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**DOI**

[10.4324/9781315463612-16](https://doi.org/10.4324/9781315463612-16)

**Publication date**

2019

**Document Version**

Final published version

**Published in**

Designing Accessibility Instruments

[Link to publication](#)

**Citation for published version (APA):**

Bertolini, L., & Silva, C. (2019). Bridging the Implementation Gap. In C. Silva, L. Bertolini, & N. Pinto (Eds.), *Designing Accessibility Instruments : Lessons on Their Usability for Integrated Land Use and Transport Planning Practices* (pp. 223-233). Routledge.  
<https://doi.org/10.4324/9781315463612-16>

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# 16

## BRIDGING THE IMPLEMENTATION GAP

*Luca Bertolini, Cecília Silva*

### **The Lack of Implementation of Accessibility Instruments**

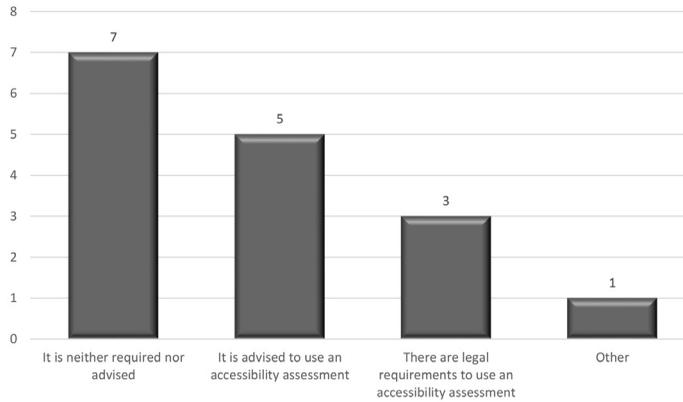
The development of Planning Support Systems (PSS) is a well-established practice in academic contexts and consultancy, with numerous examples ranging from out of the shelf, ready to use, products or software, to more conceptual prototypes or frameworks. The field of land use and transport planning, in particular, has been no exception, generating a significant number of PSS in recent years. If anything, the need for PSS has been largely advocated in this research field. Among these, accessibility-based instruments have been considered to have a strong planning support potential in, for instance, bridging the communication gap between land use and transport planners by making the overall goal of the land use and transport system explicit (it is impossible to talk of accessibility without also referring to both land use and transport systems).

Despite this focus on planning support, many of the PSS have not been applied in practice. In particular, accessibility-based PSS provide a paradigmatic example of this lack of implementation, regardless of the believed potential for the integration of land use and transport planning. In fact, of the accessibility instruments reviewed in the COST Action TU1002, less than half had been implemented as part of the urban/transport planning process, and even when implemented, it often was a one-off exercise (Hull et al., 2012; Papa et al., 2016).

This research project, reported on in this book, sets out to contribute to bridging this implementation gap by exploring why accessibility instruments are not used in practice and what can be done to overcome this lack of implementation.

First of all, it is important to point out that the lack of implementation of accessibility instruments is rooted on a weak position of accessibility planning in the political agenda, where mobility planning is still the main priority. In fact, only 3 out of 16 of the countries involved in this study are believed to have policy requirements for accessibility planning (Figure 16.1).<sup>1</sup> By and large policy still focuses on facilitating mobility as an end in itself (by developing transport systems), rather than seeing mobility as a means of granting access to opportunities (by a combination of transport and land use interventions). As explained in the introductory chapters of this book, and illustrated by the many instruments and applications that have followed, the difference is rather substantial.

Also if we take a closer look at the European Directives on transport and mobility, although accessibility is currently referred as a political priority, the specific scope is generally limited to mobility of the physically impaired or to accessibility to and at public transport stops or stations.



**FIGURE 16.1** Policy Requirements to undertake an accessibility analysis. Source: Hull, A., Silva, C. and Bertolini, L. (Eds.) (2012).

N=16 Countries of the 22 accessibility instrument developers surveyed in the Accessibility Instrument Survey (Hull, et al., 2012).

In fact, accessibility has become a fashionable concept in political rhetoric, although generally used as an incomplete or even dubious notion. According to Gould (1969) ‘Accessibility . . . is a slippery notion . . . one of those common terms that everyone uses until faced with the problem of defining and measuring it’. We still do not seem to have made much progress in this respect. In contrast to the notion of mobility, commonly related to the ‘ease of movement’ which can easily be operationalized, accessibility is commonly related to the ‘ease of reach of desired opportunities’ (Levine and Garb, 2002). Accessibility is a far more ambiguous notion than mobility, implying a range of aspects such as the distribution of potential destinations; the magnitude, quality and character of activities; the performance of the transportation system; the characteristics of the individuals; and the times at which the individuals are able to participate in activities (Handy and Niemeier, 1997; Liu and Zhu, 2004).

The conceptual mismatch and political ambivalence between mobility and accessibility among public authorities, certainly explains part of the implementation gap of accessibility instruments. It is not difficult to understand that practitioners cannot recognize their need for accessibility-based PSS if they are regularly using mobility-based PSS convinced these also consider accessibility concerns. The lack of a clear political priority for granting accessibility above facilitating mobility only compounds this confusion.

The political context does not, however, explain everything. Literature suggests that a fundamental dichotomy between supply and demand of information and models to support planning provide another important reason for the implementation gap of PSS (e.g., Vonk et al., 2005; te Brömmelstroet, 2010). On the one hand, planning practitioners – potential users of instruments – are generally unaware of and inexperienced in the use of PSS, not recognizing their value and potential (resulting in a low intention for use). On the other hand, developers of instruments have little awareness of demand requirements for instruments in the complex planning context in which the instruments have to be applied.

This research looked in more detail at this dichotomy between supply and demand, in particular, on its explanation value for the implementation gap, and at ways of bridging this dimension of the gap. It looked both at the developers’ perception of *usability* of accessibility instruments

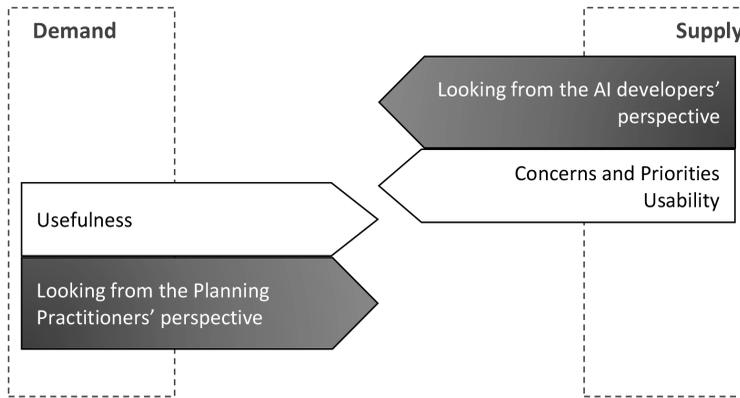


FIGURE 16.2 Research approach.

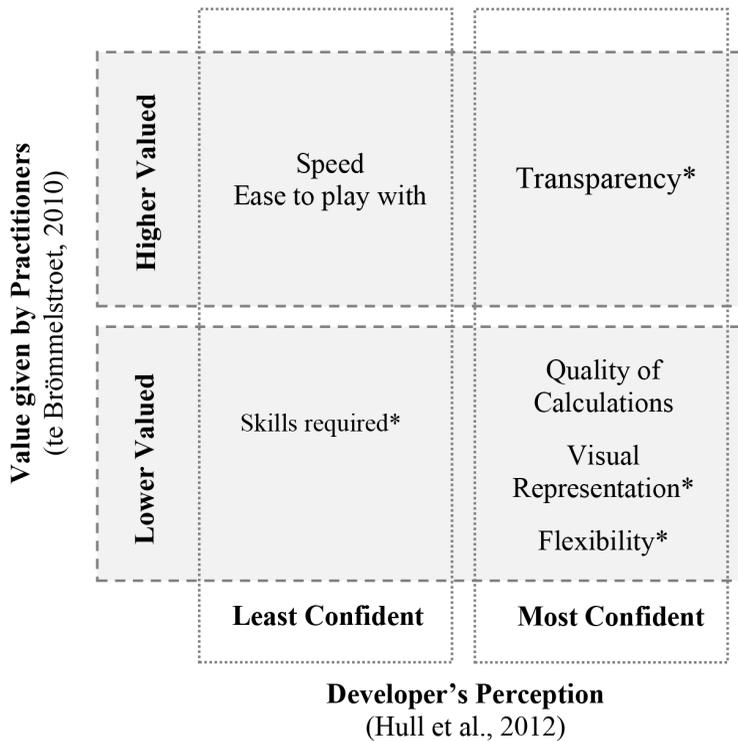
for planning practice (supply side) and at the practitioners' perception of *usefulness* of accessibility instruments for planning practice (demand side) (Figure 16.2). As introduced earlier in the book, *usability* refers to characteristics of the instrument that influence its ease of use while *usefulness* relates to the added value that these instruments have when used.

### ***Developers' Perception of Accessibility Instruments***

Developers of PSS are generally believed to be very enthusiastic about the usability of their tools. Indeed, nothing less is expected of the developer of a tool specifically built to support planning practice. However, it is still evident that many analysis, design and decision support methodologies have been built with above all a concern for scientific rigour, giving little or no attention to usability by planning practitioners. Explicit concerns with usability have been increasingly found in PSS (e.g. Silva, 2013; te Brömmelstroet, 2010; Vonk et al., 2005), but they still are not mainstream.

The Accessibility Instrument Survey (see Chapter 5) developed for this research has, among other things, provided an overview of developers' perception of usability of the 21 accessibility instruments involved. This survey revealed that developers are in fact not as enthusiastic about their instruments as could be expected. There are developers which are more positive than others about their instrument, but in general terms, when looking at all ratings of the different instruments for each usability issues evaluated, it is clear that top scores are not very frequent. 'Quality of calculations' is the feature developers feel most confident about, with around 25% of top scores (7 in a scale from 1 – least performing or most requiring – to 7 – best performing or least requiring). On the other end of the scale, no developer gives his/her instrument a 7 for 'understanding of the policy context'. As all PSS developers taking part in this survey were also involved in the research, it is reasonable to argue that the perception on usability is probably less enthusiastic than that of the remaining PSS developer community, because of their higher awareness about usability issues. However, it is important to stress that this survey was conducted at the beginning of the research, thus before the various research groups engaged with each other and developed a common view on the issue. Furthermore, these research groups involved were not handpicked but were involved by their own initiative.<sup>2</sup>

As presented in detail in Chapter 5, developers have been found to be most confident about 'Quality of calculations', 'Transparency', 'Visual representation' and 'Flexibility', while being least confident about 'Speed', 'Ease to play with' and 'Skills required'.



\* Issues practitioner have most problems with (te Brömmelstroet, 2010)

**FIGURE 16.3** Comparison of developers' perception and of value given by practitioners of most and least performing usability issues.

Looking at how much these seven usability issues are believed to be valued by planning practitioners (Figure 16.3) we can draw some general recommendations for the design of new accessibility instruments. Given that the present research did not assess the relative value of different usability characteristics, this comparison will use as reference results obtained in a separate study, evaluating the importance of certain characteristics of PSS in supporting the generation of Land Use and Transportation strategies (te Brömmelstroet, 2010), including, but not exclusively accessibility instruments, and should thus be looked at with some caution.

The first recommendation inferred from Figure 16.3 is the importance of providing instruments that are faster and easier to play with because these are recognized by developers as among the worst performing while being among the most valued by practitioners. In fact, findings of the local workshops reinforce the importance of instant computation and validation of strategies and the ability of local practitioners to play with parameters quickly testing different scenarios and presuppositions.

A second issue raised by Figure 16.3 is the need for attention on transparency. While developers are positive about the transparency of their instruments, practitioners both consider transparency an important characteristic and don't think it is satisfactory in present instruments. A third area of concern is the skills required by users in order to positively engage with the instruments. While practitioners assign the issue a lower priority, they still see it as highly problematic, and this perception is matched by that of developers. Ways for lowering this threshold (e.g. by making

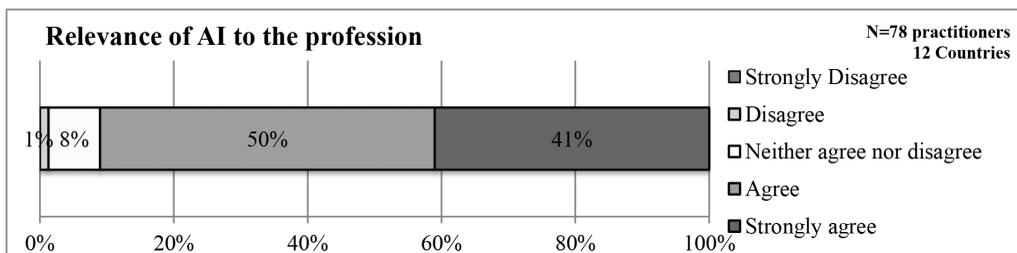
instruments simpler to understand and use, but also by educating users) need to be found. Fourth, while developers are positive about the visual representation qualities and their flexibility (i.e. their ability to match different demands), practitioners do not seem to share this view. This identifies a further area where, at the very least, expectations of developers and practitioners need to be aligned, and, better, performance should be brought closer to the specific needs of practice. The quality of calculations (in terms of reliability, precision, etc.), and perhaps differently from a pure academic view of the instruments, *does not* seem a particularly problematic, nor high priority issue.

Finally, in addition to developers' perception on the usability of accessibility instruments, the survey also provided an interesting picture of the characteristics accessibility instrument developers have focused on the most in the last years. It becomes clear that current accessibility instruments are mostly focused on municipal and supra-municipal geographical scales, with remaining scales fare less developed. Also, land use and transport are, by far, the main planning goals for accessibility instruments, although most focus strictly on one *or* the other. This reveals much room still for the fulfilment of the potential of accessibility instrument in *integrating* land use and transport planning. Although less unbalanced than the previous issues, accessibility instruments still favour car and public transport with regard to transport modes considered. Accessibility instruments considering walking and cycling are still underdeveloped, while multimodality and interchange are fairly absent.

### Practitioners' Perception of Accessibility Instruments

Practitioners are generally believed to be unaware of and inexperienced in the use of PSS, not recognizing their value and potential (resulting in low intention to use them) (Vonk et al., 2005; Geertman, 2006; Hoetjes, 2007; te Brömmelstroet, 2007, 2012). From the perspective of their potential users, PSS are generally stated to be too abstract, generic and complex, producing inflexible systems for the support of planning which are narrowly focused on strict technical rationality. In these conditions potential users are sceptical of the usability of the PSS for planning practice.

This general view seems to contrast with the perception of the practitioners participating in our workshops. The post-workshops surveys developed in 13 local workshops of different European Countries and Australia (Chapter 10) have, among other things, provided an overview of practitioners' perception of usefulness of the accessibility instruments involved. As shown in Figure 16.4, the survey revealed that most practitioners are actually convinced of the usefulness of accessibility instruments in planning practice, regardless of having actually used them before.



**FIGURE 16.4** Relevance of accessibility instruments for the planning profession. Source: Post-workshop survey (all workshops) 2012/2013. Te Brömmelstroet, M., Silva, C. and Bertolini, L. (Eds.) (2014).

In general, planning practitioners involved across the 13 local workshops where post-workshop surveys were conducted, were quite positive about the workshops themselves and about the new insight they had created (with more than 75% of participants agreeing or strongly agreeing with this position). Practitioners were also found to be very positive about the usefulness for real world planning of the instruments they used in their workshops, being mostly confident of the new insights these instruments can bring into planning practice. Thus, and contrarily to what might be expected, practitioners had a significantly positive reaction to these accessibility instruments. However, when asked about their likeliness to use the accessibility instrument in their daily practice, agreement dropped to 50% of participants with almost 10% disagreeing strongly. Among the barriers evidenced by the post-workshop survey, lack of familiarity with accessibility instruments and the lack of alignment of the underlying policy goals of accessibility instruments with the organization's political commitment (still focussed on facilitating mobility, or managing land use rather than on granting access by a combination of the two), were among the strongest. As could be expected, lack of familiarity with accessibility instruments was stronger perceived by land use planners than transport planners. Barriers regarding the availability of time, money and skills for use of the different accessibility instruments were also significant but not as strong as could be expected (with at least 50% of practitioners believing their organization had enough resources).

### Wider Planning and Research Implications

The research showed that accessibility instruments can generate new and relevant insights for planners. However, these are just a beginning, a 'promise', which will only be fulfilled if the insights derived from the workshops are followed by consequent decisions and actions in actual practice. Planners cannot do it alone, as the research also showed that the engagement with accessibility instruments generated as many questions as answers. The key implication seems to be that if we want accessibility planning to become common practice, instrument developers should *keep engaging* with planners and the organizations they work in. A couple of workshops will not do, at least for the time being. This would of course require that planners and organizations are *also willing* to keep engaged. A further and more fundamental implication might be the need of some institutionalization of accessibility planning (e.g. by means of making accessibility analysis a requirement for particular decisions and thus making accessibility concerns baseline to everyday decisions). This would create a structural demand for accessibility knowledge without which the continuous engagement advocated above seems difficult to sustain. One of the evidences of the workshops was the limited prior knowledge or experience in use of accessibility instruments,<sup>3</sup> also revealing limited concerns with accessibility in general (when compared to mobility). Institutionalization of accessibility planning would again play an important role here.

This research also showed that, in addition to the need for more engagement from developers with planners and the organizations they work in, there is considerable room for improvement in the supply of accessibility instruments. The overview of accessibility instruments developed by this research revealed that some types of accessibility instruments are far more developed than others. Future accessibility instruments should thus focus on providing some of the relatively underdeveloped characteristics among accessibility instruments, increasing choices made available to practitioners and the chances for goodness of fit to different planning goals. The sort of learning among instrument developers representing different conceptualizations, operationalizations and areas of applications facilitated by the COST Action seems a key way of doing this, and should be continued in the future.

The range of transport modes covered by accessibility instruments has grown and it is increasingly diversified. Nevertheless, most accessibility instruments are focussed on the car and/or public transport, with far less choice available to planners concerned with walking and cycling accessibility.

Also, existing accessibility instruments can be hardly seen as fully multi-modal (i.e. providing information about all the different options to reach a destination – including temporal variations in transport options and telecommunication options) and fully inter-modal (i.e. including all possible combinations of transport and telecommunication options within a single journey). Similar limits apply to the characterization of destinations (typically broad functional categories are used instead of specific information on the resources and opportunities that can be accessed).

A third, and key area of related improvement concerns the needs and desires of people that are at the basis of accessibility analyses. Existing models typically adopt implicit assumptions on accessibility thresholds which are actually based on real travel behaviour to define what is currently called acceptable choices. However, this reasoning gives focus to the current travel choice and excludes information on acceptability of other travel choices (in fact, implicitly we are assuming that other travel choices are not important and should be kept this way). Thus more detailed knowledge is needed on individual perception of accessibility and accessibility thresholds.

A main finding from the research is that ideally instruments should facilitate planners to interact in real-time with each other and the substantive issues at hand (Donald Schön would have said that instruments should facilitate a ‘conversation with the situation’). Related to this, the added value of spatializing and visualizing information (i.e. through maps) was also stressed. However, the real-time interaction capability of existing instruments is still rather low. Also in terms of spatialization and visualization existing instruments show varying performance. It seems important then that these capabilities are greatly improved in the future.

Another important finding is that existing accessibility instruments are not particularly explicit about the goals implied by the use of a certain metric. This has made it harder for potential users to choose a particular instrument over another and even for a practitioner to have a better understanding of the goodness of fit of the instrument to the planning goal. Thus, even practitioners aware of accessibility instruments may choose not to use them because of the lack of understanding of the purpose of the instrument. Also, the lack of clear objectives may create mistrust among practitioners of the usefulness of accessibility instruments.

Finally, while there is still significant room for improvement in the supply of accessibility instruments, the research also suggests that *other* issues seem to have a more important role in improving the use of accessibility instruments in planning practice. In fact, planning practitioners are in general very positive about the use of accessibility instruments and were quite enthusiastic of the insights generated during the local workshops. Of course, some accessibility instruments still perform better than others but generally the balance was positive for all. According to the practitioners participating in the workshops, the major barriers lay elsewhere, and particularly in the still marginal and at best ambivalent position of accessibility in the policy agenda (by and large, the focus is still on facilitating mobility) and the lack of institutionalization of accessibility instruments (accessibility analysis is not a formal requirement, nor there are accepted procedures to perform it). These two matters seem at the heart of the implementation gap, and it is difficult to see how the gap can be bridged without them being addressed.

In summary, this research has produced the following recommendations for accessibility instrument developers willing to increase their usability and usefulness of their instruments:

- Accessibility instrument developers should keep engaging with planning practitioners, so that instruments can interactively and iteratively improve.
- When relevant, new accessibility instruments should provide some of the now lacking information (e.g. with respect to non-motorized modes, multi- and inter-modality or specific destinations).

–More knowledge is also needed on individual perceptions of accessibility and accessibility thresholds, and on accessibility options other than those shown by actual travel behavior.

–Next to improving the contents, providing real-time interaction capabilities (by speeding up calculations) and strengthening the communicative value (by better visualization and spatialisation) seem key areas of necessary improvement.

–New accessibility instruments should be more explicit about the policy goals they imply, and be open to adapt the characteristics of the instrument to match different views about these goals.

–Finally, a clearer and stronger embedding of accessibility goals in the policy agenda, and institutionalization of accessibility planning seem essential prerequisites for increasing the practical impact of accessibility instruments.

### **The Contribution of COST Action TU1002 to Bridging the Implementation Gap**

It is important to point out that besides the findings produced by this COST Action, which later can be incorporated into new research and practice and thus contribute to bridging the implementation gap of accessibility instruments, the Action already had a tangible contribution in closing the implementation gap through the development of a number of local workshops.

On the one hand, the workshops have brought researchers out of their office and into contact with practice. For many of the researchers involved, this was the first outreach into practice they had done with their accessibility instruments. Through the workshop methodology specifically developed for this research, this Action has proven an adequate setting to apply more than half of the accessibility instruments involved in the research in a real world context, helping accessibility instrument developers to overcome the initial hurdles of engaging with practitioners. The same workshop methodology has provided researchers a setting for learning and experiencing/experimenting with practitioners revealing new forms of engagement which were, until then, unknown by many of the researchers involved. For many of these researchers, these workshops revealed the potential new role of accessibility instruments as mediating the planning process for the first time.

On the other hand, the workshops also were a unique opportunity to bring awareness on accessibility planning and instruments to practitioners, across several European and Australian Cities. For many of the involved practitioners this was the first time they used accessibility instruments and engaged with their developers. The experience was generally appreciated by practitioners and its added value recognized.

Finally, another important initiative of this research which is also expected to bring contribution to bridging the implementation gap was to make accessibility instruments readily available to all (researchers and practitioners). This was brought about by the development of the online collection of accessibility instrument linked to an interactive search engine selecting the most appropriate instruments for specific requirements (such as policy aim, transport modes to be considered, activities to be considered etc.). For each of the accessibility instruments, the website (<http://www.accessibilityplanning.eu/>) provides a summary sheet (identifying the main characteristics and the evaluation on usability), a short report presenting the theoretical underpinnings and the local workshop report (including evaluation of usefulness by practitioners).

## Wider Research Questions<sup>4</sup>

This broad research into the usability and usefulness of accessibility instruments for integrated land use and transport planning practice has provided a number of contributions for bridging their implementation gap. Nonetheless, it has also opened new research questions, some of which clearly define the follow-up step for this research, while others open up new debate on what are and should be the main research questions.

One key question is that of the rigour relevance dilemma. Although this dilemma is not specifically researched here (see for example: Andriessen, 2004, Fincham and Clark, 2009, Straatemeier et al., 2010), it is one of the starting points of the research approach. In particular, this research has been based on the assumption that, at the present point in the development of PSS, the attention of PSS developers has to be shifted from how to improve rigour of PSS to how to improve relevance, that is, to fulfil planning practitioners' needs. The work carried out in the four years of the Action did not provide reasons to question this assumption, on the contrary. Based on the findings in the workshops, recommendations for more usable accessibility instruments, presented in the previous section, are not focussed on increased rigour but on increasing the choice made available to planning practitioners. In particular, the general recommendation for more real-time calculations (and also for more visualization and spatialization of results) actually seems to require *less* rigour while striving for increasing simplification. This contradicts current trends towards more detail and complexity of PSS following technological improvements with regard to data gathering and processing possibilities (as with 'big data'). Striking a balance between rigour and relevance will always be a challenge. But the challenge might have to be reframed. Until now, PSS developers' have been facing the question of how to improve the rigour of their tool while keeping it usable. Now we are redefining the challenge to how usable (and thus, often, simple) can we make the instruments without renouncing too much to the opposite requirement that the information produced should be as true as possible to the complexity of reality. More research in this direction is needed.

Above, we have noted that existing accessibility instruments are not particularly explicit about the goals implied by the use of a certain metric. Part of the solution is, quite simply, being more explicit about these: which overall goals are implied by particular accessibility metrics? However, some more fundamental questions might be underlying, requiring further research, including the following. How to incorporate the explicit assessment of benefits and costs in relations to specific impacts (e.g. sustainability impacts) in accessibility instruments? On the other hand, is there also a limit to how far we must and can go in measuring impacts? And how to cope with uncertainty about impacts?

Existing accessibility instruments typically adopt an aggregate approach to individuals, implicitly assuming that there is a meaningful average of accessibility needs and desires across a large population. But how acceptable is this assumption? How about the needs and desires of specific individuals and groups? Isn't every individual and group specific? The overarching question seems then: how to develop more individual needs and desires centred accessibility instruments, which are also practical in their use and development? The answer, however, does not seem easy, and we should be prepared to be faced with some inevitable trade-off.

Other questions relate to the process of analyzing accessibility and developing planning strategies. The workshops stopped at the moment that new insights were generated and shared. We didn't follow up to see if this changed anything in actual practice. How do planners use accessibility analyses? Do accessibility analyses make a difference in what they think and do? What are barriers to the generated insights having a real impact and how can these be overcome?

A related question that was raised is whether we should institutionalize accessibility planning, and how. Most participants in the workshops seemed to agree that we should, but if others also

agree is a different matter, as it is the way to do it. For instance, should we or could we prescribe steps in the planning process that incorporate accessibility analysis? Which steps? Should we, could we define and implement ‘quality standards’ for accessibility instruments, as it is presently being done for transport models? Which standards?

The workshops were mostly limited to transport and land use planners. Many have advocated that there is a need to shift the focus: from involving professionals to involving a broader range of stakeholders, and even the public at large. How would the accessibility planning process need to change (e.g. from top-down to bottom-up, from involving expert knowledge to also involving local knowledge, etc.)? And what would the implications for supporting it by means of accessibility instruments be? Would we need different instruments, interfaces and/or processes?

All instruments incorporate some degree of information and communication technologies. However, this is an area of continuous innovation. Should newly emergent information and communication technologies and practices (e.g. internet based maps and databases, mobile apps, participatory GIS, social networking) be integrated into the instruments and/or their use? Why? How? Could this perhaps help to address some of the issues raised above: achieving both more real-time interaction, better visualization and richer information? Involving a broader range of people and backgrounds?

The research also raised some more fundamental questions. An implicit assumption of accessibility planning is that accessibility has positive value, and that it should be increased. However, is that always the case? Or are there limits? How much accessibility is *enough*? Can accessibility be *too much*? Is an increase in accessibility always the solution or can it result into a new problem? Should we, and could we, identify ‘critical accessibility thresholds’ (not too little, not too much)? And if so, should they be the same across transport modes, spatial structures, urbanization levels, user groups etc.? New related questions have arisen around, for instance, local versus regional accessibility, the benefits of high accessibility with low mobility, among others.

Last but not least, how do accessibility planning and accessibility instruments relate to a possible more fundamental shift in planning issues? Most crucially: are we going to see a shift in focus from quantitative goals (e.g. fostering growth) to qualitative (e.g. fostering quality of life, or fostering identity)? Which planning support tools and procedures would be required by such different issues? What would the role of accessibility instruments and planning be, if any?

## Notes

- 1 This values are based on the perception of the accessibility instruments developers surveyed during the accessibility instrument survey, involving 22 accessibility instrument developers from 16 countries.
- 2 Once a COST Action proposal is selected for financing, the national research institute of each of the Countries involved in COST invites, selects or appoints the national participants for that Action.
- 3 This is, however, not always evident from the surveys since many practitioners actually were referring to transport models when stating to have used accessibility instruments before.
- 4 These questions also rely on discussions at the margins of the last COST Action meetings, starting with a WG2 brainstorm in Munich.

## References

- Andriessen, D. (2004) Reconciling the rigor–relevance dilemma in intellectual capital research. *Learning Organization* 11(4): 393–401.
- Fincham, R. and T. Clark (2009) Introduction: Can we bridge the rigour–relevance gap? *Journal of Management Studies* 46(3): 510–515.
- Geertman, S. (2006). Potentials for planning support: A planning–conceptual approach. *Environment and Planning B: Planning and Design* 33(6): 863–880.

- Gould, P. (1969). Problems of space preference measures and relationships. *Geographical Analysis* 1: 31–44.
- Handy, S. L. and D. A. Niemeier (1997). Measuring accessibility: An exploration of issues and alternatives. *Environment and Planning A* 29(7): 1175–1194.
- Hoetjes, P. (2007). Planning as a design science – design science as a methodology. In *Proceedings of the AESOP 2007*. Naples: Amsterdam Institute for Metropolitan and International Development Studies, copy available from P. Hoetjes.
- Hull, A., Silva, C. and Bertolini, L. (Eds.) (2012). Accessibility instruments for planning practice in Europe. Work document, European Cooperation in Science and Technology. Website: <http://www.accessibilityplanning.eu/reports/report-1-accessibility-instruments-in-practice/>.
- Levine, J. and Y. Garb (2002). Congestion pricing's conditional Promise: Promotion of accessibility or mobility? *Transport Policy* 9(3): 179–188.
- Liu, S. and Zhu, X. (2004). Accessibility analyst: An integrated GIS tool for accessibility analysis in urban transportation planning. *Environment and Planning B: Planning and Design* 31: 105–124.
- Papa, E., Silva, C., te Brömmelstroet, M. and Hull, A. (2016). Accessibility instruments for planning practice: A review of European experiences. *Journal of Transport and Land Use*, 9 (3), 1–20. DOI 0.5198/jtlu.2015.585.
- Silva, C. (2013) Structural accessibility for mobility management. *Progress in Planning*, 81(1), 1–49
- Silva, C. (2012). Structural Accessibility Layer (SAL). In Hull, A., Silva, C. and Bertolini, L. (Eds.), *Accessibility Instruments for Planning Practice*. Porto: COST Office.
- Straatemeier, T., Bertolini, L., te Brömmelstroet, M. and Hoetjes, P. (2010). An experiential approach to research in planning. *Environment and Planning B* 37(4): 578–591.
- Te Brömmelstroet, M. (2007). Desired Characteristics of Expert Knowledge to Support the Integration of Land Use and Transport Planning. In *Proceedings of the Bijdrage aan het Colloquium Vervoersplanologisch Speurwerk, 2007*. Antwerpen.
- Te Brömmelstroet, M. (2010). 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. (2012). Transparency, flexibility, simplicity: From Buzzwords Towards Strategies for Real PSS Improvement. *Computers, Environment and Urban Systems* 36(1): 96–104.
- Te Brömmelstroet, M., Silva, C. and Bertolini, L. (Eds.) (2014). *Assessing Usability Of Accessibility Instruments*. Amsterdam: COST Office. Website: <http://www.accessibilityplanning.eu/reports/report-2/>.
- Vonk, G., Geertman, S. and Schot, P. (2005). Bottlenecks Blocking Widespread Usage of Planning Support Systems. *Environment and Planning A* 37: 909–924.