InViTo for measuring accessibility of new development areas in Northern Turin

cost
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

Edited by
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Assessing Usability of Accessibility Instruments

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Assessing Usability of Accessibility Instruments

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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 form 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) where 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 in 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

3.7

ITALY 2

INVITO FOR MEASURING ACCESSIBILITY OF NEW DEVELOPMENT AREAS IN NORTHERN TURIN

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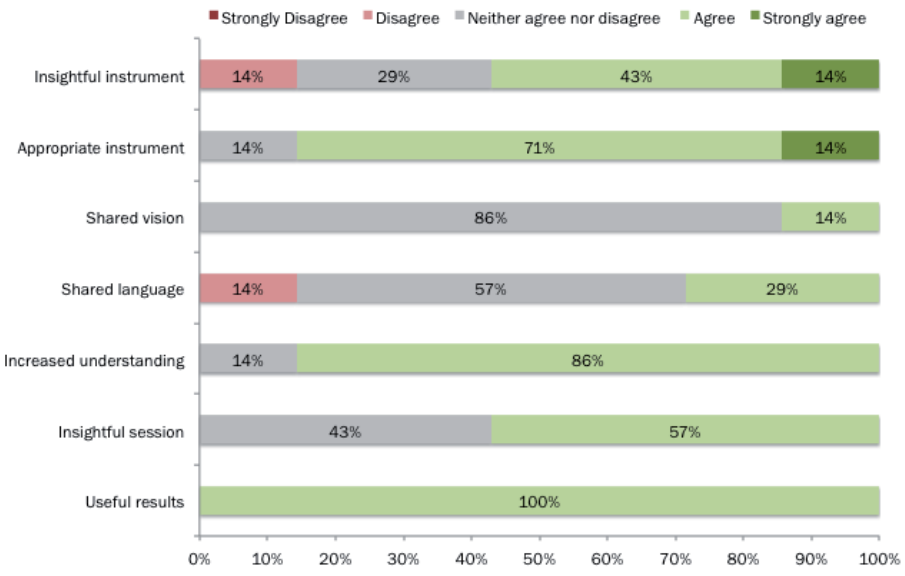
Participants' profile	# Participants: 7
Male | Female	5 | 2
46–60 | >60	5 | 2
Transport planner | Urban planner | Architect	3 | 2 | 2
Public organisation | Private organisation	5 | 2

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 synthetize 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 Grognardi, Urban Planning Executive, Municipality of Turin;
- Domanico 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.