop enabled the participants to draw two conclusions from the proposed accessibility model:

- Representatives from the municipal administration of Municipality Domžale (Department of Spatial Planning) became aware of the fact that technical

infrastructure should play a vital role in the selection of the appropriate planning zones for residential land use (as mentioned above, according to Slovenian spatial legislation, accessibility to technical infrastructure is not considered a key influential factors at the strategic level of planning);

- Representatives from the planning practice saw the proposed model as a tool to help them in their effort to explain their solutions to decision-makers in the field of spatial planning.

The current model can be used to develop interventions but not in real time (in order to ensure the possibility of real-time interventions additional programming in a GIS environment is needed). The time and effort needed to ensure real-time capability of the instrument are not financially viable at the moment. The instrument is still in the stage of academic research. In its current form the instrument and the output maps are seen as providing an expertise base knowledge to help stakeholders understand more easily the impact of accessibility to technical infrastructure when deciding on appropriate planning zones for residential land use.

From the practitioners' point of view, additional parameters need to be included in the proposed model. The question that remains unanswered is how many parameters to include, because each new parameter increases the risk of reduced transparency/clarity of the proposed model.

3.12

SPAIN

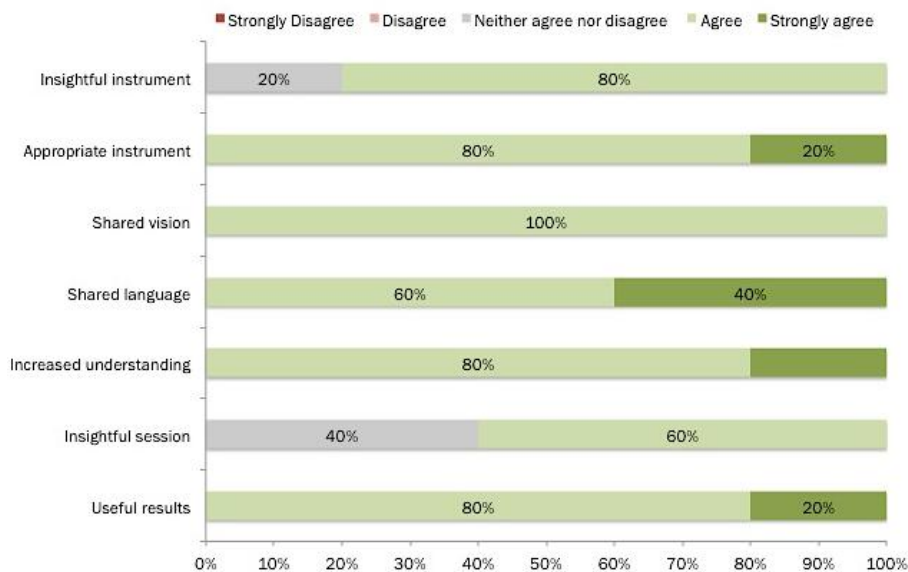
ISOCHRONES AND CONTOUR MEASURES FOR LEISURE FACILITY IN SOUTHERN MADRID

Enrique J. Calderón*, Rosa M. Arce Ruiz, Maria Henar S.-O. and Emilio Ortega

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Participants' profile	# Participants: 5
Male Female	3 2
31–45 >60	3 2
Transport planner Urban planner Researcher	1 3 1
Public organisation	5
Views about the session and the instrument	



Isochrones and contour measures

Isochrones are lines of equal distance or travel time to a particular centre of interest. These lines can be drawn for private transport, in the simplest case, but can also take into account public transport and slow modes. Isochrones are computed in GIS, thus allowing the estimation of a variety of indicators and contour measures, which provide information on the number of residents, employees, potential customers and others within each distance or travel time to a particular centre of interest (workplace, commercial centre, hospital, university, etc.).

They can be understood as a measure of accumulated opportunities considering the population or employment options within a certain distance or time threshold from one or several centres of interest. By taking into account the total population within these thresholds, the measure of accumulated opportunities provides an estimation of the potential demand.

Isochrones and derived indicators allow the identification of areas that fall outside the accessibility threshold as well as an estimation of the population or workplaces located within each accessibility threshold. Planning practitioners are particularly interested to find out exactly which populated areas have poor or non-existent accessibility to public transport.

The role of public transport in the study area was introduced to the participants at the pre-workshop meeting by distributing a copy of the publication 'Metrosur: Análisis SIG del transporte público y los cambios en la accesibilidad en el Sur de Madrid'. In this publication the authors analysed accessibility to hospitals and universities with the use of isochrones and related indicators before and after the Metrosur subway line connected southern Madrid with the city centre.

During the workshop, the working group developed an example of isochrones by private vehicles in order to generate a discussion about the implications of the development of a new mega leisure facility on the accessibility of Madrid. We explained how isochrones can be useful for measuring accessibility to a certain point of interest, and for counting and analysing the population that has access to it. The presentation included some examples of studies of accessibility showing isochrones maps and related tables.

Setting the scene

The participants included four members of the COST Action WU in Madrid (Enrique Calderón, Rosa Arce, Emilio Ortega Pérez and Maria Henar Salas-Olmedo). The other five participants had the following backgrounds: the urban planning perspective (Silvia Villacañas from Madrid City Council, and Manuel

Lázaro from Fuenlabrada City Council); the transport planning perspective (Ramón Cuvillo from Universidad Politécnica Madrid, Consultant on Urban Affairs, and Domingo Martín from the Madrid Regional Transport Consortium) as well as the transport research community (Floriea Di Ciomo from TRANSyT: Transport Research Center).

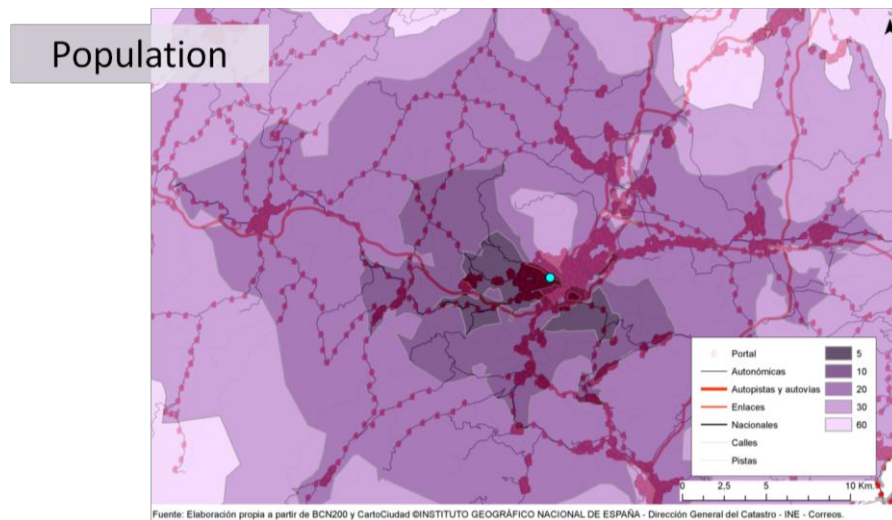


Figure 3.28: Screenshot of an isochrones output

Some of the participants had used accessibility measures in the past, particularly those coming from the transport planning and research fields, whereas others were interested in introducing the concept in their projects, and had only initial knowledge about the topic.

Describing the workshop

Step 1

The topic was first introduced in the pre-workshop meeting, where the participants were asked to outline potential accessibility questions that they would like to discuss. Based on their comments, the working group defined the final planning problem, which was presented in the workshop. The indicator was chosen based on previously completed work and data availability.

Step 2

In order to address accessibility needs, information regarding the types of people who would demand accessibility and the various activities (both in time and space) is required. After a debate about the profile of the persons who

would be travelling to the new leisure centre, it was agreed that the scenarios might change over time and that the discussion should continue on the basis of a jointly agreed hypothesis.

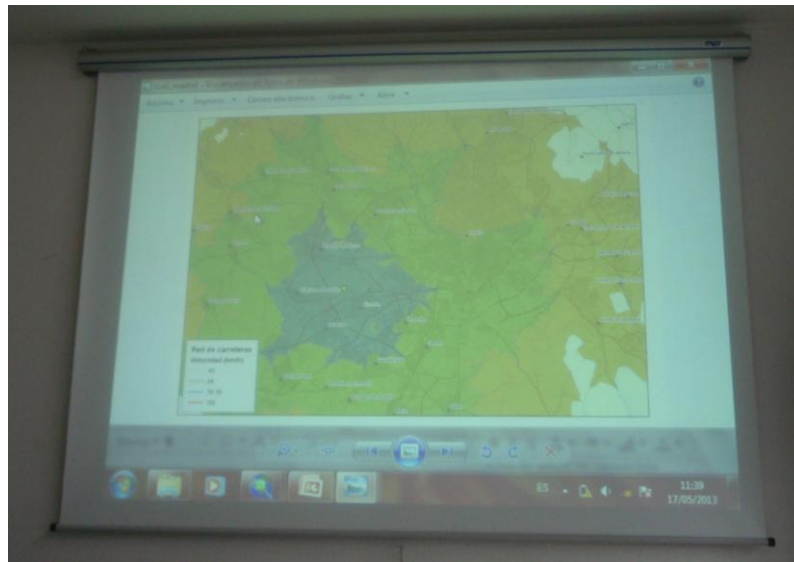


Figure 3.29: Presentation of the instrument at the Madrid workshop

Step 3

The public administrations need to estimate what investments would be required in order to provide accessibility to prospective users as well as to maintain the current accessibility levels for existing ones. Politicians will normally support this viewpoint if it is linked to economic development. An adequate level of accessibility needs to be provided both to workers and suppliers. It was agreed that clients and visitors might accept longer travel times than workers and suppliers.

The participants were asked to suggest measures that should be taken to improve accessibility to the new development, while avoiding an increase in the congestion level of the transport network of the metropolitan area. Different kinds of measures and viewpoints were shared by the participants, with the differences following the professional background divisions. For example, the participants with academic profiles emphasised the need to implement soft measures (i.e. road pricing vs. road construction), while urban planners expressed their concern regarding the efficiency of that type of measure.

The public administration should encourage developers to take part in funding the actions required to maintain or improve accessibility after the construction of the new mega leisure centre. This should be done in coordination with other

new developments in the metropolitan area (e.g. the new railway line). In absence of a regional planning document, the regional transport consortium plays a key role in coordinating new accessibility needs and solutions.



Figure 3.30: Set-up of the Madrid workshop

Step 4

The group had an intense debate on the measures that could help solve the problem of increasing accessibility to a certain location without worsening the current situation in other parts of the city. During the discussion, moderators provided examples of the results of the suggested measures, based on their own expertise. Therefore, the participants could evaluate the usefulness and the need to complement those measures with others in order to mitigate the undesired effects.

At the end of the discussion there was an agreement on some measures that would benefit future employers of the new development. These include encouraging the use of the currently underused infrastructure, for example, providing shuttle buses to connect Metrosur with the mega leisure centre; adding or reserving a BUS-HOV lane in the A5 highway; modifying current public transport fees, thus allowing public transport to compete with the private vehicle in periurban-to-periurban commuting.

Other proposed measures focused on preventing the overuse of local resources, for example, by imposing a fee on road traffic with touristic purposes or by developing a legal framework that requires developers to co-fund new public transport solutions for a specific time period. The later suggestion follows the example of Catalonia, where new developments have to comply with a sustainable mobility plan.

Lessons on usability

At the end of the workshop, all the participants put forward their main conclusions and lessons learned:

- Maintenance and eventual improvement of current accessibility levels should be a key goal, which may imply adding new lanes, modifying public transport fees, taking advantage of new railway investments, and other measures.
- The project will affect accessibility by all modes of transport, thus actions should consider all those modes jointly.
- There would be a large variety of uses, which makes transport planning particularly difficult. Intersectoral planning is a must, and GIS is an adequate tool to integrate information from different sources.
- Accessibility improvements should be negotiated with prospective developers prior to the granting of development permits.
- The analysis of accessibility could be enhanced with the inclusion of additional development options planned at a metropolitan/regional scale in the study area.
- Alternative soft solutions are the BUS-HOV lane along the A5 and tourism-linked road pricing.
- The suggested indicator (i.e. isochrones) is deemed useful, albeit subject to improvements. The main strength is its simplicity and ability to be integrated with other datasets in a GIS. It should have been used prior to making the final location decision, and in relation to urban and regional planning strategies.
- Isochrones must be included in a sustainable mobility plan for this development. They are useful tool for other urban sustainable mobility plans as well as for urban and regional planning. They can be employed for identifying low accessibility areas.
- There is a need for closer integration of data sources from different departments in order to better analyse land use and mobility needs through a transversal perspective.

These are useful lessons both for the participants and for the workshop organisers. Our main lesson learned as researchers is the importance of providing a meeting place where stakeholders and academics can share their viewpoints, and thus foster knowledge transfer between different groups. The moderators can help summarise the ideas and take advantage of the synergies between the different solutions that emerge during the discussion. The main strength of the tool is that it is GIS-based and, thus, can be easily computed

(compared to transport models) and integrated with other datasets (e.g. population, credit card use, etc.).

However, even though the activity was enriching for all participants and the need for cooperation and coordination was unanimously acknowledged, there is still room for improvement. Especially the elaboration of a long-term plan for establishing the procedure that will bring this cooperation to life was seen as an important post-workshop step. There is room for improvement in the real-time capability of the instrument. Fortunately, real-time data availability is increasing, although it remains rather expensive, which limits its usability. Basic private vehicle isochrones maps for this particular study case were shown, followed by a discussion about the usefulness of this tool. It was agreed that the results would benefit from the inclusion of traffic data and the integration of the public transport system.

3.13

SWEDEN

ACCESSIBILITY ATLAS TO ANALYSE REGIONAL ACCESSIBILITY TO LABOUR IN THE FOOD SECTOR

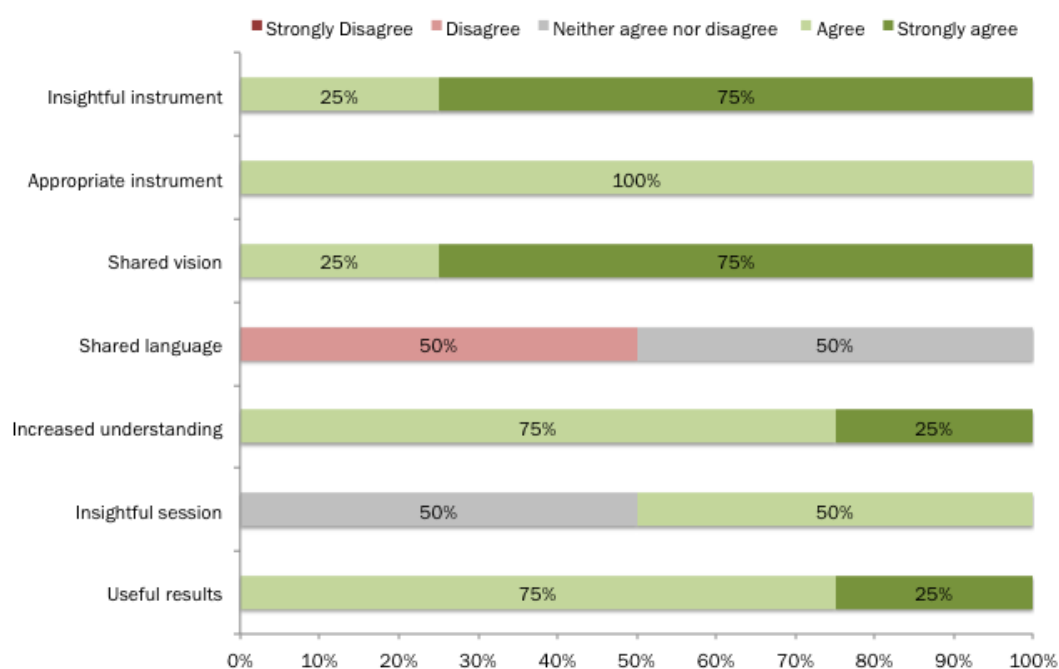
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email: anders.larsson@geography.gu.se

Participants' profile	# Participants: 4
Male Female	2 2
31–45 46–60	3 1
Transport Planners Regional Planners	3 1
Public organisation	4
Views about the session and the instrument	



Accessibility Atlas for the Västra Götaland region

The instrument calculates travel time for car and public transport to one or many selected destinations with a 500 m geographical resolution for the entire Västra Götaland region. It is also spatially compatible with a large number of socio-economic data sets, which enables further analysis. The core of the calculation and data manipulation is developed by a consultancy firm³ as a plug-in using the TransCAD software package. For further analysis and visualisation other GIS software is used. Public transport travel time calculations are based on time table OD data.

The instrument defines accessibility as the possibility to connect origin and destination points for a specific purpose. The accessibility tool has no predetermined restrictions in terms of accessibility measures. However, at the current development phase, two different measures are used: a location-based accessibility measure and a cumulative opportunity measure. In both cases travel times are used as the distance function. The following features make the tool very useful for planning practice:

- It operates with high-resolution data in 500 m cells. This allows for very accurate mapping and hence a clear relationship between data and reality. It also allows for analysis beyond administrative borders.
- Public transport and car travel analysis is performed within the same high resolution. This allows for detailed comparison between modes.
- The 500 m cells can be linked to socio-economic micro-data, which provides a base for a detailed analysis of accessibility taking into account age, gender, income and place of residence/work. Furthermore, it is possible to conduct labour market and firm data support analysis of accessibility to industry clusters and other business/commercial areas.

Setting the scene

Four planners took part in the workshop. They are all active on the regional level. Three participants work at the Public Transport Unit and one at the Regional Economic Development Unit. The PT planners have different specialisations: supply of public transport in peripheral areas, innovation in PT, and human rights in PT planning (for different user groups). From the instrument developers side, three persons attended the first meeting and two

³ The plug-in T500+ performs the calculations and data management during the build-up of the databases. We would like to thank Svante Berglund WSP/Royal Swedish University of Technology for his invaluable support.

the second. The same person acted as facilitator throughout the entire workshop, including the post-workshop focus group session.

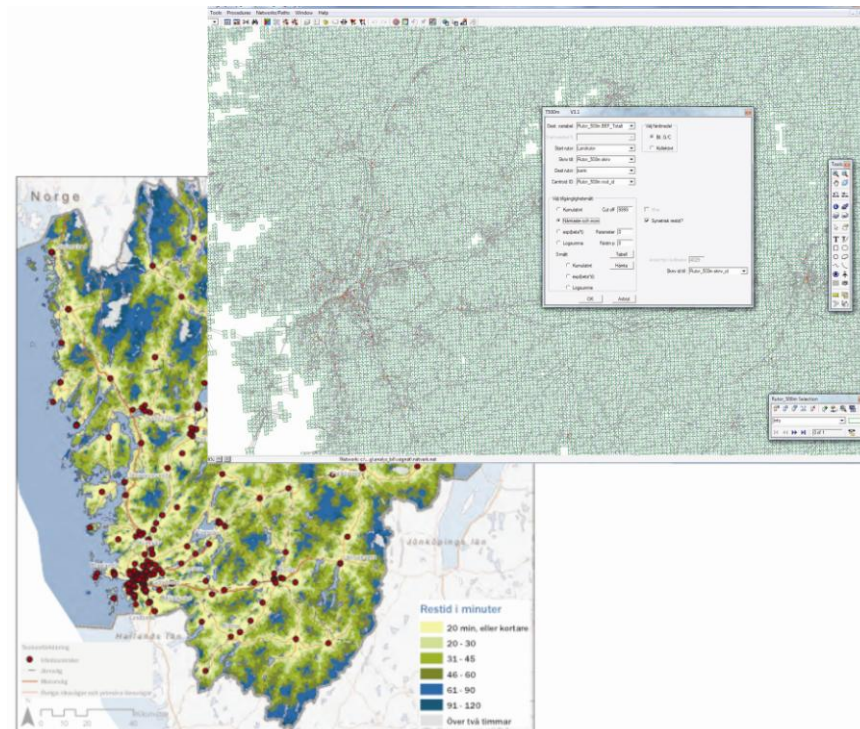


Figure 3.31: Screenshot of T500+ in TransCAD (right) and an accessibility map in ArcGIS (left)

The participants do not use accessibility instruments or other planning tools in their daily work. Information is most often acquired from professional knowledge, internal reports, databases and consultancy reports. However, the instrument developers have since 2010 worked together with the Regional Authority, specifically with a group of planners, on the development of the instrument. The participants were involved in this group. During this process the participants have been introduced to accessibility as a concept in planning as well as to the more technical aspects of the instrument. Their general knowledge about the instrument is good, but practical everyday experience is lacking. Concerning accessibility indicators and maps, the instrument developers had produced a printed atlas with different accessibility maps,⁴ which was used by the participants in their planning practice.

⁴ See the following link for a pdf version of the Accessibility Atlas: http://vgr.se/upload/Regionkanslierna/regionutveckling/Publikationer/2011/1105_Tillganglighetsatlas-VG.pdf

Describing the workshop

The workshops followed the COST 4-step model, however, with slight changes, since the pre-workshop meeting overlapped with step 1 of the first workshop. The process could thus be 'kick-started' at workshop one from an already commonly defined planning question and maps based on this knowledge. This resulted in a situation where workshop one went through steps 1, 2 and halfway through step 3 producing not only specific accessibility questions but also a first version of interventions. Accordingly, the second meeting restarted at stage 2 again, to revisit and evaluate the accessibility questions in the light of the new maps and data provided. From that step, new planning questions and the revised interventions were later developed.

Step 1

This step was prepared during the first pre-workshop meeting. As the participants already had good knowledge about the instrument, this occasion was used to fill in the pre-workshop survey. In addition, the group started step 1 of the workshop process by discussing a common planning problem. The common planning problem was defined as follows: How can a qualified labour force reach the food sector in Skaraborg via public transport commuting? The instrument used in the case cannot perform online simulations of new infrastructure or timetable modifications. Due to this limitation, the instrument developers produced a number of maps for the first physical meeting based on the outcomes of the pre-meeting.



Figure 3.32: Two planners discussing the content of the maps during meeting one

The first workshop was programmed to last 3.5 hours. The maps were presented and the participants were given time to discuss the content of the maps and what they represented. The results of the discussion were summarised under three headings: 1) ability to understand the maps, 2) usefulness of maps for the planning question, and 3) missing information. Based on the discussion the planners agreed on formulating the planning problem in six accessibility questions.

Step 2

One map that answered question 6 was produced online at the first meeting and included in the discussion. Based on the questions in step 1, the instrument developers used the time between meeting one and two (three weeks) to produce a new set of maps within the possibilities of the instrument. These formed the basis for the discussion at the second meeting.

The second workshop started with a presentation of the new maps. One experience from the first meeting was that a large number of paper-maps hindered discussion. The maps and statistics for the second meeting were compiled on four A1-sized posters that were put on the wall, 'forcing' planners and instrument-makers to stand together and discuss. This method proved to have very positive results.



Figure 3.33: All four planners discussing the content of the maps on posters during meeting two

During the ensuing discussion several of the issues from the first set of maps came up again, although most of them were addressed by the new maps. In some cases, due to the limitations of the instrument, no additional solutions could be developed.

Step 3

The group was able to agree on two preliminary planning interventions already at the first meeting, based on the available maps. These interventions provided one of the inputs for the production of the maps for the second meeting. During the second meeting each of the new maps and statistics were discussed in light of the accessibility and planning questions. Labour statistics proved very useful for positioning the food sector within the regional economy. Location maps of production facilities and places of residence of workers in the food clusters also provided a very good background to the travel time maps for public transport to each of the two regional clusters. The end result of the discussion was that the planners realised that public transport would not be able to create a single, integrated, regional commute-based labour market.

Step 4

Based on the new revised maps and labour market statistics, the planners agreed on two new planning interventions during the second meeting. First, a new direct train connection should be built, to link the main urban areas in the Skaraborg food production cluster to the new train corridor between Trollhättan and Göteborg. The aim is to cut travel time from 118 minutes in 2011 to 70 minutes. Second, the currently weak east–west connection between the urban areas in Skaraborg should be strengthened, by combining express-bus systems and bicycle pools into a sustainable daily commute alternative.

Lessons on usability

The workshop's 4-step model was very good to use as a structuring device to explain to planners what was going to take place. However, it was a bit complicated to follow in a practical setting (notwithstanding that how the actual process plays out is probably very context dependent). In our case, the planners had basic prior knowledge about the planning instrument and accessibility as a concept. This proved to be very useful in the subsequent sessions since the focus could be kept on the planning problems and the process could proceed without interruptions at a normal pace.

During the sessions the maps proved to be very powerful for visualisation of large volumes of detailed data. This was a crucial advantage since our instrument operates with a 500 m cell resolution. One very important—and somewhat surprising—lesson was the impact of the maps and the accessibility language. The detailed maps and micro-data had a real impact on the decisions made. The planners could easily translate the map output into their planning reality. The risk of information overflow should be highlighted—too many and too complex maps can be confusing. We used six different themes

(travel time, accessibility to labour, accessibility to workplace, location of labour, location to workplace, education level of labour). This was enough to support the discussion and the decisions. Furthermore, we experienced that workshop interaction was better facilitated with wall posters, instead of individual paper maps or overhead projection of maps. On a more general note, the workshops showed that accessibility as a concept is far from intuitive. However, since a basic understanding was already established beforehand it worked as a very useful integrator between public transport and regional economic development planners.

Usability is a good indicator as long as the analysis is limited to basic functions, such as travel time, and the result can be relatively easily linked to socio-economic data via GIS software. One half-day session is enough to give planners the basis to follow the instructions to set up and execute the travel time analysis and then link the outputs to the GIS software. However, in our case the instrument-makers produced most maps between the two meetings, mostly due to the need for detailed socio-economic input data.

The data input process, the design of the databases and the calculation of travel time for new public transport timetables involve extensive data capture. This basic restriction limits simulation potential, and thus limits usability in situations where planners want to understand how changes in public transport infrastructure and services influence geographical accessibility.

The most useful improvement of the instrument is the development of a possibility for live modelling of future accessibility scenarios, whereby alterations are made to the infrastructure and/or public transport system. Given the present data structure of the software, this would require substantial work. A more realistic scenario would be to combine the strengths of our instrument with other instruments. Within the current COST Action there are a number of different instruments that are useful in scenario planning. One additional avenue to explore is the potential of specific software solutions to conduct part of the analysis directly in the public transport timetable database.

There is a general need to simplify the data input into the model. Currently the planning organisation needs specific expert knowledge to update road infrastructure and timetables for public transport. The detailed steps required for adapting the data to the demands of the model are particularly challenging.

One final lesson is related to the general knowledge and experience with statistics and GIS, which was relatively weak among the workshop group. One alternative route to reaching a basic usability level without altering the instrument would be to increase the planners' knowledge in qualitative methods (even a modest increase has visible effects on usability).

3.14

UNITED KINGDOM

SNAPTA – CONTROLLING CLIMATE CHANGE THROUGH SUSTAINABLE TRANSPORT

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SNAPTA

Spatial Network Analysis of Public Transport Accessibility (SNAPTA) is a GIS-based accessibility instrument that relies on a package of different measures to quantify spatial accessibility to urban services and activity opportunities by public transport modes. The instrument, therefore, takes into account the land use and transport characteristics of urban interactions and the availability of opportunities that can be accessed by public transport. It focuses on groups of people, and their social and economic activity needs to be met at different destinations. It assumes that travel demand will be determined by the attractiveness of these locations and the quality of the transport infrastructure linking these places.

The instrument adopts a robust theoretical basis using a sufficient data approach based on a high level of data disaggregation. It provides an adequate representation of accessibility aspects, without making it very difficult to operate, interpret and, consequently, apply in practice. However, the instrument does not claim to provide the complete picture of actual travel behaviour and transport accessibility. It merely attempts to achieve a balance between the ease of interpretation and operationalisation, and the complexity of the theoretical basis and data disaggregation.

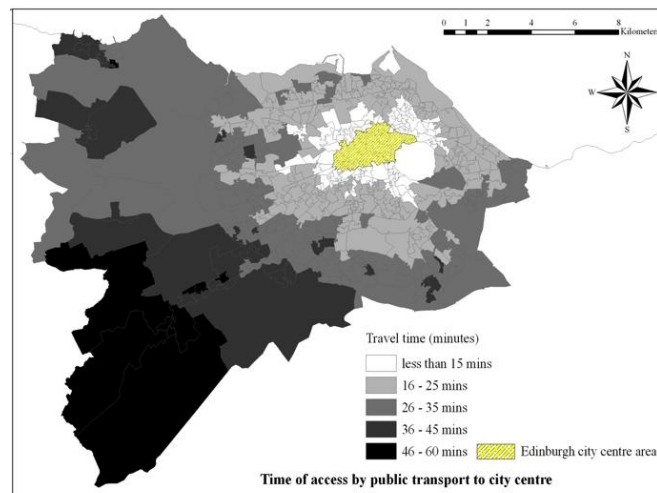


Figure 3.34: Screenshot of SNAPTA

SNAPTA is intended to assist discussion and support decision-making within the fields of transport and land use planning, particularly where government contexts call for more sustainable transport options to be developed. The development of SNAPTA has been closely linked to the policy needs arising from the Edinburgh Local Transport Strategy (2007–2012) and subsequent

revisions. Since such strategies present key sustainable transport ideas, such as plans to boost transport and land use integration and increase reliance on public transport, SNAPTA provides an opportunity to deliver key elements of this strategy so that policy decisions are based on evidence of the impacts on accessibility. Issues concerning the spatial equity of public facilities; accessibility to workplaces, shops, education facilities, health and medical services, and leisure activities by public transport; as well as the changes to accessibility brought about by new transport infrastructure or the relocation of public facilities can all be interrogated through the instrument. Therefore, SNAPTA shows how transport and land use integration can be clearly and visually communicated, and how the instrument's outputs can be used to influence City of Edinburgh Council's transport and land use decisions.

Setting the scene

The City of Edinburgh Council were initially very keen to participate in this workshop, with the Transport Planning and Policy Manager providing a list of seven land use planners and six transport planners. However, the agreed workshop date in June 2013, unfortunately, proved to be inconvenient for many potential participants. In the end the participants included one land use planner from the Development Planning Department in the City of Edinburgh Council; one private transport consultant with experience in planning practical approaches to improve access to essential services; one model developer (from academia) and the moderator. All the participants had thorough knowledge of the concept of accessibility in transport and land use planning and were familiar with a number of commonly used accessibility measures.

Describing the workshop

Step 1

In the initial discussions held with the Transport Planning and Policy Manager he suggested that the workshops should focus on a specific public transport problem. The problem or policy issue current at the time was the perceived comfort and convenience of public transport provision to two areas of the city populated by low income inhabitants. The pre-workshop questionnaires which were returned were mainly in agreement that the workshop should look at more general transport issues and that the accessibility instrument should be used to analyse these questions.

The following planning problem and indicators were agreed: controlling climate change through sustainable transport, with the indicators of mode share of

sustainable travel modes; ensuring that development is located in accessible locations; and ensuring access to all key services.

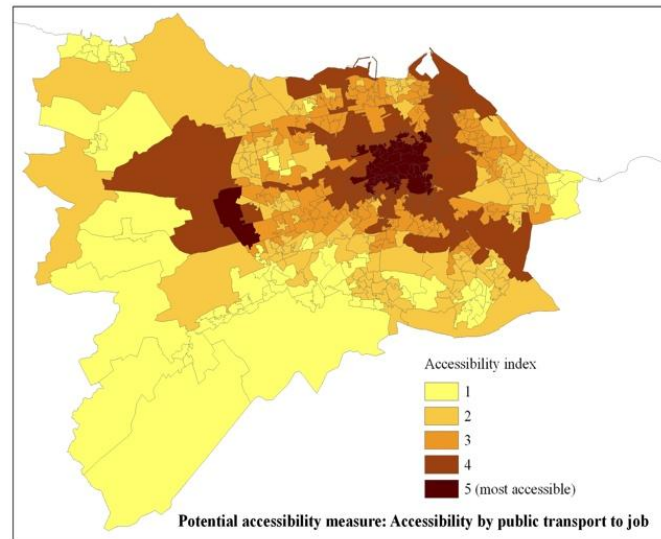


Figure 3.35: Screenshot of SNAPTA

Step 2

Following the introductions, the workshops continued by discussing how the participants used accessibility in their daily practice and introducing different measures of accessibility. The example of the accessibility of households in Edinburgh to grocery stores was taken using the indicator of 400 m to the stores. A map was generated using the ACCALC instrument to show the output for Edinburgh to inform the discussion and improve the usefulness of accessibility indicators.

Step 3

A number of maps regarding the application of the SNAPTA instrument to Edinburgh's network were distributed on the table. The maps show the current status of accessibility by public transport to jobs and retail services across the 549 zones of the council area. They were produced using three different accessibility measures: travel time (i.e. total travel time of the shortest public transport journeys that people in each zone require to travel to all other zones), contour measure and potential accessibility measure (gravity-based measure). Therefore, the difference in the spatial distribution of accessibility between these measures' outputs was interpreted as a consequence of the different

consideration and estimation of accessibility features (e.g. cut-off travel time, distance decay and land use attractiveness).

Another map was presented to show the accessibility by local bus services to the new large Sainsbury's food store (in Longstone), focusing on its catchment area by identifying the zones where people can reach the store site within 30 minutes travel time.

In addition, some maps produced by SNAPTA were used to demonstrate the change in accessibility to jobs and retail services that will be brought about by the full construction of the infrastructure improvements of the tram system and Edinburgh South Suburban Railway (ESSR). The maps assisted the discussion about whether the planned transport infrastructures for Edinburgh will lead to better accessibility and reduce the spatial inequity across the city.



Figure 3.36: The maps used during Edinburgh workshop

Step 4

Specific policy interventions were not discussed; rather emphasis was put on the usefulness of accessibility instruments as well as SNAPTA's usefulness and potential for improvement. The planning team in City of Edinburgh Council already use PTALS to assess the accessibility of new housing proposals as part of development management and as input for the land use development plan.

Lessons on usability

In order for the workshop to meet its target, it is important to give sufficient explanation of the instrument and generated maps, in order to make sure that every participant is aware of the analysis method and the type of data used.

It is useful to engage participants who have prior experience with accessibility instruments. This will enrich the discussion and give an opportunity to the

workshop participants to compare the different instruments and identify the strengths and weaknesses of the instrument in question.

The role of the moderator is crucial for leading the discussion in the right direction and preventing that it deviates from its main focus.

The SNAPTA instrument is good for visualising spatial accessibility as well as the impact of changes in transport infrastructure and land use and activity systems on accessibility. The resulting maps are clear and easy to understand. They can be used as an appropriate foundation for a discussion between experts and practitioners from different disciplines. The accessibility maps can help practitioners to analyse the situation and define planning problems. Also planners can use them throughout the decision-making process to assess different alternatives and develop transport/land use actions and strategies.

Not solely relying on contour measure and using different accessibility measures—particularly the gravity-based measure that is not familiar to the City of Edinburgh Council—was described as a useful method for providing a different perspective on accessibility patterns.

It can be observed that the consideration of a high disaggregation level, using the Scottish Census Data Zones (the key small-area statistical geographical units in Scotland), is a suitable choice to assess accessibility at the city level. However, this disaggregation system has the disadvantage of featuring a large range in the size of zones according to population density. For example, the areas of some zones in the west and southwest of Edinburgh are very large compared with the rest because of their low population density.

The instrument has no accompanying programme that automatically updates the data in real time. The transport and land use data can only be updated manually within the GIS environment, which is straightforward and can be done quickly when a relatively small number of changes is required. However, the instrument is capable of generating results and visualising them in maps rapidly based on ad hoc enquiries.

Improvement is recommended towards a more efficient and time-saving method for updating data (e.g. for updating data in real time). Moreover, SNAPTA has been developed with a focus on public transport modes only, which is considered as a potentially serious limitation for some purposes. However, the tool has the potential to also include car-based modes by offering the ability to build the road network taking into account driving directions and travel time estimates based on the mandated speed limits.

3.15

TURKEY

DEVELOPING SPATIAL USE PROPOSALS ACCORDING TO CITTASLOW CRITERIA IN İZMİR-SEFERİHİSAR AND EVALUATION OF DIFFERENT TRANSPORT OPTIONS

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Travel distribution with TransCAD

The transportation proposals will be developed on the neighbourhood scale in the working area of the Seferihisar district in Izmir, with a gravity-based model in TransCAD.

Seferihisar is a tourism-dependent area; the city's population doubles in the summer. There is also a marked increase in weekend traffic, especially from İzmir. In 2009, the city adopted a cittaslow (slow city) statute. Many of the city's natural and cultural values already conform to the criteria in the cittaslow statute. However, the city still has to fulfil the traffic requirement: alleviating traffic congestion; reducing demand for motorised transportation (especially car); increasing bicycle and pedestrian use; and evaluating alternative public transport options. The integration of these outcomes could also be achieved within revised land use plans.

Therefore, the city authorities sought to address the traffic problem in accordance with the cittaslow criteria by cooperating with the COST Action project. The most important feature of the model is its prediction capacity of future transport demand, allowing policymakers to evaluate the alternative transportation options and the required road network improvements. Looking at travel objective (business, training, education, recreation and others) and type of transportation (pedestrian/bicycle, automobile, public transportation), the model estimates the average travel time. The scope of the TransCAD instrument facilitates the analysis of the obtained spatial data in GIS. By integrating socio-economic data into the model, it is possible to also work with high-resolution maps.

The model includes household surveys, traffic counts and roadside surveys. It mathematically calculates and presents travel analyses providing a wealth of detailed travel information according to different parameters: weekdays and weekends, daily schedules and peak times, neighbourhoods and location, types of vehicles used, and routes of the road network.

Setting the scene

The following persons participated in the workshop:

- The mayor and two deputy mayors of Seferihisar;
- Representatives of the Sustainable Transport Association EMBARQ, an NGO that carried out a part of traffic analysis;
- Three representatives from the department responsible for physical planning in Seferihisar, who presented the zoning maps of the city, emphasising in particular high-demand access points (education, business);

- Four participants from the working team that conducted the project under COST Action TU1002: landscape architects and landscape planners.

The use of accessibility instruments in Turkey is very limited. The participants in the workshop had conducted an experiment in transportation planning within the context of the land use planning. The urban planners and landscape planners had taken part in preparation of the land use plans and urban plans using GIS techniques. They had experiences in analysing traffic data (like user surveys, vehicle counts and parking time) with GIS techniques in decision-making processes related to transport planning.

The workshop

First, the problems related to traffic and transport planning were discussed. The representatives of the local government provided information about the accessibility demands based on the needs of residents and tourists.

Step 1

The preliminary study related to the present status of the area was conducted while the project suggestions under the COST Action were being prepared. The ground of the basic planning problems was prepared with the Seferihisar local government. The 'present condition analysis' study, which gathered information on the spatial and physical characteristics of the area and produced the maps, was completed during the first six months of the project. The results were shared with the participants during the workshop. The pre-workshops meeting was held in January 2013, with the entire project team (three landscape planners, one landscape designer, one urban planner) and four officials from the Municipality (the mayor and three urban planners responsible for the preparation of the urban plans). At the pre-workshop meeting, the results of the 'present condition analysis' study were presented, outlining soil type, land use types, vegetation, structure density and other factors. Thematic maps of the area were also presented. The municipal officials presented information related to the zoning plans of the area. The maps and the graphics allowed the participants to discuss the transport-related indicators: the existing transportation network map, population density at the neighbourhood level, number of vehicles in the city, parking space, sidewalks and road width, size of walking areas, etc. There was consensus on the following key observations:

- The working area is the touristic area, which experiences big population increases during summertime (after April). The traffic problem adversely affects the transportation for daily services.

- Because the working area is designated as cittaslow, the local authorities are committed to plan for environmentally friendly solutions, like walking and bicycles. These two transportation options are currently insufficiently represented in the city.

Step 2

After the pre-workshop meeting, the user's survey and vehicle counts were carried out in the area. The graphics for the user's survey and vehicle counts were presented at the workshop. A zoning map was made, based on user preferences from the Sığacık region, which has heavy traffic congestion (according to the vehicle counts) and large volume of daily service commuters (education, healthcare, shopping and recreation). In addition, the locations dependent on the travel for recreation purposes have been identified and mapped. The materials were sent by email to the participants before the workshop and were presented as printed materials during the workshop.

Some participants felt that the data from the traveller surveys is incomplete, and that they should be repeated during a period of intense tourism activities. We observed that the analysis made with TransCAD did not support real-time results.



Figure 3.38: Presentation of the instrument

Step 3

Because the participants of the workshop come from different cities, the traffic surveys of the team that administered the project sent the vehicle counts and the spatial area analysis by email prior to the meeting. Also, the participants were asked to think about possible planning interventions before coming to the next session of the workshop.

The materials that were presented in step 2 were discussed in light of the transportation and planning problems. Each participant shared their proposed planning interventions. The participants from the Municipality discussed the planning interventions that do not trigger legal obligations (as per the legal competencies of the implementing body).

Some participants stated that the transportation options calculated with the help of the accessibility instrument should be applied in other areas. They expressed their concern that the instrument mainly depends on the traveller surveys and vehicle counts, and, therefore, is not integrated with spatial planning that holistically approaches the physical structure of area.

Step 4

There was broad agreement on the following points:

- Seferihisar has a weak transportation network that does not support the current traffic load. Bergama needs to review the transportation network with the planning of area use. In this scope, bicycle and walking roads must be provided in the urban plans.
- The public transportation network needs to be restructured according to the perceived travel needs and times. Currently, the people prefer using their private cars mainly because of the insufficient and irregular public transportation (by bus).
- User preferences should be used as an important evaluation criteria in designing transport solutions.



Figure 3.37: Discussion of transportation challenges and cittaslow requirements

In addition to the users' questionnaires, the existing spatial structure of the area is another important evaluation criterion. Regarding the existing physical conditions, the participants agreed that Seferihisar does not have any

restricting factor regarding transportation in terms of natural barriers. However, man-made barriers are a problem. The city centre lies on the main road axis that connects Izmir and Kusadasi. There is a dense travel demand between Seferihisar city centre and Sigacik (the main tourism neighbourhood). The Izmir–Kusadasi road divides these two settlements and is an important limiting element for planning subsequent transportation solutions.

Lessons learned

- Since different shareholders attended the workshop, general information had to be shared during the sessions.
- Experiences and information regarding accessibility were shared among the participants.
- The overhead presentations were a good tool to present information clearly and use time more effectively.
- Sending documents and maps before the workshop by email is a good strategy to maximise effective use of the time during the session.
- The participants' views were evaluated with a common language.

The TransCAD GIS-based model is useful because it can provide analysis of reach transport data based on household surveys, traffic counts and roadside surveys. The most important feature of the model is its ability to forecast future transportation demand, and to allow for the assessment of alternative transportation options and road network improvements. The following specific strengths and weaknesses were identified:

- It delivers results that are transferable to spatial plans and integrated.
- It makes it possible to evaluate socio-economic data.
- It provides data that can be processed in high resolution.
- A comparison should be made with other accessibility instruments that provide the opportunity to analyse data at the neighbourhood level.
- The integration of the results in the process of land use planning should be improved.
- The model can be used more efficiently if the statistical and GIS understanding of the end users is enhanced.

3.16

FRANCE

CONTACT POTENTIAL MEASURES FOR ANALYSING NEW INTERCITY LINKS MADE POSSIBLE BY THE PLANNED TOURS–BORDEAUX HSL

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Setting the scene

This 'contactability' indicator was developed from a vision of networks. As it was developed in theoretical geography and in reaction to classic accessibility indicators, it places too much emphasis on quantifying a level, thus losing the network view of the access conditions.

The scientific study sought to supplement accessibility indicators with a complementary view that would allow for a better understanding of how transport networks contribute or hinder accessibility at the local level.

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 contactability for cities and metropolitan regions? Which links are missing in the transport network for better spatial integration of the city network?

Conceptual framework and theoretical underpinnings

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 field of innovation 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 contactability indicator as the potential a person has to realise face-to-face contact with another person in a single or a group of distant locations.

The measure of accessibility is each O-D pair looks at the question: Is it possible (YES) or is it not possible (NO) to establish contact under specific time constraints? These constraints are departure not earlier than 5:00 and return no later than 23:00 as well as a minimum meeting time of 6 hours (connection times are also considered) (see figure below).

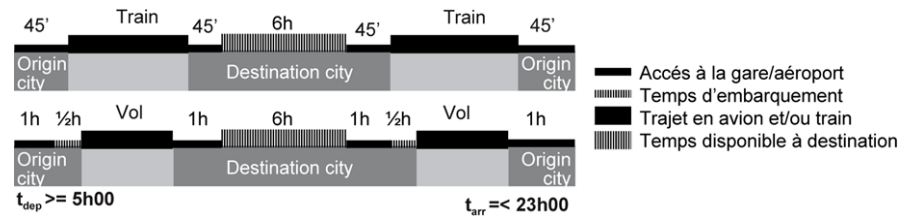


Figure 3.39: The principle of the contact potential for a one-day return trip for a six-hour meeting

Implementation

Contactability 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 intermodality 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.

This data can be secured by purchasing the OAG database (www.oag.com) for flights, and through queries on the Deutsche Bahn website (www.bahn.de) for the train timetables. The data is stored on a mysql database. Timetables and nodes (the graph) must be put in the database, and then the minimum paths are processed through the database. The minimum paths have been computed with the *Musliw* software (not publicly available, developed by P. Palmier from the Centre d'études Techniques de l'équipement Nord-Picardie). The degree of required technical expertise for performing the calculation and processing the information is high, because of the volume of information involved.

Application to the Tours–Bordeaux HSL

The workshop was set up after a discussion with Èlodie Manceau, the head of the observatory of the Tours–Bordeaux HSL currently under construction in western France. Manceau assisted a presentation by Alain L'Hostis on the contact potential indicator in Lille in an open research workshop, and she expressed an interest in developing this approach on the territory affected by the Tours–Bordeaux HSL project.

For the purpose of the workshop, the indicator was set to simulate the state of the railway network in 2017, including the new timetable of trains on the new line. The indicator was computed for two periods, 2009 and 2017, so that a comparison could be made. The following figures illustrate the existing and new contact potential of the main cities on the line, Bordeaux and Poitiers. Also the results for Angoulême and Tours were presented in the workshop.

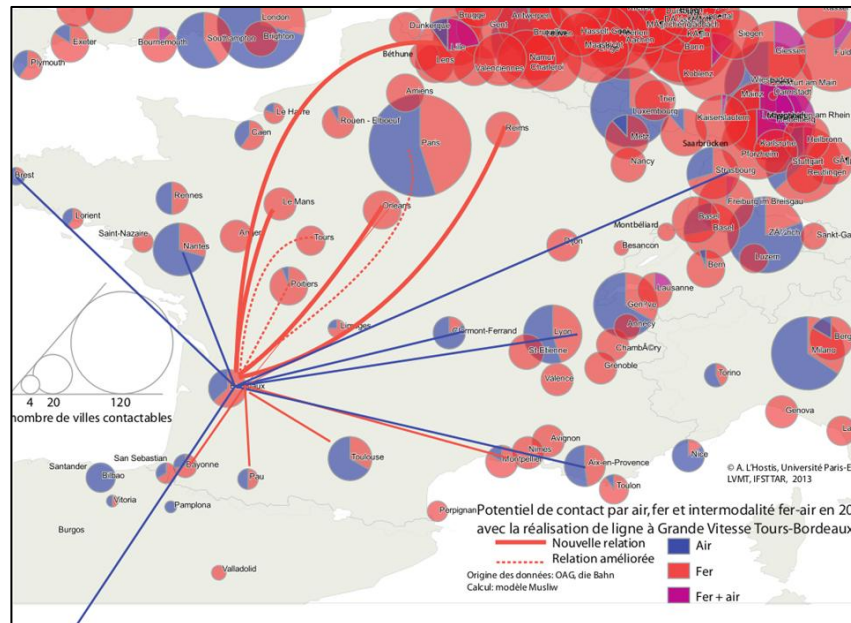


Figure 3.40: Existing and improved contact potential from Bordeaux with the Tours–Bordeaux HSL

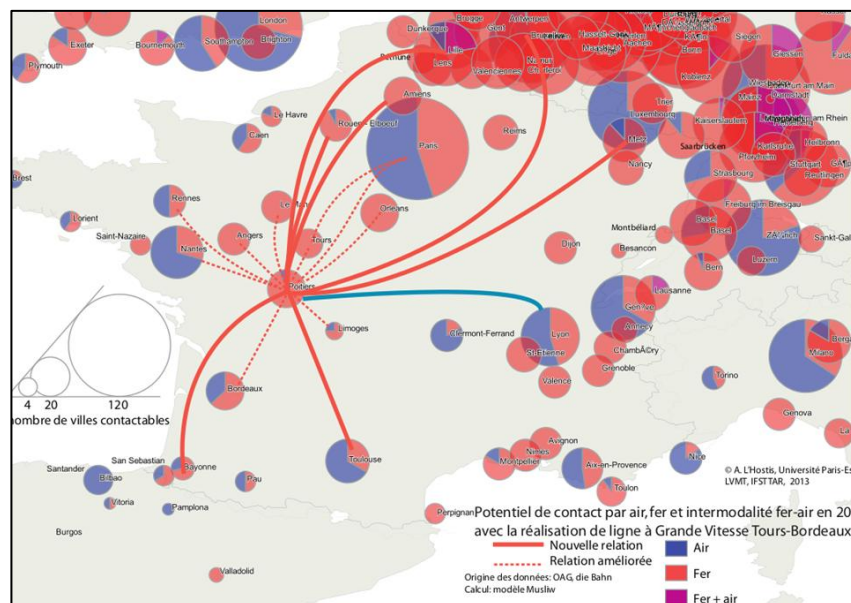


Figure 3.41: Existing and improved contact potential from Poitiers with the Tours–Bordeaux HSL

A map of all the new links made possible by the new line was also presented (see figure below), and considerable effort was invested to improve the readability of the maps.

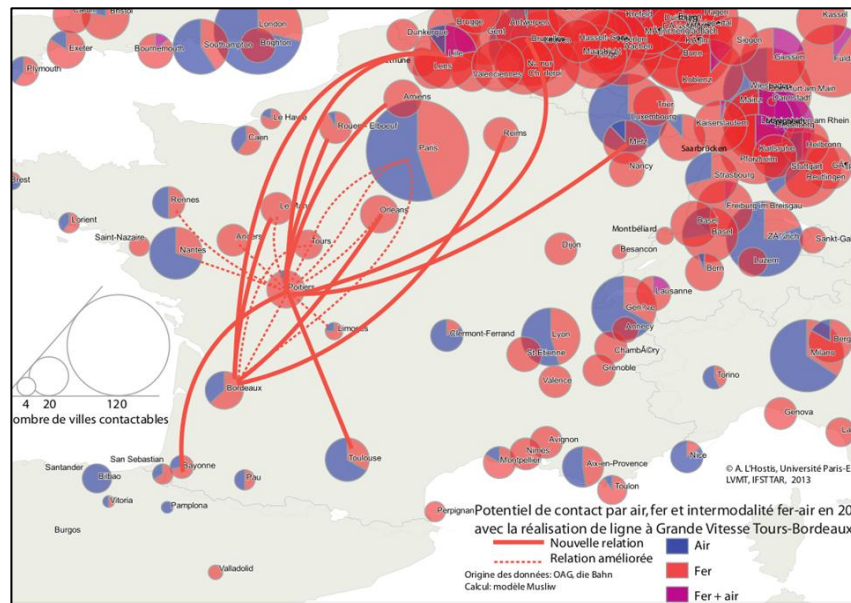


Figure 3.42: Total new and improved contact potential with the Tours–Bordeaux HSL

Organisation of the workshop

The workshop took place on the premises of RFF, the French Rail Network, in Paris, on 17 October 2013, from 9:00 to 12:30.

The workshop was organised according to the COST Action guidelines. It started with a presentation of the indicator and the results, followed by an open discussion regarding the indicator's usability potential. All of the cartographic outputs were also printed on a large scale format (A3) and made available to the participants. Several tables with detailed information about return trips were also distributed, to supplement the overhead presentations and stimulate discussion.

Workshop participants

In total six persons participated in the workshop: Alain L'Hostis, Èlodie Manceau, Antoine Frémont, Roseline Monfort, Chris Behière and Liu Liu. The list of invitees was compiled from inputs by Èlodie Manceau, who has in-depth knowledge of all the actors affected by the Tours–Bordeaux HSL. We sought to strike a balance between land use and transport actors.



Figure 3.43: Testing the contact potential indicator for the Tours–Bordeaux HSL project

Élodie Manceau is the head of the South-Europe Atlantic HSL Socio-Economic Observatory. Antoine Frémont is the head of territorial issues at RFF. Roseline Laot-Montfort is in charge of territorial strategy at the *Gironde Département* (one of the five *Départements* that make up the *Région Aquitaine*). Chris Béhière is a PhD researchers focusing on time-oriented local policymaking in the Poitiers agglomeration. Liu Liu is a Phd researcher at IFSTTAR on the topic of transport and planning coordination. Alain L'Hostis is a researcher at IFSTTAR on the topics of transport and planning issues.

Outputs of the workshop: use of the contact potential indicator

The workshop participants shared several very interesting remarks, which will be used for the subsequent developments of the indicator and by the local actors. The initiative around the Tours–Bordeaux HSL Observatory and the contact potential indicator has already aroused the interest of some Bordeaux metropolis actors, who would like to use the indicator to express the potential for interaction with other cities that the new line enables. The indicator will be used to populate an atlas at the Bordeaux metropolis level.

Comments on the indicator itself

- The indicator is based on the maximum time available at destination. It does not compute the values if less time is needed (e.g. 6 instead of 9 hours) and must be complemented by frequencies analysis.
- The indicator provides little meaning if the trend to consider home as a place of working develops. It is not that obvious because even if home becomes a place of work, the need for occasional mobility may still persist; hence, the need for one-day returns to distant cities may remain strong.
- One-day return trips are tiring for the traveller, and usually are not done each weekday but only occasionally in most business sectors.

Comments on possible modifications of the indicator

- It would be interesting to combine this indicator of reachable cities with the availability of office space and/or services for business travellers. This remark raises the issue of service provisions inside and around railway stations. The HSL will increase the volume of these users with specific needs in terms of goods and services (e.g. temporary office space in railway stations or temporary meeting rooms).
- The criteria need to be kept strict. If the criteria are relaxed (e.g. less time available at destination or next-day returns), all cities become accessible and the indicator is neither selective nor useful.
- Could the time spent waiting for connection (connecting time) be mapped to help develop a strategy for service deployment in railway stations?

Comments on employing the indicator in policymaking

- Is the indicator of contact potential relevant for territorial policies?
- Two issues emerge regarding the directions of the relationship: Which location can be accessed from a specific city? and From which cities is it possible to reach a given city for a meeting? The answers to these questions provide very different implications in terms of territorial strategies: What activities should be developed in my city, and, on the other hand? How can we help travellers realise one-day returns, and are their needs being met in terms of services and local accessibility?
- The indicator shows that the HSL creates the possibility for a new relationship between Bordeaux and Reims. This is important to know but the real question is what should be done with this new connectivity. What purpose can it fulfil?
- For the operator of the line, being aware of this new connection helps improve communication with the territorial actors.
- Smaller cities (like Angoulême or Libourne) can develop a metropolitan level contact potential. They benefit from a network effect by being located on the itinerary of the new HSL. What can be their strategy? To which local level can one develop the contact potential measures? The tool informs of the new proximities in time-space produced by the new line. Some distant cities like Angoulême, located in a different Département and Région, would be accessible within 30 minutes from Bordeaux. How does this change affect the Gironde Département with Bordeaux as its main city and capital?
- The difficulty of communicating the information to the average elected policymakers needs to be considered. How can it be made more accessible? Ideally, decision-makers should be able to use the information

and analysis provided by the tool to inform their elaboration of transport strategies in their administrative unit?

References

- Erlandsson, U. 1979. Contact potentials in the European system of cities, in *Spatial inequalities and regional development*. 93–116. Dordrecht: Springer.
- Hägerstrand, T. 1970. What about people in regional science? *Papers of the Regional Science Association* 24:7–21.
- Haggett, P. 2001. *Geography, a global synthesis*. Harlow: Prentice Hall.
- L'Hostis, A., and B., Hervé. 2006. A Transport network for a city network in the Nord-Pas-de-Calais region: linking the performance of the public transport service with the perspectives of a monocentric or a polycentric urban system. *European Journal of Spatial Development* (www.nordregio.se/EJSD).

3.17

NORWAY

REPORT ON THE SURVEY OF PLANNING PRACTICE IN THE STAVANGER REGION

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The Stavanger region

With 230 000 inhabitants, the Stavanger region is the third largest urban area in Norway. It is the fastest growing region in Norway, and the population is expected to increase by more than 40% by 2040 (more than 100 000 new inhabitants). The region has also the most fertile agricultural land in the country, which poses a major challenge for urban expansion. At the core of the region is Stavanger city with 130 000 inhabitants, however, the central built area is made up of four independent municipalities. With each municipality enjoying land use planning 'monopoly', important regional decisions are very difficult to coordinate across municipal borders or according to the national goals. Rogaland County cooperates with the municipalities in the Stavanger region on land use and transport planning, but cannot issue binding regulation to the municipalities.

The Stavanger region is heavily car dependent and with income expected to double by 2040, car ownership will continue to increase and so will car use (see concluding section for details). To meet these major challenges, the Stavanger region is pursuing a major planning Bybanen, a light rail transit (LRT) system. However, the Bybanen proposal was stopped, and the region is at present planning a Busway alternative. This complex context is the arena for our investigation of accessibility tools in planning practice.

Method

As it was not possible to arrange a workshop in the region due to the poor availability of senior planners, it was decided to use the pre-workshop questionnaire and interview the planners instead.

Close to twenty planners were invited for interviews, with eleven planners accepting the offer. The interviewees came from the Municipality of Sandnes, the Municipality of Stavanger, Rogaland County and the consultancy ASPLAN VIAK. Most of these planners held senior positions with extensive experience in land use and transport planning. In fact, the average duration of their professional planning experience was 27 years. Most planners were interviewed using the questionnaire as a guide, while some filled in the questionnaire and submitted the answers by mail.

The answers to the questionnaire

In this section each of the 12 questions from the guide is presented together with some of the answers given for each particular question.

Question 1: The field of work

People were asked to tick the appropriate type of planning, which did not function very well because many ticked all the planning types listed. Most of the planners interviewed worked with strategic land use and transport planning at the city and regional level.

Question 2: The definition of accessibility

Most of the planners defined accessibility as the ability to access destinations (also cultural destinations) by all modes. In particular 'Universal Design' or 'Access for All' came out strongly as major goals in the Stavanger region. Some typical answers included the following:

- The ability to reach/average travel time with different modes to different destinations.
- Accessibility can be described as the populations' opportunity for choice of travel mode to a particular geographic market area. The market will consist of delocalised travel goals, like workplaces, shops, nurseries, schools, etc.
- Land, both accessibility and universal design (culture, health, roads, all functions). Accessibility for whom and to what? Physical distance and quality on the connection lines.
- It has several dimensions: geographical, social, ecological, interface social/cultural and mode split. Infrastructure is attached to geography.
- SAT (Integrated land use and transport planning) in Fremtidens Byer (Future Cities is a national demo project in Norway involving 13 cities). Reduce transport demand is an aim: density, mix of functions, node development/TOD.

Question 3: The definition of mobility

Most of the planners interviewed defined mobility quite broadly as the movement between two positions, including all modes and destinations (also social mobility was mentioned). Some typical answers included the following:

- Mobility can be described as the population's opportunities to use different travel modes, to reach different travel goals for different travel reasons.
- Mobility is all human movement to and from a particular location.
- Transport mobility is reaching a maximum number of destinations within a certain time period. Distance is less relevant. Mobility also has a social dimension—inclusion vs. exclusion.

Questions 4 & 5: Policy issues and tools

The planners indicated that they use all the information and data at hand to solve each particular planning problem. A lot of tacit knowledge has been accumulated among the planners in each planning office. Accessibility tools are used when appropriate and available, but such instruments are not in the forefront when addressing planning problems in the Stavanger region. The table below presents some of the answers to question 4 in the left column, while the corresponding answers to question 5 are in the right column.

Question 4: <i>Thinking about people and travel, name 3 important policy issues that your agency is working on in this respect?</i>	Question 5: <i>In regards to the 3 policy issues you have listed, what data, tools, or information makes you aware of these issues?</i>
Person 1: — Land use planning. — Decisions on localisations. — Transport planning.	Person 1: — Land use plans. — Population data and data on businesses. — Transport models/GIS tools.
Person 2: — The bus networks' properties regarding accessibility. — The street networks' degree of walkability. — Capacity limitations for parking and roads.	Person 2: — Bus lines network data (where and when). — Mapping and registering peoples walking habits. — Mapping of queues and parking restrictions.
Person 3: — Land use. — Public transport. — Parking policy.	Person 3: — Land use, localisation and density decide in the long run trip length and travel patterns (which strongly influence accessibility with different modes). — The system must be seriously improved, especially travel time and capacity, to become more competitive against cars. — Parking policy influences all car trips (both ends), short and long trips in the same degree. This makes parking regulation possibly the most important instrument for influencing mode choice.
Person 4: — Urban transport, Accessibility for All, enlarged mode split definition. — Rural transport, need intelligent concept for district expansion/accessibility. — Regional enlargement (mostly roads, but	Person 4: — RVU (Travel study). — Population prognoses, preferably disaggregated. — Transport on roads, PT and freight (e.g. SINTEF: PT down from 8% to 6%).

not basically).	
	— Land use data: historic data and ATP/accessibility data.
Person 5: — Accessibility, especially seamless accessibility using different modes in both directions. — Systemise and categorise mobility to answer travel needs. — Very important where housing, work and other functions are localised relative to each other.	Person 5: — Travel Study, infrastructure transport, statistics and concrete data for traffic, population and area. — Arc view/GIS. — The PT company has tools that are being prepared for GIS. The ATP model has ambitions to integrate the transport model.
Person 6: — Cycling strategy. — KVV (Concept choice statement) of the report Bybanen (Citytram - LRT proposal) and the follow up of the Busway alternative. — Integrated land use and transport, localisation and TOD.	Person 6: — Database VG, which has a lot of data, but even if users are trained ultimately only one person in the organisation is able to use it. — ArcGIS with extra modules for network analysis/spatial analyst. — Kompas population forecasts.
Person 7: — Increase accessibility for cyclists and PT, i.e. the capacity and standard for bus and bike. — Actions to reach zero growth in car traffic. All growth to follow from PT, bike and pedestrians. — New road toll package and new parking regulation on Forus.	Person 7: — Registration of bus travel time. Registration of quality BikeWalk net. — Car traffic statistics, RVU. — RVU shows high car share, work trips to Forus. Registration of parking places and infrastructure for all modes.

Table 3.1: Answers to policy issues and tools

Question 6: When considering land use and transport systems, which data, tools, or information make you aware of development opportunities within the city?

- The same tools as mentioned above, but how they are used is important. There is an increasing need for more detailed data when planning for increased density and transformation in complex situations.
- We use the ATP model (Areal og Transport Model) to analyse accessibility, including strengths and weaknesses in the different networks (car, PT, cycling). The data is used to assess localisations, mobility plans, design of parking regulations, PT planning, etc.
- GIS based tools for analysis. Data on status on municipal level and municipal plan. Good traffic models can be of help to find alternatives and

decide on strategy. Limited information is available for freight/business logistics; it should be supplemented.

- The challenges and opportunities are great, not least in cooperation with other municipalities (e.g. cooperation on digital land accounts, an application to ArcGIS).
- It is a paradox that a major localisation (say 2 000 jobs) is decided today, while the consequences of the decision will be felt after several years when the surroundings may be completely changed (PT supply, traffic queues, and land use), and the consequences of the decision will last for several decades.

Question 7: How does your organisation match planning goals (e.g. increased access to labour force/locating residential development/locating employment centres) to transport modes?

Some of the planners pointed to the history of artificially low forecasts making the anticipated future challenges a lot smaller than what they actually became. The planning practice and plans then produce artificial knowledge, which politicians can use to show anticipated results (in fact unrealistic projections).

- Develop different tools for different planning tasks, land and area analysis. Supplement the Norwegian ATP model (land use, transport planning) with transport model elements.
- Bad! In principle overoptimistic goals, car development and welfare. Too little professionalism, too many elastic aims: 'We will to do good'. 15% is the PT goal, but now it is decreasing. At Forus the aim is 40% PT! It tells the politicians that it is easier to reach the goals than it actually is.
- Analysis of localisations in urban transformation. Now home and work is theoretically localised close to each other, but the opportunities are there also in practice. City transformation is the key to reduce VKT and increase density and TOD.

Question 8: When thinking about different transport modes in your city, what kinds of opportunities do you think are important for people to have access to?

Most informants found this question difficult to answer; they could not understand how to prioritise or grade opportunities.

Question 9: When preparing or assessing a plan, what information does your organisation use to assess the efficiency of local and regional accessibility within the city? (*defined by the user, please specify)*

The planners interviewed pointed to the history and the knowledge collected over the years. If the accessibility information is there, then it is used. If not, accessibility often is described without the use of formal models.

- Use accessible travel data, multimodal network, business data to describe an area's mobility and likely transport needs.
- Accessibility maps. Travel time with different modes in the actual travel market for the planning area.
- Test walk distance, cycle distance, terrain, work in parallel, network analysis in GIS.
- Strategic transport planning at regional level: 1) population, welfare growth, 2) RVU (travel study) and freight, 3) spatial organisation. There are two important parts, registration and prognosis. You have to know the explanatory value, and you must be able to assess uncertainty.
- Accessibility is assessed towards goals, but goal achievement is often ignored or interpreted very widely.

Question 10: How are tools or data outputs from tools selected for use in preparing or assessing a plan?

The participants provided very similar as in question 9: if accessibility information is there or a model at hand, then it is used. If not, accessibility often only described without the use of formal models.

- Assess capacity and demand in road networks, parking, public transport supply and bike-walk system in the study area. Evaluate sensitiveness and alternative opportunities for bus, walking and cycling.
- Depends on type of plan and land use. Shopping and service areas have different mix of modes and travel distances than for example workplace locations.
- Accessibility in short trips (typical shopping) is completely different than longer trips (typical work journeys). The type of trip decides what type of data one focuses on.
- It is very important: for all tools to communicate. The traffic plan is always drawn in Dac. Simple and effective GIS is used in strategic planning.
- Classic reporting and dissemination, decision-making support. People must understand the essence of the message and the available knowledge (presentation of models). Illustrations provide 70% of the message through visual impressions.

- Municipality intranet has most programmes accessible, and most of the information is there.

Question 11: Where in the organisational hierarchy of your organisation are decisions made about accessibility? (e.g., informal meetings with colleagues; a decision-making committee, or by tech reports to politicians)

(This question is a very complicated question, and social scientists have been struggling with it for years.)

- Planners' meetings.
- County director is the real decision-maker; the administration only provides recommendations. Rogaland County is good at drawing the line between politicians and planners.
- The state ('Access for All' law) criteria for accessibility.
- The political steering group decides on the Transport Plan. In practice the planners and transport officials decide together through cooperation.

Question 12: Comments?

There is an overall demand among the planners for an integrated land use and transport planning model, which can easily simulate different alternative paths and trajectories using different policy instruments to reach policy goals.

- The tools we use are developed by our company (ASPLAN) and I have used these for many years. Accessibility analyses show a high degree of sensitivity since the trips are relatively short in the region, and because modes like walking and cycling are sensitive to distance. Public transport is also relatively sensitive since competition with the car is geographically limited (hence the low grade of PT accessibility in the 'city belt').
- Tools that integrate land use and transport systems are required. This would give the opportunity to decide sensitivity and the strength of different variables in an integrated process.
- There are several methods for calculating and assessing accessibility, but little professional discussion about the topic.
- There is a need for an interactive land use and transport planning model for all levels: region, city and neighbourhoods.
- VISUM should be acquired by the county council.
- The regional section and the transport section have two different cultures. The regional section looks at legal precedence and ignores substance. Often the regional section knows the government's view in advance, and follows this line of thinking! The regional planning section is more democratic.

- A wish: a model that 1) combines travel mode choice with input from land use/accessibility models, and 2) visualises the results, which now is very difficult. A better interface model and dissemination/visualisation tools need to be developed.

Conclusions

This quote from one of the informants gives a good picture of the present state of affairs in the Stavanger region:

Competence in planning? Architects/planners believe that land use is decided and then transport follows. There is a need for better understanding of the complexity and how regional strategies can influence change.

This statement points to the current inadequate approach in the planning institutions. The fragmentation and sectorisation of the planning institutions across levels and layers has produced a gulf: land use planners make their plans and transport planners theirs, with little integration between the respective plans. The informant also sees improved knowledge and understanding of the complex processes of urban change as the way to increase planning competence. However, increased planning competence does not automatically lead to better planning outcomes (e.g. the desired modal shifts).

The interviews in the Stavanger region were done to find out what the planners described as their major tasks, and in particular how accessibility tools could be helpful in planning practice. These conclusions assess the information from the interviews in the perspective of how the planners have experienced past planning and the major challenges that confront the Stavanger region.

Past experiences with accessibility planning

On the following map of the Stavanger region the black dots show where new office buildings have been localised between 2000 and 2007. The aim and the plan was build a more compact city with better access to the PT system, hence all new buildings should be localised around important PT nodes with good walking accessibility to the network (or at least close to the PT network). However, as the map clearly shows, the majority of the new office buildings are located in the white part, outside the coloured area with good accessibility.

The dark yellow circles on the map are nodes with very good accessibility defined with the use of GIS tools and adjusted according to the planners' local knowledge. The main information in the map is that the majority of new jobs in the region are localised far from the PT system and thus contribute to more car

dependence. The lesson from the past planning is that good accessibility knowledge did not improve planning practice in the Stavanger region or lead to achieving transport goals.

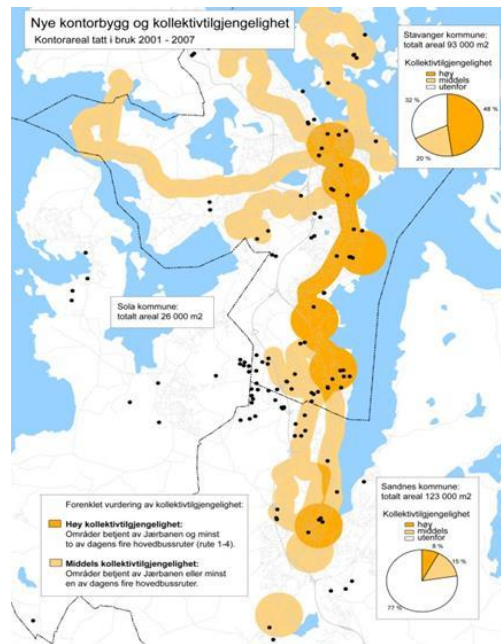


Figure 3.44: The Stavanger region (Source: KVV Bybanen)

The major challenges for the Stavanger region and planning practice

The Stavanger region is the most automobile dependent region in Norway; it is the richest region, and it is also the fastest growing urban area. One major challenge for the region is the increase in the number of inhabitants, illustrated in the figure below.

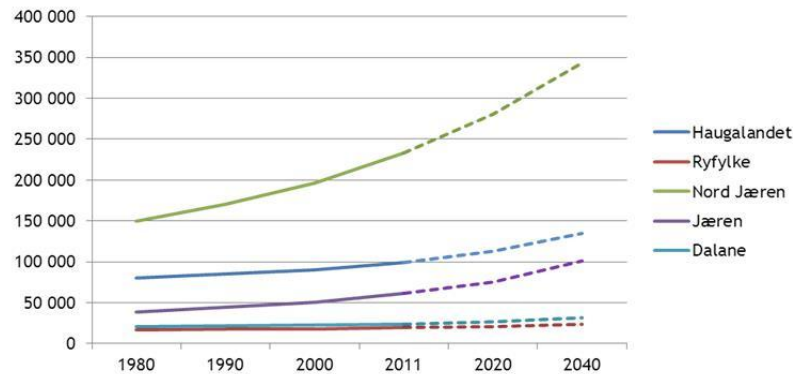


Figure 3.45: Population growth in Stavanger region (Source: SSB)

The green line for Nord Jæren is fairly similar to the Stavanger region. Up to 2040 the population is expected to grow with more than 40%. With the region bordering the best agricultural land in Norway, the additional population will be located within the existing urban area and on the edge of the urban area. Hence, the average travel distance will increase and more residents will live in areas that are very difficult to service with a good PT system and have poor accessibility.

Another major challenge is that the residents are becoming more affluent and hence will buy more cars. Income per capita in the Stavanger region is very high. The income development 2000–2010 for different regions in Rogaland County and for Norway as a whole is shown in the figure below.

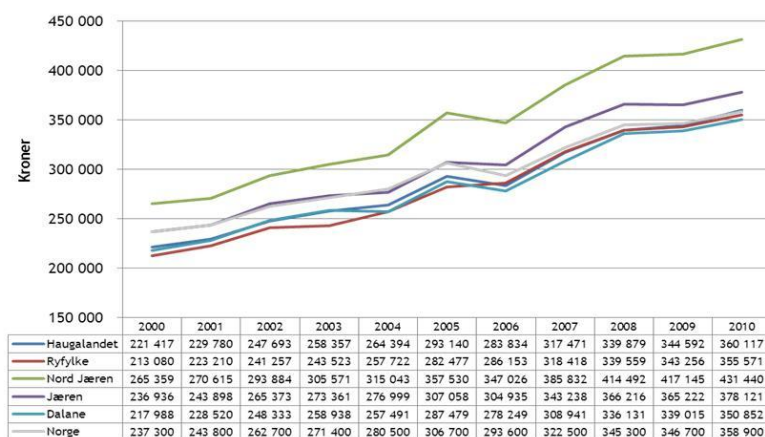


Figure 3.46: Income developments in the region (Source: SSB, adapted by Rogaland County)

The Stavanger region (Nord Jæren) has an income per capita that is about 20% higher than the national average. Incomes in the Stavanger region will also

grow much faster than the national average in the years up to 2040, according to government projections. This background is important for understanding the answers of the interviewees.

The main lessons from the Stavanger region

First, there is a call for an effective model that integrates land use and transport. The model must be easy to use so that the consequences of different strategies at the regional level, strategies at the municipal level and planning proposals at the local level can be evaluated at low costs (time and money). It must also be so easy to use that it becomes a tool in daily practice.

Second, the lack of goal achievement and inefficient planning shown above raise questions about the fragmented planning system and political decisions. The planners' carefully elaborated plans—which are also adopted by the politicians—seem to have little influence on political decisions when a new development proposal is in conflict with the plan. This is very frustrating for planners, and they do not feel that more knowledge produced by better planning instruments (i.e. the accessibility model) would improve this situation.

Third, there is already a large body of tacit knowledge among planners in planning offices. When the currently available accessibility instruments are stacked against this existing tacit knowledge, they are not able to produce data that can significantly improve upon present planning practice in the region.

Chapter 4 AGGREGATED OUTCOMES

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Alberto Dominguez

David Zaidel

4.1 Participant profiles

Thirteen out of the 17 cities that organised local workshops submitted a complete set of evaluation surveys and these were subsequently included in our analysis. In total, 80 professionals participated in twelve European and one Australian workshops (see Table 4.1). The number of participants varied from 3 in Breda (the Netherlands) and in Helsinki (Finland) to 10 in Lisbon (Portugal) and in Adelaide (Australia). The per workshop average was six participants. The majority of the participants were male (69%), young (31–45 years old, 46%) and middle-aged (46–60 years old, 44%) (see table 4.2). A variety of professions formed the workshops teams: transport planners (43%), urban planners (26%), architects (8%), urban and transport planners (6%), regional planners (4%) and others (lawyers, surveying engineers, housing developers; 14%). The majority of the professionals worked at a public organisation (78%), while 17% worked in the private sector. Five per cent of the participants were affiliated with universities or non-governmental organisations.

Gender		Age		Profession		Organisation	
Male	55 (69%)	<30	3 (4%)	Urban planner	21 (26%)	Public	62 (78%)
Female	25 (31%)	31–45	37 (46%)	Transport planner	34 (43%)	Private	14 (17%)
		46–60	35 (44%)	Architect	6 (8%)	Other	4 (5%)
		>60	5 (6%)	Urban and Transport planner	5 (6%)		
				Regional planner	3 (4%)		
				Other	11 (14%)		

Table 4.1: Cities, countries and number of participants in the local workshops

City (country)	Participants	City (country)	Participants
Adelaide (Australia)	10	Breda (the Netherlands)	3
Limassol (Cyprus)	6	Krakow (Poland)	7
Helsinki (Finland)	3	Lisbon (Portugal)	10
Munich (Germany)	8	Ljubljana (Slovenia)	5
Volos (Greece)	4	Madrid (Spain)	5
Rome (Italy 1)	8	Göteborg (Sweden)	4
Turin (Italy 2)	7		
Total (13 cities)			80

Table 4.2: The socio-demographic profile of the participants in the local workshops

4.2 Perceived quality of the process

All participants were asked 16 questions about the session in the post-workshop evaluation survey. Their combined responses are presented in Figure 4.1. The participants shared a very positive general reaction about the process, as indicated by the first four questions. Specifically, the vast majority of the respondents (97%) stated that the session resulted in useful results, while 97% were satisfied with the session itself. Seventy-three per cent of the respondents felt that the results of the session were based on correct assumptions, and consequently they were confident that the group solution they reached was correct (77%). Questions 5 to 7 explored how insightful the session was for the participants. Between 76% and 80% of the respondents stated that the session provided useful insights regarding the processes underlying the planning problem, the opinions of the other participants and the possibilities that their organisation has in 'steering' the problem. Seventy per cent of the participants did also state that they would use the insights from the session in their daily planning practice (q. 9), and they expressed commitment to share the session results within their organisation at a very high rate (q. 8: 88%). The perception of enhanced communication was also high, as 88% agreed or strongly agreed that the process helped them interact with the other participants and understand their ideas about the problem (q. 10), while 68% had a strong sense of being part of a group during the session (q. 15). This positive view is further reinforced by the positive responses about the perception of consensus in terms of reaching a shared vision regarding the problems (q. 12: 72%) and the goals (q. 13: 66%). However, the participants were more sceptical about the contribution of the session to the development of a shared professional language with their colleagues (q. 11, 11% disagreed or strongly disagreed). The difficulties in developing a shared professional language may also have affected the respondents' perception of the contribution of the session to reaching a shared vision on the possible solutions (q. 14, only 60% agreed or strongly agreed).

Out of the 16 questions, five questions (1, 5, 7, 11 and 14) were selected for further investigation of the perceived quality of the session according to participating city (see Figure 4.2). According to the results, participants in the Adelaide and Rome workshops were more enthusiastic about the process (70% and 63% strongly agreed respectively). The participants in Turin, Breda and Krakow were the least positive about the usefulness of the session's outcomes, with no one expressing strong agreement that the session resulted in useful results. In the other cities, the participants strongly agreed that the session resulted in useful results (between 11% and 33%). The workshops in Helsinki, Limassol, Volos and Lisbon were, according to the participants, the

most insightful in terms of the processes that play a role in the problem (it should be noted that 20% of Lisbon's participants had a neutral reaction about this factor). On the other hand, 14% of Krakow's and Ljubljana's participants found the workshop not insightful at all, while 29% of them had a neutral reaction. Krakow was also very negative regarding the insights the session offered in terms of understanding the opinions of the other participants about the problem. On the other hand, participants in Limassol, Helsinki and Gothenburg appeared to be very positive about this factor (33%, 33% and 25% strongly agreed respectively). Krakow was among the cities where participants stated in relatively high numbers that they did not develop a shared language during the session. In fact, the lowest perception of development of shared language was found in Munich, followed by Gothenburg and Helsinki. Finally, participants in the Gothenburg, Helsinki and Munich workshops strongly agreed (75%, 67% and 25% respectively) that they reached a shared vision on possible solutions during the session. Also, Madrid's, Adelaide's, Ljubljana's, Lisbon's and Volos' participants gave relatively positive responses.

Two groups of cities can be identified based on the results about the perceived quality of the process. In the first group, participants stated that the session did indeed allow them to penetrate deeper into the problem, understand the views of their co-participants, develop shared language, and finally reach a consensus about the possible strategies. As a result the participants from this group of cities appeared to be more satisfied with the session. These cities include Limassol, Volos, Lisbon and Madrid, with Adelaide, Helsinki, Munich and Gothenburg also close by (despite the relatively negative attitudes concerning the development of a shared language). In the second group of cities, the participants were less positive about the insights into the problem and into the opinions of their co-participants that the session had provided. They were also quite sceptical about the contribution of the session to the development of a shared language and consequently of a shared vision on the potential solutions. Turin, Breda and Krakow fall in this second group of cities.

The final set of results presents the variations of the perceived quality of the process according to gender, age, profession and the sector of the participants' organisation (Figures 4.3 to 4.6). Thirty-three per cent of male participants strongly agreed that the session produced useful results, while the respective rate for female participants was only 17%. Moreover, more male participants strongly agreed that the session was insightful regarding the problems and the participant's views (22% and 17% respectively) compared to female participants (20% and 4% respectively). The perception of the development of a shared language was similar for both genders, but more female participants stated that they reached a shared vision on the possible solutions than their

male counterparts (13% to 7% respectively). The variation of the perceived quality of the process between the younger (<45 years old) and older participants (>45 years old) was not high. Both groups were very satisfied with the session. The older age group was slightly more positive regarding the insights the session offered, while in contrast, the younger age group was more positive regarding the development of a shared language and a vision of the possible solution. Urban planners strongly agreed that the session resulted in useful results (32%). Their views were more positive than the transport planners' (21%), although both groups were positive about the outcomes of the session. Finally, the private sector participants were more enthusiastic about the session than their public sector counterparts (36% to 27% respectively in the 'strongly agree' category). Additionally, private sector participants perceived the session more positively concerning both the insights into the problem it offered and the development of a shared professional language.

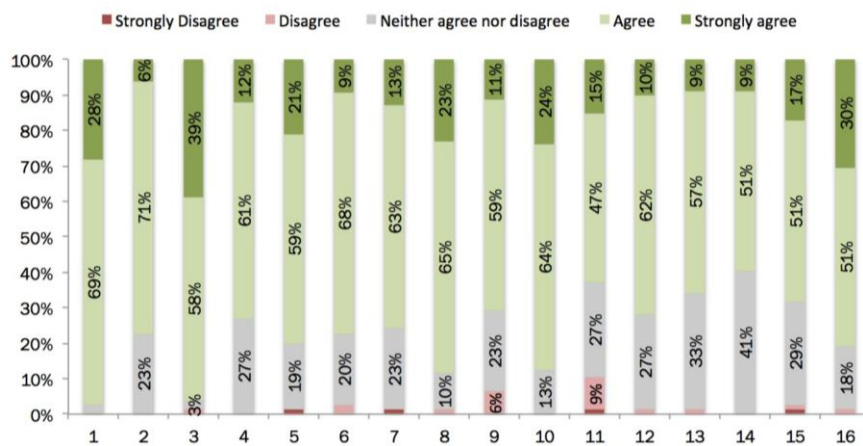


Figure 4.1: Perceived quality of the process aggregated for all 13 participating cities

1. The session resulted in useful results
2. I am confident that the group solution is correct
3. I am satisfied with this session
4. The results of the session are based on correct assumptions on the underlying system
5. I now have more insight into the processes that play a role in the problem
6. The session has given me insight into the possibilities my organisation has in 'steering' the problem
7. My understanding of the opinions of the other participants about the problem has increased
8. I will communicate the results of the meeting in front of other members of my organization
9. I will use insights from the session in my daily planning practice
10. The process helped me interact with other participants and understand their ideas about the problem
11. During the sessions we have developed a shared professional language
12. We have reached a shared vision of the problem
13. We have reached a shared vision on the goals
14. We have reached a shared vision on the possible solutions
15. I had a strong sense of being part of a group
16. The session was time efficient

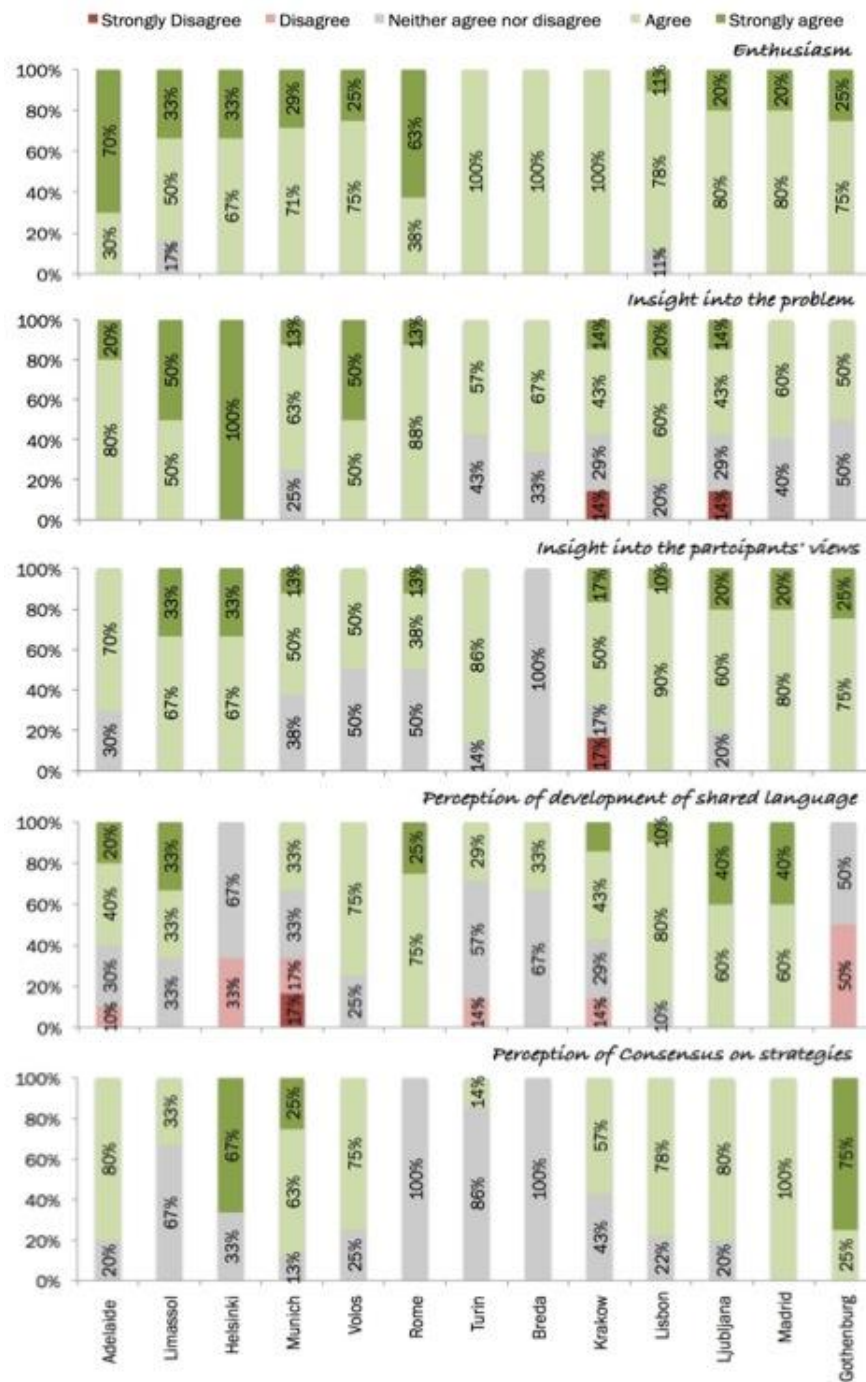


Figure 4.2: Perceived quality of the process according to city

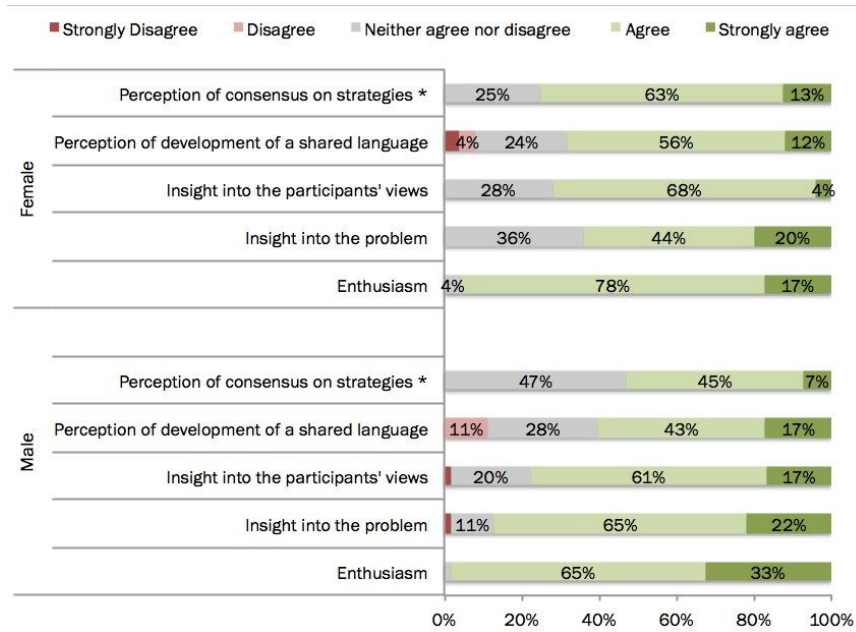


Figure 4.3: Perceived quality of the process according to gender. Statistically significant differences are shown as * $p < 0.05$, ** $p < 0.1$ (Mann-Whitney U test)

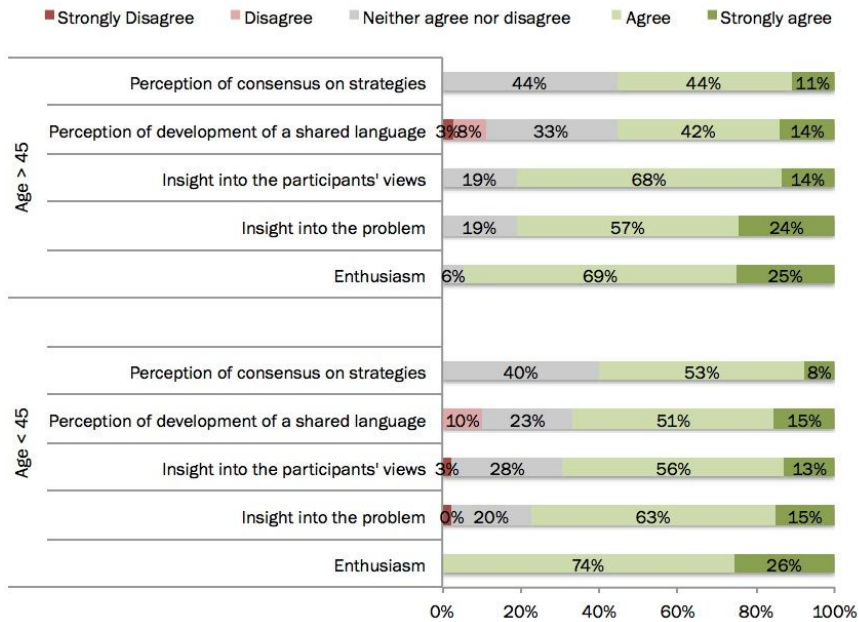


Figure 4.4: Perceived quality of the process according to age. Statistically significant differences are shown as * $p < 0.05$, ** $p < 0.1$ (Mann-Whitney U test)

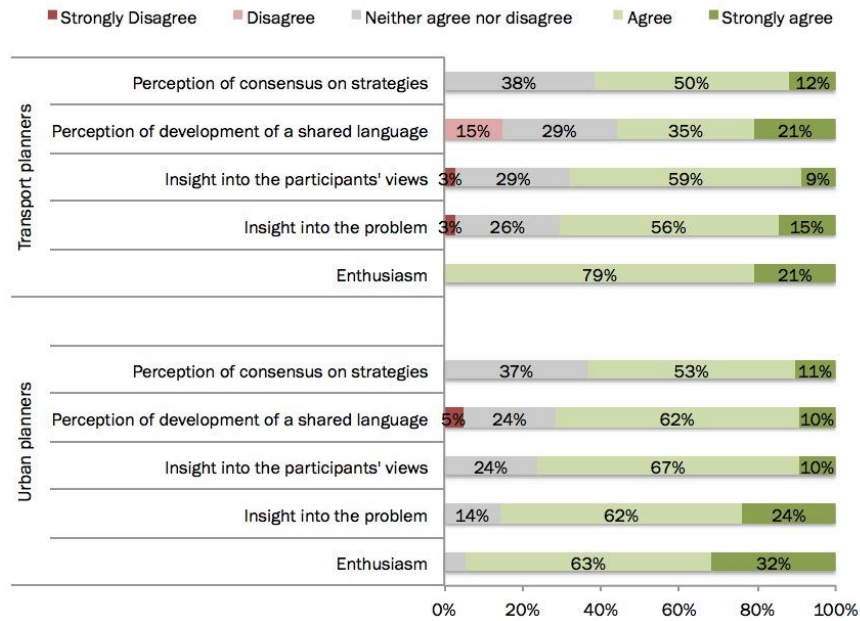


Figure 4.5: Perceived quality of the process according to profession. Statistically significant differences are shown as * $p < 0.05$, ** $p < 0.1$ (Mann-Whitney U test)

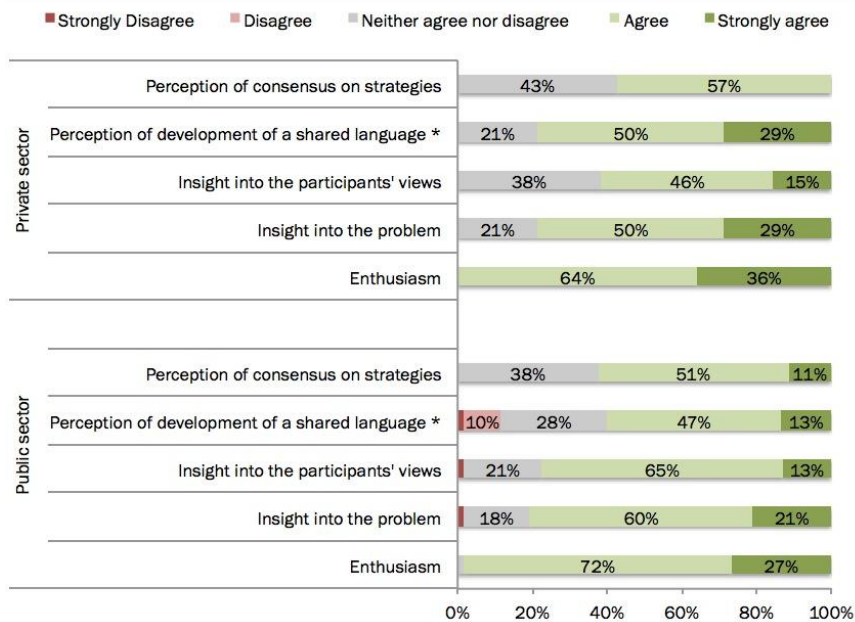


Figure 4.6: Perceived quality of the process according to the organisation's sector. Statistically significant differences are shown as * $p < 0.05$, ** $p < 0.1$ (Mann-Whitney U test)

4.1 Perceived usability of the instruments

All participants were asked 21 questions about the usability of the instrument in the post-workshop evaluation survey. Their responses are presented in Figure 4.7. In general the participants expressed very positive views regarding the usefulness of the instruments in real-life planning practice (q. 18: 86% agreed or strongly agreed). They also found the instruments relevant to their profession (q. 21: 91% agreed or strongly agreed). Eighty per cent of the participants responded that the instruments offered them new insights into planning problems (q. 22), although this percentage dropped quite low (to 48%) when the participants were asked about the insights that the instruments offered into the land use–transportation relationship (q. 35). The instruments were also found to be useful for generating and identifying problems in the urban structure (q. 25: 92%), analysing problems (q. 28: 89%), selecting strategies (q. 26: 91%) and finally implementing solutions (q. 27: 86%). On the other hand, two groups of barriers were identified concerning the potential use of the instruments in planning practice: first, the technical and resources barrier (see questions 17, 19, 24, 36 and 37), and second, the political barrier (see questions 20, 32, 33 and 34). Specifically, the participants expressed significant concerns about the familiarity of their organisations with accessibility instruments, and, therefore, they felt that the instruments presented in the workshops would most likely not be used (q. 19: 26% disagreed or strongly disagreed). Moreover, a significant portion of the participants believes that their organisations do not have sufficient resources, in terms of time and money (q. 36: 22%); data (q. 37: 15%); and computational skills (q. 17: 14%). Also 34% (q. 24) of the participants believe that due to the high required precision of the presented instruments, they would be too costly for the organisations to apply in planning practice.

Seven out of the 21 questions (18, 19, 20, 22, 24, 28 and 35) were selected to further investigate the perceived usability of the instruments according to participating city (see figures 4.8 and 4.9). According to the results, participants in the Adelaide, Limassol, Munich, Madrid and Helsinki workshops were the most positive regarding the appropriateness of the instrument for the analysis of urban structure problems (40%, 50%, 50%, 20% and 100% strongly agreed respectively) and support of planning decisions (20%, 33%, 38%, 20% strongly agreed and 100% agreed respectively). Moreover, the instruments in the Adelaide, Helsinki, Munich and Gothenburg workshops were found to be insightful for planning problems (40%, 50%, 43% and 75% strongly agreed respectively), while in cities like Turin, Lisbon, Ljubljana, Krakow and Breda the participants were less positive and more neutral about this factor. The instruments in all cities seem to be less successful in giving insight into the

land use–transportation relationship. Specifically, in Krakow, Lisbon and Ljubljana the previously neutral assessment about the general insight into problems, turned into a negative perception regarding the insights provided into the land use–transportation relationship (14%, 30% and 20% disagreed or strongly disagreed respectively). However, the most negative perception of this factor was recorded in Helsinki, Gothenburg, Madrid and Limassol (50%, 50%, 20% and 17% strongly disagreed respectively). Finally, regarding the barriers to use of the instruments in planning practice, participants in Limassol, Helsinki, Breda, Krakow, and Ljubljana perceived the most significant political constraints (67%, 50%, 66%, 40% and 50% disagreed or strongly disagreed respectively). From this group of cities, Ljubljana’s and Breda’s workshop participants also identified significant barriers regarding the complexity of the model and its subsequent cost increase (40% and 33% disagreed or strongly disagreed respectively). This factor was also important for the participants of many other cities, including Adelaide, Rome, Turin, and Lisbon (11%, 50%, 14% and 28% disagreed or strongly disagreed respectively). The level of familiarity of their organisations with accessibility modelling seems to be also a significant barrier for many other organisations in different cities like Rome, Breda, Limassol, Madrid, Adelaide, Lisbon, Ljubljana and Munich (88%, 66%, 40%, 25%, 22%, 20%, 20% and 13% disagreed or strongly disagreed respectively).

The final set of results presents the variations of the perceived usability of the instruments according to gender, age, profession and the sector of the participants’ organisation (figures 4.10 to 4.13). Women tend to see more barriers on the technical level regarding, for example, the level of familiarity of their organisation with the accessibility instruments (48% disagreed or strongly disagreed; the respective rate for men was 23%), while men tend to focus on the political constraints (25% disagreed or strongly disagreed; the respective rate for women was 10%). Also, half of the participants from the ‘over 45 years old’ age group felt that the lack of technical skills in their organisation would be a significant barrier in using the instrument (51% disagreed or strongly disagreed). The complexity of the instrument and the political constraints are recognised as important barriers by the older age group as well (12% and 22% disagreed or strongly disagreed respectively). Moreover the older age group responded that the instruments did not offer adequate insights into the land use–transportation relationship (24% disagreed or strongly disagreed). Regarding the profession category, urban planners tend to perceive more barriers for using accessibility instruments in their daily planning practice compared to transport planners. These barriers comprise the technical skills and familiarity of their organisation with accessibility modelling (45% disagreed or strongly disagreed) and the political constraints (19% disagreed or strongly disagreed). Urban planners are also less sure about the usefulness of the

instruments in real-life planning problems (6% strongly disagreed) and about the insights into planning problems that the instruments provided during the sessions (5% disagreed). No major differences in the perceived usability of the instruments were identified between public sector and private sector employees.

In the following chapter we will further explore some possible interpretations of the observed differences within and between cases, and reflect on their potential implications for research and practice.

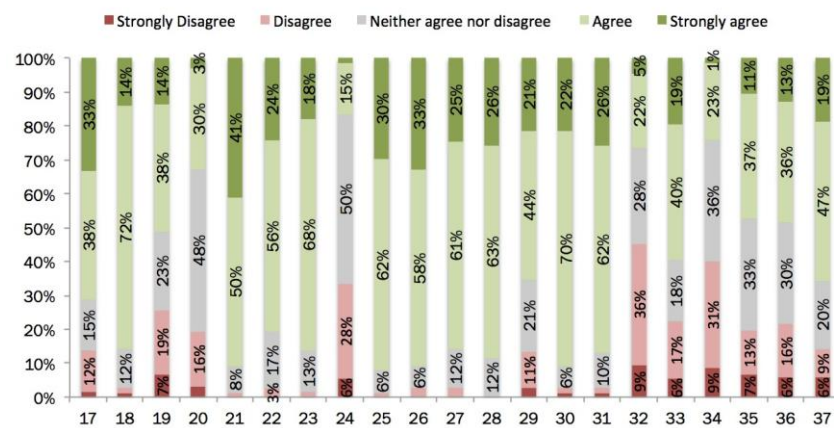


Figure 4.7: Perceived usability of the instruments aggregated for all 13 participating cities

17. My organization has the required computational skills to use the instrument "x"
18. The concepts/calculations/assumptions used in instrument 'x' could be useful in real world planning decisions
19. Instrument 'x' would likely be selected for use in planning decisions as the organization is familiar with accessibility instrument
20. The results from instrument 'x' are strongly related with the political commitment of my org.
21. Accessibility instruments are relevant to my profession
22. Instrument 'x' offers new insights to planning problems
23. The organization serves the needs of multiple communities, and instrument 'x' outputs would be useful to inform the debate
24. The precision of instrument 'x' would not increase its cost
25. Instrument 'x' would be useful at generating and identifying problems in the urban structure
26. Instrument 'x' would be useful at selecting strategy/options for the urban structure
27. Instrument 'x' would be useful during implementation of an urban structure solution
28. Instrument 'x' would be useful for analysis of urban structure problems
29. Access. Inst. outputs should be part of a learning process and not provide answers
30. Access. Inst. outputs should be used to communicate urban structure concepts and ideas
31. Access. Inst. outputs should be used to look for alternative scenarios to a planning solution
32. Conflicting policies between agencies does not inhibits the use of accessibility instruments
33. The culture of the organisation enable the use of accessibility instruments
34. There is formal or informal incentive for coop. between agencies on accessibility issues
35. Inst. 'x' has demonstrated well the relationship between land use and transport to be useful
36. There are sufficient resources in my org. (time/money) to complete accessibility modelling
37. There are sufficient resources in my org. (data/skills) to complete accessibility modelling

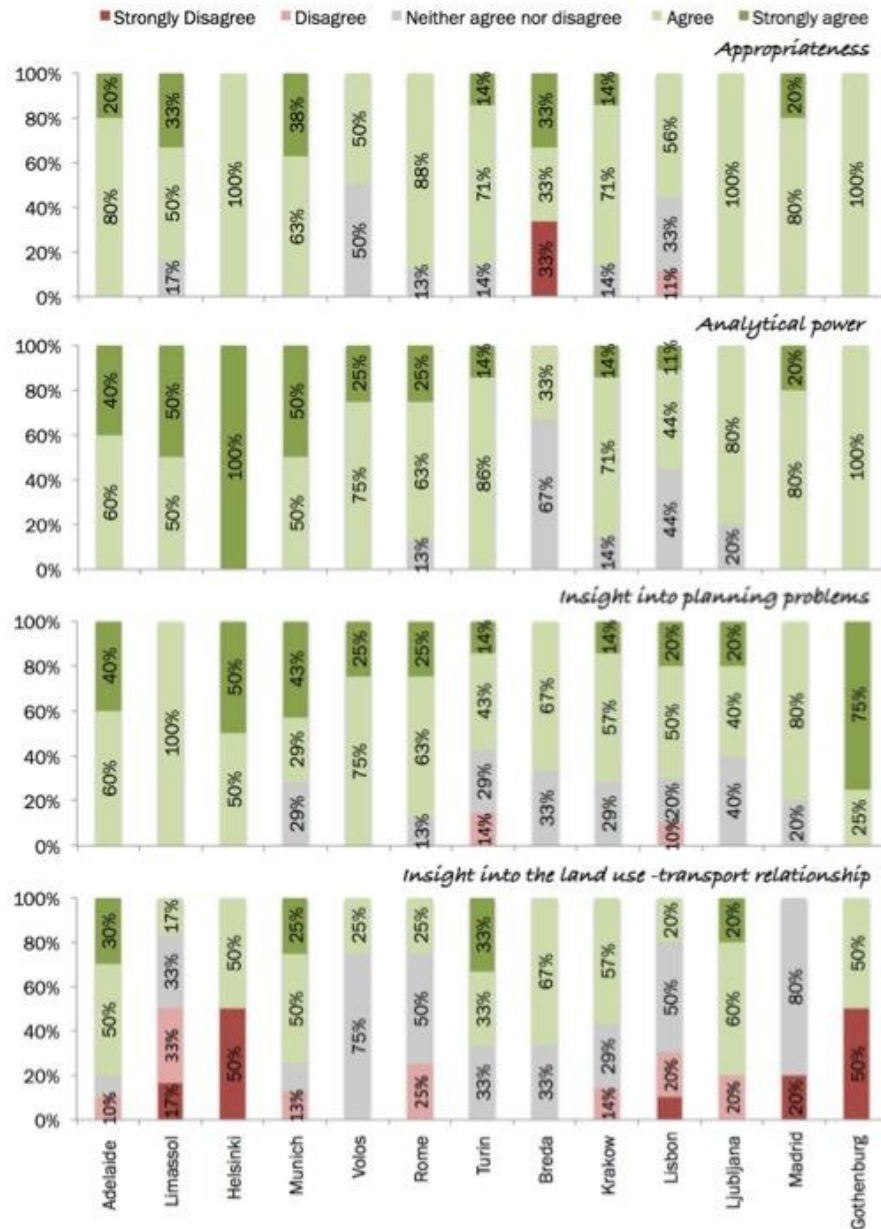


Figure 4.8: Perceived usability of the instruments according to city (1/2)

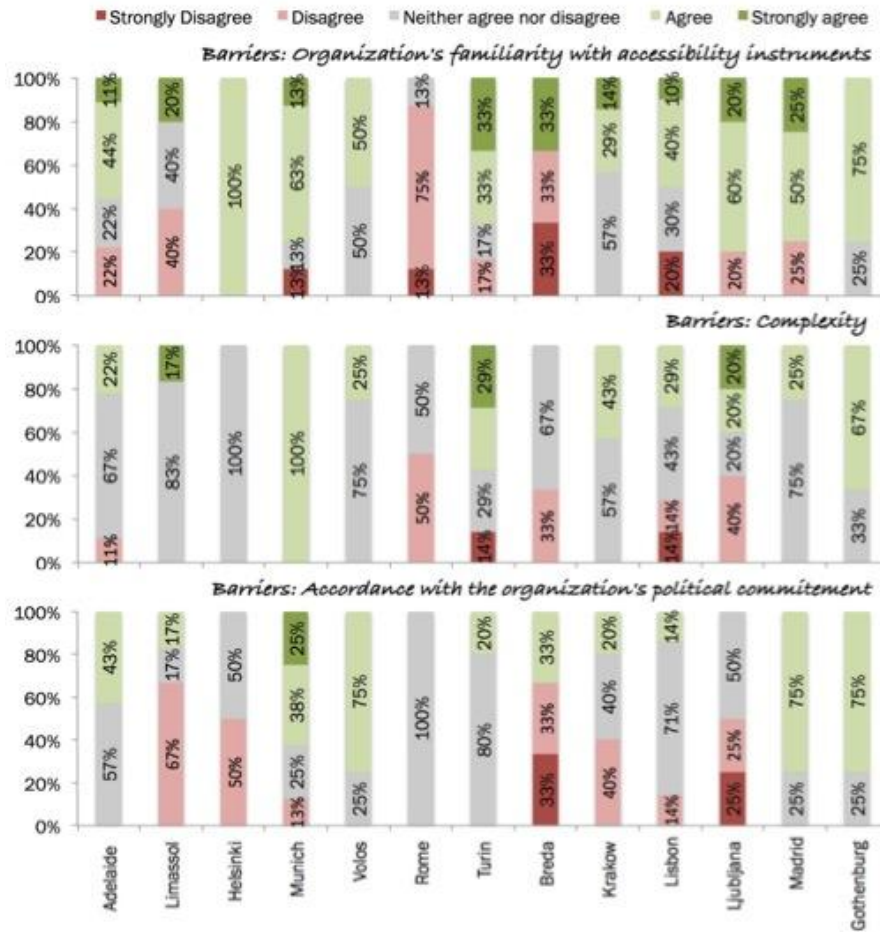


Figure 4.9: Perceived usability of the instruments according to city (2/2)

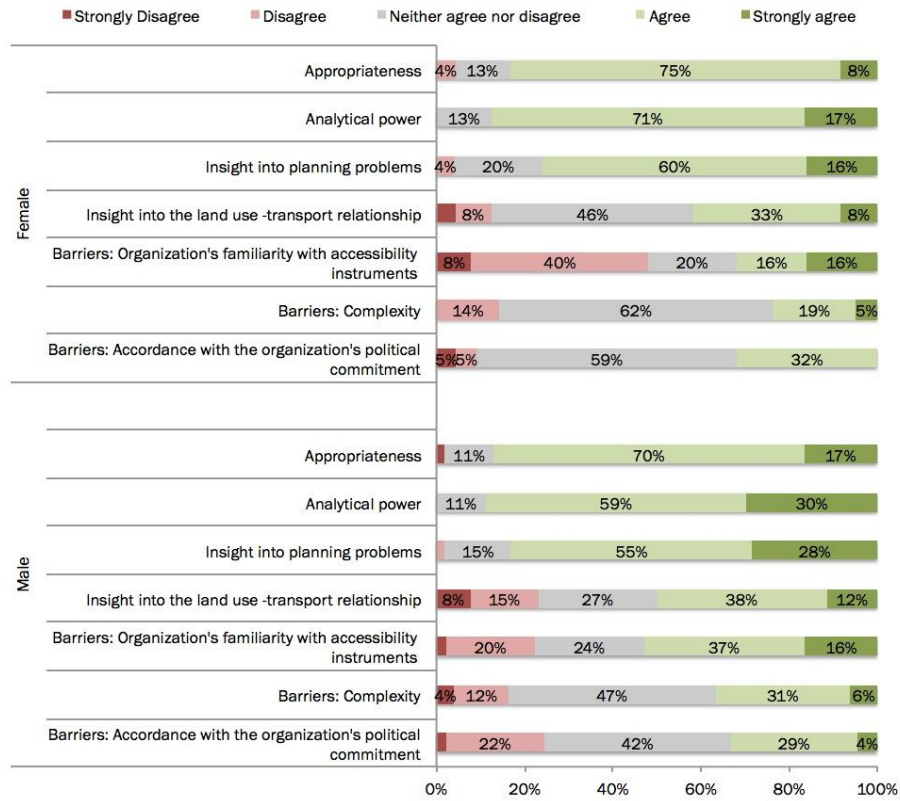


Figure 4.10: Perceived usability of the instruments according to gender. Statistically significant differences are shown as * $p < 0.05$, ** $p < 0.1$ (Mann-Whitney U test)



Figure 4.11: Perceived usability of the instruments according to age. Statistically significant differences are shown as * $p < 0.05$, ** $p < 0.1$ (Mann-Whitney U test)

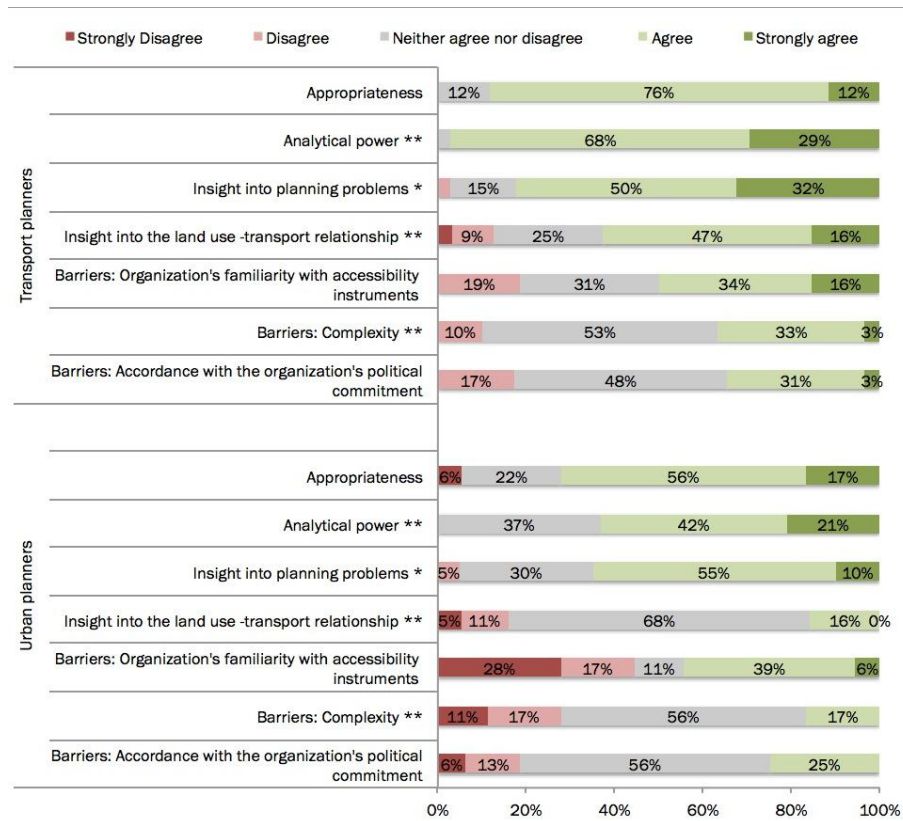


Figure 4.12: Perceived usability of the instruments according to profession. Statistically significant differences are shown as * $p < 0.05$, ** $p < 0.1$ (Mann-Whitney U test)

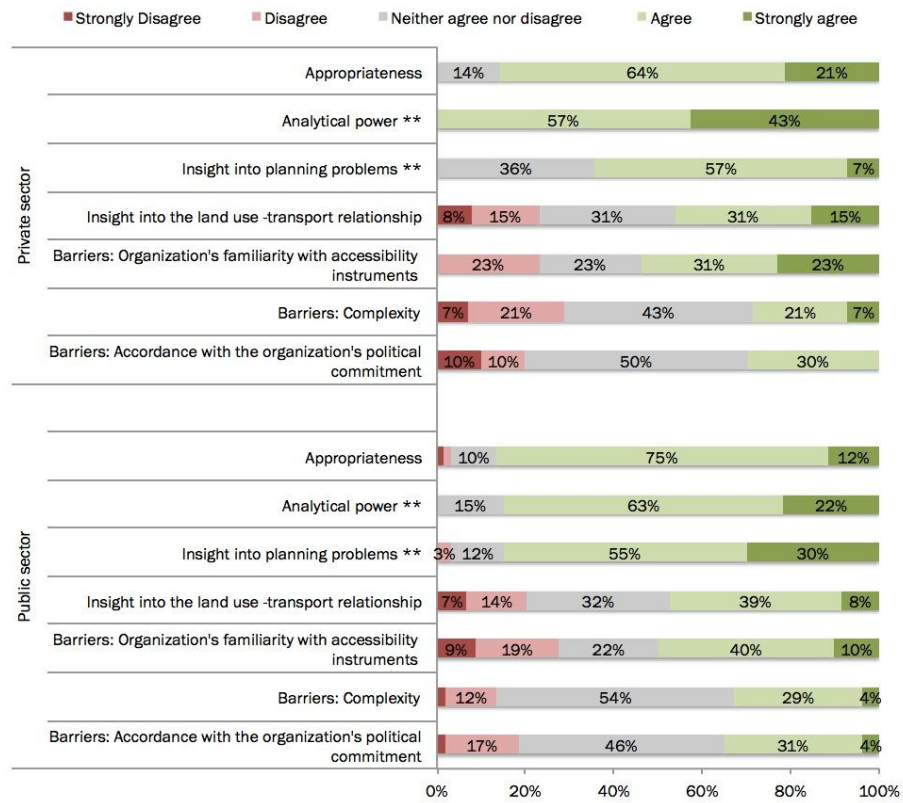


Figure 4.13: Perceived usability of the instruments according to the organisation's sector. Statistically significant differences are shown as * $p < 0.05$, ** $p < 0.1$ (Mann-Whitney U test)

Chapter 5 CONCLUSIONS AND DISCUSSION

Marco te Brömmelstroet, Carey Curtis, Anders Larsson & Dimitris Milakis

5.1 Conclusions

This report started by identifying the potential of accessibility instruments to support planning practices and by discussing the implementation gap that limits this potential. We set up an experiential research design to investigate the usability of current accessibility instruments and to gain insights into the types of interventions that can improve usability. The research question was defined as follows:

How usable are accessibility instruments in supporting urban planning practices across Europe, and how can their usability be improved?

Building on the pragmatic paradigm of research in planning (coined realistic evaluation), we attempted to answer this question through multiple experiential case studies in which a wide variety of instruments were used and tested in simulated real-life planning practices. Through discussions within the COST Action TU1002 partners, we developed a standardised approach for the workshops central to these case studies and the questionnaires on the usability of the instruments.

In total, 17 workshop-based case studies were performed across Europe and Australia; also one interview-based study from Norway was added. The case studies fed into this report with rich accounts of each individual workshop, local planning context and instrument usability characteristics (Chapter 3). Next to these reports, a number of indicators were collected and analysed, in order to help the team interpret the underlying patterns (Chapter 4). Below, we will draw conclusions based on these empirical findings and divide them between those on the experiences of the planning processes in the workshop and on the perceived usability of the accessibility instruments.

Participant definitions of accessibility and their prior experience with using accessibility instruments

The findings seem to indicate that the reactions to the accessibility instrument are influenced by (1) how the practitioners define accessibility, and (2) by their prior experience of using accessibility instruments and transport models. It seems that prior experience with an accessibility instrument makes it easier to use another instrument, due to the acquired baseline understanding of the concepts.

In our analysis we found that the most frequently proposed definition of accessibility was 'the ease of getting to a place'; however, the fact that a very wide range of definitions was suggested indicates that there is still a need for the development of a shared language.

A final thought that arose from this analysis is that the types of planning being undertaken by participants as well as the extent to which their respective organisations see accessibility seems to matter as a core part of their policy direction are important. Both aspects seem to influence the participant's ability to grasp accessibility as a concept and, therefore, are integral to their assessment of usability.

Defining a planning problem—the richness of approaches to accessibility

All 17 workshops focused on existing planning problems in their local contexts, which can be broadly divided into the following types (although some instruments cross this typology):

- 1) Accessibility to/from specific amenities or infrastructure projects;
- 2) General accessibility indicators/levels for areas;
- 3) Network-based accessibility and connectedness (none or only a limited land use component).

Typical examples of the first category are Munich, Turin, Madrid and Gothenburg; there the instrument was used to answer a specific planning question (for example, in the Munich case the interest was to accommodate increased housing demand and its distribution in relation to accessibility). In the second category (e.g., Adelaide, Rome and Lisbon) accessibility measures and indicators were used as part of a more comprehensive planning process in the respective area. In this group the planning interrogations focused on strategies to achieve sustainable urban development. The last set of cases (e.g., Volos, Limassol, Ljubljana and Izmir) took infrastructure-based measures of accessibility as a point of departure (for example, in Izmir alternative transport options for future mobility needs were assessed).

In response to this diversity of planning problems, different approaches were taken—ranging from interactive live scenario testing (via a combination of computer and pre-printed maps) to only printed maps and pre-defined planning problems. This span is related to the different technological configurations of the specific tool regarding real-time capabilities as well as to the data requirements and the means for manipulating and inputting new data in response to questions arising from the group.

Perceived quality of the workshop process

The participants had, in general, a very positive reaction to the process (for example, mentioning that the workshop gave useful results; satisfactory sessions; correct assumptions and group solution; useful insights with regard to the processes, the opinions of the other participants and the possibilities that their organisation has in 'steering' the problem). The moderator seemed to

have a central role in supporting the successful exchange of information. Finely honed skills and abilities are required to manage the process well and meet the Action's goals while, at the same time, following the participant discussions and offering solutions if the discussion takes an unexpected turn. Clearly, managing such an interactive and discursive process requires attentiveness and responsiveness, combined with an open mind to new possibilities.

Most participants stated that they would use insights from the workshop in their daily planning practice and that they would communicate the session results in their organisations. These statements attest to the value they placed on the accessibility instruments and their relevance to planning questions.

The perception of communication and cohesion was generally high among the participants. This is likely related to the positive responses about the perception of consensus in terms of reaching a shared vision on the problems and the goals.

Despite the high level of agreement across all workshops regarding the usefulness of the accessibility tool, there were key difficulties in developing a shared professional language. This may have had a negative effect on the respondents' perception about the contribution of the session towards reaching a shared vision on the possible solutions.

Two groups of cities can be identified based on the perceived quality of the process. In the first group (Limassol, Volos, Lisbon, Madrid, Adelaide, Helsinki, Munich and Gothenburg) the participants stated that the session did indeed allow them to penetrate deeper into the problem, understand the views of their co-participants, develop shared language (only in the first four cities of the group), and finally reach a consensus about the possible strategies. As a result the participants in this group of cities expressed higher satisfaction levels with the session than the participants from the second group of cities (Turin, Breda and Krakow). There the participants appeared more concerned about the insights into the problem and into the opinions of their co-participants provided by the session. They were quite sceptical about the contribution of the session to the development of a shared language and consequently a shared vision on the possible solutions.

Male participants appeared to be more satisfied with the sessions than female participants. All age groups were very satisfied with the session. Urban planners strongly agreed that the session resulted in useful results with a higher percentage than transport planners (although both groups had a positive reaction about the session). Participants who work in the private sector were more enthusiastic about the outcomes of the session than their public sector counterparts.

Perceived usability of accessibility instruments

The participants had in general very positive views regarding the usability of the instruments for real-life planning problems; the relevance of the instruments to their profession; and the insights that the instruments offered into planning problems (but not so much into the land use–transportation relationship).

The instruments were found to be useful for generating and identifying problems in the urban structure, analysing them, selecting strategies and finally implement solutions.

A common response across the workshops was that participants found the visual map-based media to be a very useful tool for communicating accessibility and for laying a basis for discussion. This latter aspect provided a particularly useful way for bridging the professional discipline divide. Generally, it was demonstrated that planners prefer maps, while transport planners are more at ease when presented with quantitative outputs.

Two groups of barriers were identified concerning the potential use of the instruments in planning practice: first, the technical and resources barrier, and second, the political barrier. The participants expressed significant concerns about the low familiarity of their organisations with accessibility instruments and, therefore, felt that the instruments presented in the workshops would not be used. Moreover, a significant portion of participants believes that their organisations do not have the sufficient resources, either in terms of time and money or data and computational skills. These findings mirror those found by Curtis (2011). Also the instruments' high precision requirements are perceived as a factor that would increase the cost of using them in planning practice.

The participants in Adelaide, Limassol, Munich, Madrid and Helsinki were the most positive regarding the appropriateness of the instrument for analysing urban structure problems and supporting planning decisions. Additionally, the instruments used in the workshops in Adelaide, Helsinki, Munich and Gothenburg were seen as providing significant insight into planning problems.

In all cities, it was reported that the instruments seem to be less successful in giving insight into the land use–transportation relationship.

Regarding barriers for applying the instruments in planning practice, the participants in Limassol, Helsinki, Breda, Krakow and Ljubljana perceive the political constraints as most significant. Complexity is also an issue in the majority of cases, including Adelaide, Rome, Turin, Lisbon, Ljubljana and Breda. The level of familiarity of their organisations with accessibility modelling seems to be also a significant barrier, as reported in many workshops (Rome, Breda, Limassol, Madrid, Adelaide, Lisbon, Ljubljana and Munich).

Women tend to see more barriers on the technical level regarding, for example, the level of familiarity of their organisation with the accessibility instruments, while men tend to focus on the political constraints. The older the participants, the more barriers they tend to perceive.

Urban planners tend to perceive more barriers to using accessibility instruments in their daily planning practice than transport planners. These barriers include the technical skills and familiarity of their organisation with accessibility modelling and the political constraints. Urban planners are also less sure about the usefulness of the instruments in real-life planning problems and about the insights into planning problems that the instruments provided.

Potential for improvement of accessibility instruments

Only one instrument (from the Torino workshop) could process scenarios in real-time. It offered users the opportunity to change infrastructure networks and directly recalculate the accessibility effects. A majority of the other teams concluded that real-time capabilities were the most-demanded feature missing in their instruments. Some instruments were able to perform scenarios in real-time, but teams decided to use printed maps in order to avoid any potential technical problems that would be detrimental to the rest of the workshop.

One further aspect mentioned by most teams is the positive influence of geographical maps in the presentation of accessibility and other data. The output of an accessibility analysis in the form of numbers, tables and graphs is often complex and requires a high degree of expert knowledge. Maps provide an overview that invites a much wider group of users to take part in the discussion. The ability to use maps to simplify the presentation of large amounts of spatial data is one key feature. Another, more indirect dimension, is the fact that maps puts the planning problem in its real-world place so to say. Planners can recognise places and relate accessibility to other planning questions from their everyday work.

Several teams commented on the usefulness of high-resolution geographical data. The ability to model the area in question in detail facilitates the usability in terms of 'being closer to reality'. Most instruments used administrative areas as the basis for visualisation. Some used a grid system while others relied on the infrastructure network level of visualisation. Although geographical detail was seen as a positive feature, there are potential methodological problems to aggregate such data into more general accessibility indicators.

One last point mentioned by many teams is the risk of information overflow. Accessibility instruments have the ability to be easily translated in printed maps, as experienced in many workshops where, accordingly, the organisers

had prepared a large number of them. However, in most cases only a few of the maps were eventually used in the exercise, because participants could not absorb more than five to six different maps in a single session.

5.2 Reflections on the methodology

The four-step process model was helpful in explaining to the participants the actions that were going to take place and their sequence. However, the case comparison made it clear that very few workshops were able to use the four-step model without alterations. In most cases workshop sessions had to be shifted or compressed due to the participants' tight schedules. In a few exceptional cases the organisers themselves defined the planning problems and even proposed solutions in order to complete the workshop.

Several cases reported problems with involving all participants in the discussion and/or spending extra time on technical discussion and explanation. This can be related to the need for a basic level of knowledge about accessibility instruments and the concept of accessibility—all participants shared at least a minimum level of understanding. Most workshops held a pre-meeting session in order to provide basic information to the participants; however, based on the reflections from the cases, it looks as if this stage needs careful attention, especially with participants from different planning specialisations (transport planners and urban planners).

A comparison of the cases shows that the focus on one specific planning problem makes the workshop process easier and clearer for the participants. From a methodological point of view, we recommend spending sufficient time on the formulation of a limited number of accessibility-relevant problems.

Most importantly, and even if we take into consideration all of the potential shortcomings listed above, the workshops show that the accessibility instruments can contribute to the development of a common language and proved to be a very good platform for cross-sectorial discussion about planning problems. Particularly due to its integration capabilities, the methodology has a clear potential for application in real-life planning contexts.

5.3 Discussion

As indicated in the introductory section of this report, accessibility planning by its very nature brings together a focus on both urban land use planning and on transport planning. Clearly this integrated focus requires interaction between at least two profession groups—transport planners and urban planners. Although both groups work to service the city's plans and projects, they tend to work

separately, i.e. at best cooperating with each other rather than collaborating (Curtis and James 2004). Each specialisation has its own unique professional training, skill set and ideology. The difference can be seen in their use (or lack of use) of transport models and accessibility instruments as well as in their diverse definitions of accessibility. An interesting finding is that urban planners are less convinced than transport planners about the usefulness of the instruments in real-life planning problems and the insights they gained during the sessions. In part this difference may relate to the barriers they perceive to using accessibility instruments (see below), but arguably, it may also be due to the fact that urban planners typically are already used to thinking about the city from a strategic accessibility perspective. The fact that urban planners questioned the usefulness of the accessibility instruments must be unpacked further. The reasons are likely quite diverse (e.g. perhaps accessibility is not yet a policy focus of their organisation). The fact that the cases analysed here are quite diverse and context specific compounds this limitation even further.

The nature of the planning questions (i.e. the perceived purpose of the planning exercise) may be at the heart of the matter. In most cases the focus is on either individual land parcels within a city and their future function (urban planners) or on how to provide access to a central location (transport planners). However, strategic accessibility considerations—such as how to ensure that all residents gain adequate public transport, walking or cycling accessibility—are infrequently or rarely addressed by both professional groups. In the workshops there was considerable variation in the ability and speed with which the participants grasped the concept of accessibility in a practical way, i.e. how to apply it to particular planning questions. In Breda, for example, while the group could propose a long list of planning questions that needed answers, they faced difficulties in translating these into accessibility questions—a predicament overcome only once the facilitator (the accessibility tool developer) intervened and guided the participants. On the other hand, in the Adelaide workshop the participants were conversant with accessibility concepts, despite the fact that they reported little or no background in accessibility modelling. This outcome is due in part because their planning policies and strategies were written in such terms, and in part because they had prepared for the workshop by reading in detail about the application of the accessibility tool in other places.

It appears that the 'shared language' stumbling block is related to several factors: the professional training and experience of the individuals; the policy focus of the organisation; the complexity of the tool relative to the skill preference of the users; and the different preferences for types of accessibility outputs (again *relative* to skill preference).

5.4 Steps forward

For accessibility instrument developers

The feedback from the 17 cases demonstrated a clear need for developing interactive ways to enable planning practitioners to engage with visualised accessibility indicators. Although the participants were not unanimously supportive about the shared language offered, we expect that enhancing the instruments' capabilities to quickly test and manipulate planning interventions would greatly improve their usability. It would allow the instruments to go beyond providing only a passive view of an existing situation and to offer also a way to understand how existing accessibility scores can be changed (i.e. how response the urban system is on these indicators). The limited experiences with this approach have shown that through such play and shared testing of believes from different domains a remarkably higher sense of shared language and greater insight can emerge.

A further point is that it appears crucial that instrument developers keep on developing ways to explain accessibility indicators and mechanisms in lay terms, so that all the actors in the planning processes are able to understand and work with the tools.

A key aspect of map visualisation seems to be the map-user interrelation. In order to increase usability beyond pure technical and analytical improvements, instrument developers need to put more attention on maps as communication tools. From the COST Action cases a clear message seems to emerge: maps are invaluable, especially as platforms for discussion between different user groups.

The four-step process model that was developed as a guideline for all workshops placed the link between existing planning questions and the instrument square in the centre. Many participants and instrument developers saw this direct dialogue between user and developer as an important step forward. However, also some limitations in the ability of accessibility instruments to represent planning problems were observed. To increase the application potential, each developer needs to carefully assess what sorts of planning questions can be answered with the instrument and what added value the instrument can bring to the planning process. The collection provided in this report can serve as a portfolio of instruments, each covering a different aspect of planning problems.

For planning practitioners

The other side of the coin is that planning practitioners should actively engage with the logic of accessibility. The cases show that the accessibility language

offers important potential for assisting questions that link land use, transport and other domains. Current planning strategies should be adapted to reflect the new insights gained. The four-step process model offers a way for practitioners to actively engage with the instruments. By tinkering with the key assumptions and mechanisms of an instrument, they can adapt it to the needs of their specific context.

According to the findings from the case studies, many organisations are still far from integrating accessibility analysis as a mainstream methodology in their everyday work. However, COST Action teams have already taken a step forward by establishing a positive relationship between academia and practice through the workshops. It is essential to continue and develop this collaboration in order to strengthen the position of accessibility analysis in planning practice.

For accessibility scholars

This research conducted under this COST Action clearly is just the start of the efforts to bridge the gap between the broad range of accessibility instruments and their potential users.

One direction for future research is to keep conducting context-rich experimental case studies. By focusing on specific families of instruments (e.g. Space Syntax or gravity based ones) such research can be further refined and focused.

Another direction is to go deeper into the relations between the personal characteristics of potential users (their experiences, professional backgrounds, and attitudes towards the use of information) and the use and usability of accessibility instruments. The same can be done for relationships between different planning settings (public vs. private, strategic vs. operational, open vs. closed) as well as use and usability.

Another possible direction is to triangulate our research design, which can be pursued in two ways. One is to deepen our understanding by following one interaction with an accessibility instrument in much more depth: for instance, following, observing and interviewing individual users over a longer time period will certainly improve our understanding of how accessibility instruments can enhance their planning experience. Another way is to generalise the use and usability mechanisms beyond the different contexts (e.g., by setting up quasi-experiments that would isolate the mechanisms and control the context as much as possible). Validating the effects of these mechanisms in a quasi-experimental setting will add valuable academic rigour to the study of the role that accessibility instrument can play in supporting integrated planning.

5.5 References

- Curtis, C. 2011. Integrating land use with public transport: The use of a discursive accessibility tool to inform metropolitan spatial planning in Perth. *Transport Reviews* 31(2):179–197.
- Curtis, C., and James, B. 2004. An institutional model for land use and transport integration. *Urban Policy and Research* 22(3):277–297.

APPENDICES

A. Pre-Workshop Survey

European Union COST Action TU 1002
‘Accessibility instruments for planning practice in Europe’

COST is an intergovernmental framework for European Cooperation in Science and Technology, allowing the coordination of nationally funded research on a European level.

By completing this 15 minute telephone questionnaire, you are greatly assisting the international research and practitioner community to build knowledge on accessibility planning nationally and internationally. Dissemination and discussion of the results with local stakeholders will be carried out through workshops in selected cities and through publications for all cities. You will be kept informed on the availability of results by your local COST working unit members.

ABOUT YOU AND YOUR ORGANISATION

Name _____

Email Address _____

Organisation Name _____

1. What type of planning does your organisation undertake? (Tick more than one box if required)

- ☐ STRATEGIC CITY PLANNING
- ☐ STRATEGIC ROAD PLANNING
- ☐ STRATEGIC PUBLIC TRANSPORT PLANNING
- ☐ STRATEGIC LAND USE PLANNING
- ☐ PRIVATE VEHICLE NETWORK EFFICIENCY
- ☐ PUBLIC TRANSPORT NETWORK EFFICIENCY
- ☐ INFRASTRUCTURE PROVISION
- ☐ DEVELOPMENT ASSESSMENT / STATUTORY PLANNING
- ☐ NON-MOTORISED TRANSPORT PLANNING
- ☐ LOCAL OR REGIONAL ECONOMIC DEVELOPMENT
- ☐ OTHER _____

PEOPLE, TRAVEL AND LAND USE

2. Thinking about People and Travel, name 3 important policy issues that your agency is working on in this respect?

i. _____

ii. _____

iii. _____

3. In regards to the 3 policy issues you have listed above, what data, tools, or information makes you aware of these issues?

i. _____

ii. _____

iii. _____

4. When considering land use and transport systems, what data, tools, or information makes you aware of development opportunities within the city?

• _____

5. How does your organisation match planning goals (e.g. increased access to labour force, locating residential development, locating employment centres) to transport modes?

• _____

6. When thinking about different transport modes in your city, what kinds of opportunities do you think are important for people to have access to?

<u>MODE</u>	<u>Opportunity 1</u>	<u>Opportunity 2</u>	<u>Opportunity 3</u>
Walking	_____	_____	_____
Bicycle	_____	_____	_____
Bus	_____	_____	_____
Train	_____	_____	_____
Tram	_____	_____	_____
Metro	_____	_____	_____
Taxi	_____	_____	_____
Car	_____	_____	_____
Truck	_____	_____	_____

PLANNING AND DECISION-MAKING

7. When preparing or assessing a plan,* what information does your organisation use to assess the efficiency of local and regional accessibility within the city? (* defined by user, please specify)

8. How are tools or data outputs from tools selected for use in preparing or assessing a plan?

9. Where in the organisational hierarchy of your organisation are decisions made about accessibility? (e.g., informal meetings with colleagues; a decision-making committee; or by presenting tech reports to politicians)

10. In your own words, how would you define 'Accessibility'?

11. In your own words, how would you define 'Mobility'?

B. Post-workshop survey

COST Action TU 1002 – Accessibility instruments for planning practice in Europe

Post-workshop survey

Dear colleague/workshop participant,

After completing the workshop, it is very important for us to deepen our understanding of the experience of your involvement in this process. In particular, we would like to know your views on how the workshop was organised, its results, the utility of the accessibility model and the potential barriers to its adoption in planning practice. The aim is to address the potential weaknesses in order to improve the experience of future colleagues who will participate in similar processes that integrate research knowledge on accessibility tools in everyday planning practice.

Please find below a total of 42 items (16 about the session, 21 about the accessibility model and 5 about your profile) on which we would like you to express your opinion on a 5-point Likert scale. It will take no more than 10 minutes. _____ is responsible for this survey, so if you need any clarification, please do not hesitate to ask.

Thank you,

The COST project team

ABOUT THE SESSION

		5-point Likert scale (strongly disagree to strongly agree)	Not applicable
1	The session resulted in useful results		
2	I am confident that the group solution is correct		
3	I am satisfied with this session		
4	The results of the session are based on correct assumptions on the underlying system		
5	I now have more insight into the processes that play a role in the problem		
6	The session has given me insight into the possibilities that my organisation has in 'steering' the problem		
7	My understanding of the opinions of the other participants about the problem has increased		
8	I will communicate the results of the meeting in front of other members of my organization		
9	I will use insights from the session in my daily planning practice		
10	The process helped me interact with other participants and understand their ideas about the problem		
11	During the sessions we have developed a shared professional language		

12	We have reached a shared vision of the problem		
13	We have reached a shared vision on the goals		
14	We have reached a shared vision on the possible solutions		
15	I had a strong sense of being part of a group		
16	The session was time efficient		
ABOUT THE ACCESSIBILITY TOOL/MODEL			
		5-point Likert scale (strongly disagree to strongly agree)	Not applicable
17	My organization has the required computational skills to use the instrument “x”		
18	The concepts/calculations/assumptions used in instrument ‘x’ could be useful in real world planning decisions		
19	Instrument ‘x’ would likely be selected for use in planning decisions as the organization is familiar with accessibility instrument		
20	The results from instrument ‘x’ are strongly related with the political commitment of my organization		
21	Accessibility instruments are relevant to my profession		
22	Instrument ‘x’ offers new insights to planning problems		
23	The organization serves the needs of multiple communities, and instrument ‘x’ outputs would be useful to inform the debate		
24	The precision of instrument ‘x’ would not increase its cost		
25	Instrument ‘x’ would be useful at generating and identifying problems in the urban structure		
26	Instrument ‘x’ would be useful at selecting strategy/options for the urban structure		
27	Instrument x’ would be useful during implementation of an urban structure solution		
28	Instrument ‘x’ would be useful for analysis of urban structure problems		
29	Accessibility instrument outputs should be part of a learning process and not provide answers		
30	Accessibility instrument output should be used to communicate urban structure concepts and ideas		
31	Accessibility instrument outputs should be used to look for alternative scenarios to a planning solution		

32	Conflicting policies between agencies does not inhibits the use of accessibility instruments		
33	The culture of the organisation enable the use of accessibility instruments		
34	There is formal or informal incentive for cooperation between agencies on accessibility issues		
35	Instrument 'x' have demonstrated well the relationship between land use and transport to be useful		
36	There are sufficient resources in my organization (time/money) to complete accessibility modelling		
37	There are sufficient resources in my organization (data/skills) to complete accessibility modelling		
ABOUT YOU			
38	Name/Surname		
39	Gender	Male Female	
40	Age	<30 31-45 45-60 >60	
41	Profession	Urban Planner Transport Planner Architect Other/state	
42	Organisation (<i>Name & Sector</i>)	Public Organisation Private Company Freelance Consultant NGO Other/state	