Bottlenecks Blocking Use of Accessibility Instuments: Exploring Usability, Usefullness and Institutional Barriers

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BOTTLENECKS BLOCKING USE OF ACCESSIBILITY INSTRUMENTS – EXPLORING USABILITY, USEFULNESS AND INSTITUTIONAL BARRIERS

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Abstract: Although in the last decades, there has been significant attention and investment into Planning Support Systems, very few have actually made it into practice. This phenomenon is mirrored within the domain of accessibility instruments, a specific subset of the PSS family. Literature suggests that a fundamental dichotomy between supply and demand of PSS could be the main reason for this. On the one hand, planning practitioners–potential users of instruments–are generally unaware of and inexperienced in the use of them. 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.

Keywords: Accessibility, Planning Support Systems, Usability perception, Perception gap

1. INTRODUCTION

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; WBCSD 2001, 2004).

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 et al. 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 et al. 2008; Holden 2012; Stead et al. 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 et al. 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, 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.

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; so called Planning Support Systems (PSS). Planners see such PSS 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 et al. 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' (Vonk 2006).

One of the underlying fundamental problems seems to be a persisting disconnect between the worlds of PSS 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 (Meadows and Robinsons 2002). As a result PSS are developed from a distant and abstract idea, instead from a clear-shared understanding

of the needs and demands of specific planning contexts. From this position PSS developers tend to have high hopes for the use and added value of their instruments for planning practice. 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).

An important note here is that we should not mistake usability of these instruments for a goal in itself. Instead, the academic and practical advances in improving usability have the ultimate goal to make the instruments useful (see Keil et al. 1995; Nielsen 1994). It is one thing that a person can handle a designed object, it is quite another if using this object also has an added value. As mentioned above, and extensively discussed elsewhere, PSS that aim to support strategy-making processes and also most accessibility instruments have specific hypotheses about this added value or utility. In general terms, they aim to offer a shared language, bring different professional backgrounds together and support a shared enlightenment process. And again, this is not a goal in itself, but in turn is assumed to improve the quality of planning (processes and/or outcomes). So, where *usability* refers to characteristics of the instrument that influence its ease of use, *usefulness* relates to the added value that these instruments have when used.

A highly usable and useful accessibility instrument does not automatically mean that it will be widely used in planning practice. Geertman (2006) points to a number of context variables that influence the potential use of PSS. In this chapter, we refer to these variables as the institutional context; or more specifically institutional barriers.

From this PSS literature we can distil a number of hypotheses that can explain the remarkable and problematic low levels of use of accessibility instruments in planning practice. Referring to the conceptual scheme as represented in Figure :

- **Hypothesis one**: Developers of accessibility instruments perceive their own instruments as highly usable (while assuming their usefulness)
- **Hypothesis two**: Potential users experience low usefulness of existing accessibility instruments (while not particularly interested in usability)

These two hypotheses lead to the third, which forms a possible explanation of low use:

- **Hypothesis three**: The gap between the highly perceived usability and low experienced usefulness explains low level of use of accessibility instruments

The fourth and last expectation forms a rival hypothesis for this:

- **Hypothesis four**: Institutional barriers explain low level of use of accessibility instruments

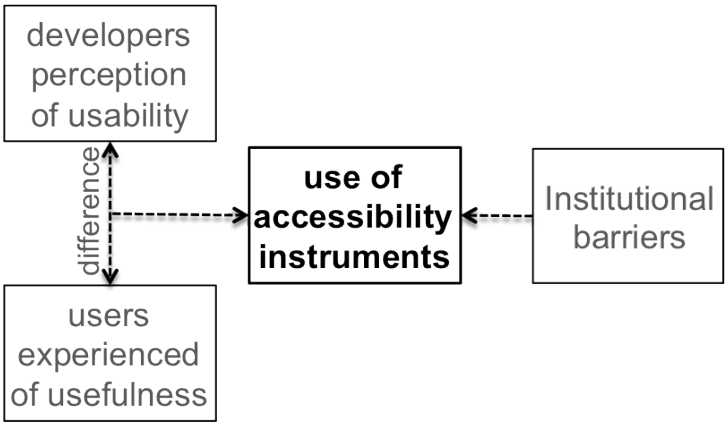

Figure 1 - conceptual scheme from PSS literature

As a conclusion to the extensive work described in this book, this chapter aims to explore the validity of these four hypotheses. It uses the findings of a survey amongst accessibility instrument developers (see chapter 7 of this book) and the outcomes of a comprehensive experiential case study effort (chapters 8-13). First, we discuss the choices made in research design, operationalization of the key terms and research methods (section two). The body of this chapter uses the findings to explore the four hypotheses (section three to six). This leads us to the conclusions and directions for future work.

2. RESEARCH APPROACH

2.1. Research design

All data was collected during a four year COST Action that brought together a large number of accessibility instrument developers from European countries (and Australia). This sample of instruments enabled us to do the data gathering and analysis. However, the voluntary basis and the country based limitations for joining the Action mean that the sample is not representative. Still, the instruments that were represented in the Action are from a wide range of different backgrounds. For the data collection on the perceptions of usability of their

instruments, the responses of 21 different teams were collected (of which only 20 were considered valid for this analysis). Data on experienced usefulness was collected after an extensive local workshop session that was only completed by 13 different teams. Responses from both surveys were also used to assess the fourth hypothesis (on institutional barriers).

<<Table 1>>

* Only presents Workshops with collection of valid responses for the post workshop survey

Table 1 - Sample of Accessibility Instruments

2.2. Operationalisation

The usability of accessibility instruments relates to the ease of use for the users. Perceived usability is defined as "the degree to which a person believes that using a particular system would be free from effort" (Keil et al. 1995, p. 76). In this, it relates to the 'hands-on', instrumental experiences that the planners have with the instrument and how easy and intuitive it is for them to work with the instrument. Based on recent research on this (Te Brömmelstroet, 2010) we focus on the most relevant ones, which were addressed by the accessibility instrument survey:

- 'Easy to play with' (evaluated as important by 64% of respondents)
- 'Transparency' (evaluated as important by 60% of respondents)
- 'Speed' (evaluated as important by 45% of respondents)
- 'Precision' (evaluated as important by 16% of respondents)

Usefulness of accessibility instruments goes a step further. It asks the question if the instrument has an added value for the task that the planning practitioners have. In other words, an instrument can be usable, but not useful. Although the tasks of planners are wildly diverse,

there are some common characteristics of usefulness of accessibility instruments that especially apply for strategic planning. These relate to qualities of the planning process as enlightenment (Amara et al. 2004; Gudmundsson 2011), or a shared learning environment (Rouwette et al. 2002). These concepts have been translated to the PSS realm and are extensively discussed elsewhere (Te Brömmelstroet 2013). Here, we zoom in on the specific added values that are expected by the academic literature on accessibility:

- Enthusiasm
- Insight
- Development of a shared professional language
- Communication
- Efficiency
- Cohesion
- Prospects for planning practice – analysis
- Prospects for planning practice – strategy development

Finally, we also consider an alternative hypothesis for low use of accessibility instruments looking at the perception of instrument developers and planning practitioners on the role institutional barriers play in this phenomenon. The hypothesis here is that the regardless of its usability or usefulness an accessibility-based planning support system may still not be used in practice due to institutional barriers, referring to a long range of issues related to the functioning of institutions, separation of planning fields, conflicting procedures between fields, etc. Institutional barriers have been found to hinder a number of other practical implementation of otherwise potential planning support systems and innovative planning procedures. We explore the role of:

- technical and resources barriers:
    - lack of familiarity of institutions with accessibility instruments
    - lack of resources of for implementation (time, money, data, computational skills)
- political barriers:
    - separation of urban and transport planning institutions
    - conflicting policies between agencies
    - lack of political commitment with accessibility concerns
    - different planning objectives / and assumptions of those used in accessibility,

2.3. Data gathering and methods

To collect data on the perceived usability of accessibility instruments, a web based survey was developed. The participating instrument developers in COST Action TU1002 were asked in 2012 to fill in this survey. The detailed setup and outcomes of this survey can be found in chapter 6 and 7 of this book (and in Hull et al., 2012). The survey included questions on quality, accuracy and speed of the instrument, on ease of use and on knowledge and skill levels required by practitioners. Next to this, it also asked the perceptions on possible institutional barriers (used to analyse hypothesis 4).

For the experienced usefulness, a survey was designed that was targeted on the planning practitioners that took part in the local workshops in which accessibility instruments were used in 2013. As can be read in more detail in chapter 6, there were a number of standardized data gathering methods around these workshops (see also Te Brömmelstroet et al. 2014). The one that is used here was called the post-workshop survey. Immediately after the workshop, it asked

all individual participants to reflect on issues relating to the usefulness of the experience. It included Likert scale questions on the level of insights into planning problems that the instrument offered, if it assisted generating and identifying problems in the urban structure or analysis of urban problems, if the instrument enhanced strategy development (i.e. designing or selecting urban and transport strategies) and/or supported strategy implementation (i.e. implementing an urban and transport solution). Again, this survey also inquired about potential institutional barriers that are foreseen by the practitioners (used to analyse hypothesis 4). Over 13 different workshops, 80 practitioners with different backgrounds filled in this survey.

For the analysis of hypothesis 1, we present the scores of each of the instrument developers for each perceived usability variable. This is considered to reflect their confidence. For each variable, the instruments are ranked according to their score. We interpret these results and discuss any patterns found (section 3). Hypothesis 2 is analysed by presenting the Likert scale distribution of each instrument on each experienced usefulness variable. Again, we interpret the results by ranking the instruments and patterns in the data (section 4). To assess Hypothesis 3, we zoom in on the consistencies and discrepancies in the rankings of the first two analyses (section 5). The discussion about institutional barriers uses the differences and similarities in the views of the developers and users (section 6). The remainder of the chapter wraps up these findings and presents our final conclusions.

3. PERCEIVED USABILITY BY THE INSTRUMENT DEVELOPERS'

The survey collecting developers' perception provides insight on usability through a group of questions focused on perception of performance and requirements of their accessibility instruments (questions on *quality, accuracy and speed of the instrument*, on *ease of using*

Accessibility Instruments and on *knowledge and skill levels required by practitioners*). Practitioners perception of 'ease of use' was rated in scale from 1 (worse performance or being most demanding to implement) to 7 (best performance or being less demanding to implement). The following figures present developer's perception on precision (phrased as 'accuracy of the model' in the survey), speed, 'ease to play with' and transparency. All figures present the 20 Accessibility Instruments ordered by score (from highest to lowest score).

3.1. Precision

Developer's perception on precision is quite optimistic, with an average score of 5.2 (in 7) and with most of the instrument being rated by their developers as above the middle score (4 in 7). Developers of Instruments 6, 12 and 15 have no doubts of the accuracy of their models. Regardless, Figure also shows that some developers have lower expectations on the accurateness of their model's representation of reality (namely, instruments 3, 9 and 19).

<<Figure 2>>

Figure 2 - Perception of accessibility instrument developers on precision of their accessibility instrument (N=20)[1]

3.2. Speed

Developers' perception on speed of their instrument is less optimistic with an average score of 4 (the middle point of the scale). With regard to this characteristic, we can find more instruments being rated poorly by their developers although we can still find top scores among the results. Developers of instruments 9 and 18 are the most optimistic about their speed while

[1] Note: The solid line represents the average score (simple mean of the scores of the 20 instruments). The average value is presented next to the line. The dashed line represents the middle score of the range (which is 4 in a range from 1 to 7). Accessibility Instruments presented in light grey are instruments without results for the usefulness analysis (presented in the next section).

instrument 20 was rated the lowest.

Interestingly, accessibility instruments such as 6 and 9 are found on opposing ends of the ratings regarding speed and precision. Although this supports arguments that increased precision hiders speed, this does not represent a general trend among all instruments. For instance, instrument 16 presents' low rates for both speed and precision, while instrument 8 presents above average rates for both these characteristics.

<<Figure 3>>

Figure 3 - Perception of accessibility instrument developers on speed of their accessibility instrument (N=20)[1]

3.3. Ease to play

Perception on 'ease to play with' is even lower among accessibility instrument developers than speed (with an average of 3.7 and below the middle score). Although we can again find scores across the entire scale, most instruments are rated below the middle score by their developers. Among the top scores we find instrument 20 and on the opposite end of the scale instrument 8.

<<Fgure 4>>

Figure 4 - Perception of accessibility instrument developers on 'ease to play with' of their accessibility instrument (N=20) [1]

3.4. Transparency

The expected transparency of the accessibility instruments is shown in figure 5. In fact, this characteristic is among the highest performing characteristics assessed by the accessibility instrument survey (see chapter 7 for more detail) with half of the instruments scoring 6 or higher and only one of the instruments scoring below the middle value (instrument 15). Instruments 9 and 12 are again worth mentioning here, now for the top scores in transparency assumed by their developers.

<<Figure 5>>

Figure 5 - Perception of accessibility instrument developers on transparency of their accessibility instrument (N=20) [1]

3.5. Aggregate overview of usability

Figure presents an aggregate score of the 20 instruments (summing the scores of the four analysed characteristics) and ordering from highest to lowest aggregate score. This aggregate score shows most developers have an ‘above middle score’ perception of the usability of their instrument. This is in line with the general perception and reasonable assumption that accessibility instrument developers are optimistic of their usability. However, scores are well below the maximum threshold of 28 (7 top score * 4 characteristics under analysis), with instruments rated 18.2 on average, revealing awareness of the limitations on usability.

While this aggregate analysis dilutes some of the opposing scores presented by some instruments across the different characteristics, it still enables a tentative comparison on the

optimism of different accessibility instrument developers' on the usability of their instruments. Accessibility instruments 1, 12, 14, 17 and 18 are among those with highest perception of usability by their developers' with instrument 14 showing a considerably higher aggregate score than the rest. On the other hand, instruments 3, 4, 8, 15 and 16 show the lowest usability perception.

<<Figure 6>>

Figure 6 - Agregate perception on usability (sum of scores for the 4 analysed characteristics)[2]

Developers seem to be quite aware of the potential usability problems of their instruments. Although precision and transparency are positively perceived, their confidence levels drops if we consider speed and 'ease to play with'. It is also clear that the level of perceived usability of accessibility instruments varies considerable. This is true when comparing instruments for the same characteristic, where we can find all possible scores from 1 to 7 (for instance speed). But this is also true when comparing among different characteristics of the same instrument, where we can find the same instrument scoring on opposite ends of the scale for different characteristics (for instance instrument 20 scoring 7 for 'ease to play with' and 1 for speed).

This survey has produced mixed findings on the developers' perception on usability. Thus it is fair to say that developers of accessibility instruments do not always perceive their own

[2] Note: The solid line marks the averge aggregate score (sum of the scores obtained for the 4 charactersistics analysed) of the 20 accessibility instruments. The dashed line marks the middel score (4 is the middle score * 4 characteristics = 16). Accessibility instruments further analysed with regard to usefulness (in the following section) are highlighted with dashed boxes.

instruments as highly usable (while assuming their usefulness). Therefore, the first of the research hypotheses defined in section 1 was not fully confirmed by our sample.

4. USEFULNESS AS EXPERIENCED BY USERS

4.1. Enthusiasm and insight

Practitioners in 10 out of 13 workshops strongly agreed at a very high rate (ranging from 11% to 70%) that the session resulted in useful results (see figure 7). Participants in the rest 3 workshops (9, 10, and 5) were also positive. Interestingly no negative responses were identified in this question. Similarly, practitioners were highly positive with respect to the insights that the session offered to them. Practitioners in 9 out of 13 workshops strongly agreed that the session was insightful at a rate ranging from 13% to 100%, while positive responses (agree or strongly agree) varied between 57% and 100% in all workshops. Participants in workshops using accessibility instruments 7 and 12 seem to be the most enthusiastic with the experience and results of accessibility instruments they used.

<<Figure 7>>

Figure 7 - Distribution of responses about enthusiasm and insight per workshop/instrument (ranked from best to worst for each characteristic).

4.2. Professional language and communication

Practitioners responded positively that during the sessions they developed a shared professional language, although this was not the case in all workshops (see figure 8). Positive responses (agree or strongly agree) were given in 11 workshops (ranging between 29% and 100%). There were also participants in 6 workshops who disagreed or strongly disagreed that the sessions

helped them to develop a shared professional language at a relatively high rate (varying between 10% and 50%). The outcome is similar for the level of communication that the participants developed during the workshop. Participants in 11 workshops responded positively (between 14% and 100% agreed or strongly agreed) that the workshop helped them to interact and understand co-participants ideas. High level of communication was not necessarily connected with the development of shared professional language and vice versa. For example participants using accessibility instruments 1, 7 and 4 were highly positive about communication, but at the same time the same workshops' participants were highly negative about the level of shared professional language they developed during the session.

<<Figure 8>>

Figure 8 - Distribution of responses about development of shared professional language and communication per workshop/instrument.

4.3. Efficiency and cohesion

The practitioners evaluated also positively the efficiency of the workshop. Between 44% and 100% of the participants in 12 workshops agreed or strongly agreed that the group solution they developed using an accessibility instrument was correct (see figure 9). However, participants in only four workshops (7, 3, 12 and 2) strongly agreed that the session was efficient. The number of workshops with highly positive responses increased significantly in the question about cohesion of the session. Participants in 9 out of 13 workshops strongly agreed at a rate between 11% and 33% that they felt as part of a group during the workshop. Participants in workshops 7 and 12 were highly positive about both factors (efficiency and

cohesion) while participants in workshops 6 and 9 were highly negative about those factors.

<<Figure 9>>

Figure 9 - Distribution of responses about effciency and cohesion per workshop/instrument.

4.4. Prospects for analysis and strategy development

Finally, practitioners were highly positive about usefulness of the accessibility instruments both for the analysis of urban structure problems and strategy selection. Regarding the first factor, participants in 10 out of 13 workshops strongly agreed at a rate between 11% and 100%, while for the second factor the respective range of the participants who strongly agreed varied between 14% and 60%. Participants in workshops 4 and 7 were highly positive about both factors while participants in workshops 10 and 11 were highly negative about those factors.

<<Figure 10>>

Figure 10 - Distribution of responses about usefuleness of accessiblity instruments in terms of analysis and strategy development per workshop/instrument.

4.5. Aggregate overview of usefulness

Practitioners were in general positive and in several cases highly positive with respect to the 8 factors reflecting the usefulness of the accessibility instruments. They showed the most positive reaction on the questions about the usefulness of the instrument in analysing urban structure problems and selecting appropriate strategies. They were also very enthusiastic with the results of the workshops and the insights that the instruments offered them with respect to the

processes that play a role in the problem they explored. They were less (but still highly) enthusiastic about the level of communication, the development of a shared professional language and finally about the efficiency of the session. Accessibility instruments 4, 7 and 12 were most frequently ranked in higher positions of the 8 usefulness factors, while instruments 1, 9, and 10 were typically found in low-ranked positions.

In conclusion, most practitioners did not experience low usefulness of accessibility instruments in our 13 case studies. In fact a number of practitioners were really enthusiastic with respect to the 8 factors reflecting the usefulness of the accessibility instruments. Our sample therefore does not confirm the second hypothesis as proposed in section 1.

5. DIFFERENCES BETWEEN USABILITY AND USEFULNESS

The above two paragraphs have painted a quite nuanced picture of usability and usefulness perceptions of the instrument developers and users. In both of these datasets, we found considerable variance. Here, with the risk to neglect this nuanced data, we want to zoom in on the gap between usability and usefulness. In figure 11, the generalized rankings of the 13 instruments on usability and usefulness are presented.

<<Figure 11>>

Figure 11 - Comparison of ‘Usability rank’ with ‘Usefulness rank’

The spiderplot uses the usability rank as order, starting with the highest rank (instrument 1).Taking this instrument as an example, the difference between the two rankings is -7,

meaning that in terms of experienced usefulness the instruments ranks 8. The six instruments that rank highest on perceived usability rank lower on experienced usefulness. Four of these (1, 5, 9 and 10) are ranked in the bottom five for usefulness. At the same time, the opposite pattern can be observed. The five instruments that rank lowest on perceived usability rank higher or similar on experienced usefulness. Four of these (7, 8, 3, 4) rank in the top six for usefulness.

The data allows us to zoom in on the separate relations between all usability and usefulness rankings. Figure 12 and figure 13 give two examples of this. Again, the ranking on the usability variable (Transparency and Ease to play respectively) are used to rank the spider plots. Similar to the overal picture in figure 11, these rankings do not show a clear pattern. While literature and anecdotal evidence suggests that increasing transparency could be related with the insight that users experience and increasing ease of play could increase enthisasm, this is not supported by our data.

<<Figure 12>>

Figure 12 - Comparison of ‘Transparency rank’ with ‘Insight rank’

<<Figure 13>>

Figure 13 - Comparison of ‘Ease to play rank with ‘Enthusiasm rank’

Adding to the nuanced picture of paragrah 3 and 4, this analysis suggests that there is no clear

linear relation between the confidence of instrument developers and perceived usefulness in the workshops. If anything, this relation appears to be juxtaposed; when instrument developers rank their instrument high on usability, the experienced usefulness is low (conforming hypothesis 3), but when they rank their instrument low, the experienced usefulness is high (rejecting the hypothesis).

6. INSTITUTIONAL BARRIERS ACCORDING TO USERS AND DEVELOPERS

The developers' perception of institutional barriers blocking the use of accessibility instruments in practice has pointed out that data availability and the separation of urban and transport planning institutions as the main reasons for low implementation of accessibility instruments. In addition, the following issues were also identified by developers as potential institutional barriers: formal processes, financial arrangements, different planning objectives/ and assumptions, staff technical skills, political commitment, lack of priority for accessibility (in comparison to mobility); lack of resources (including time), and blackboxing and competing analysis (non-transparent, non-understandable, incomprehensible assumptions etc.).

<<Figure 14>>

Figure 14 - Perceived usability of accessibility instruments: developers' perception of institutional barriers blocking the use (N=21).

Through the planning practitioners' survey we identified two groups of barriers concerning the potential use of the instruments in planning practice: first, the technical and resources barrier, and second, the political barrier. The users perceived the lack of familiarity of their organisations with accessibility instruments as one of the reasons that the instruments presented in the workshops would most likely not be used in practice (so perceived by 26% of the

surveyed practitioners). Additionally, some users responded that their organisations do not have sufficient resources, in terms of time and money (22% of practitioners); data (15% of the surveyed practitioners); and computational skills (14% of the surveyed practitioners). Also 34% of the participants found the high-required precision of the presented instruments, as an additional barrier due to the associated increased cost for their organisations. Regarding the second group of barriers (political), a significant portion of the users responded that the results from the instruments, as presented in the workshops, contradicted with the political commitment of their organization (19% of the surveyed practitioners), and that the culture of their organization does enable the use of accessibility instruments in general (23% of the surveyed practitioners). The users indicated conflicting policies between agencies as the most important barrier in this group (so perceived by 40% of the surveyed practitioners).

It is clear that both groups (accessibility instrument developers' and planning practitioners) recognise the existence of institutional barriers, in particular barriers regarding conflicts between agencies, lack of familiarity in the use of accessibility instruments and lack of resources for its use. Both, potential users' and developers' give much importance to the barriers related to conflicts between agencies. However, while data availability is considered by developers as one of the top barriers, planning practitioners do actually not consider it such an important barrier, although recognising its hindering effect on the use of the accessibility instrument. In general accessibility instrument developers' are not very far from the truth in their assumptions on barriers, also identifying the importance of lack of resources and lack of familiarity in the use of accessibility instruments (although the developers' survey phrase this as lack of political commitment which directly generates lack of familiarity in use).

It is thus fair to say that both accessibility instrument developers and planning practitioners recognise a variety of institutional barriers as alternative reasons for the low implementation of accessibility instruments in planning practice. This gives support to the 4th hypothesis.

7. CONCLUSIONS

This chapter started with addressing the potential of accessibility instruments for urban planning practice and the lack of their use. The general literature on usability of knowledge technologies in the context of planning provided two main hypotheses. They state that the low level of use of accessibility instruments in planning practice can be explained by:

- **1**: the gap between highly perceived usability by instrument developers and low experienced usefulness by planning participants (which builds on two underlying hypotheses)
- **2**: Institutional barriers

The self-selected sample of accessibility instruments within COST Action TU1002 allowed us to assess these hypothesised reasons in much more detail. To do so, the confidence of the developers about the usability characteristics of their own instrument was measured through a web based survey. Consecutively, thirteen of these instruments were used in a workshop with local planning practitioners following a fixed process. Afterwards, the participants were asked about the experienced usefulness of the instrument that they used.

When we compare the data on the developers' perception of usability and planning practitioners' perception of usefulness it becomes clear that the expected discrepancy did not

clearly come out in the sample. On the contrary! There seems to be considerable doubt about the actual usability of the instruments amongst the developers themselves. They especially feel that quite some skills and data are needed to operate the instruments, which might hamper their hands-on use in practice (which might be explained by self-selection into the Action). On the other hand, we find that most planning participants are actually quite positive about the usefulness of the instruments for supporting them in their day-to-day work. If anything, there seems to be a juxtaposing pattern: the instruments that are considered usable by their developers score lower on perceived usefulness while those that are considered less usable score higher. Observations and discussion during the Action seem to point to the fact that a well-considered workshop protocol might form a crucial linking pin in this. When practitioners experience high potential usefulness, they will except that an accessibility instrument will be chauffeured during a well-structured meeting. In this way, they do not have to bother with the specific skills that are needed for hands-on operation and instead can focus on the important content. Think of it as a complicated espresso machine that produces a great cup of coffee, but which needs to be operated by a professional barista to do so. This is mirrored in recent debates around Planning Support Systems that start to emphasize the importance (and general neglect) of the process of facilitating the exchange of knowledge between planning practitioners and the instruments (Pelzer and Te Brömmelstroet, 2014).

The data for the final hypothesis painted a clearer and more confirming picture: both accessibility instrument developers and planning practitioners recognise a variety of institutional barriers as reasons for low use. The most common perceived barriers are conflicts between agencies, lack of familiarity in the use of accessibility instruments and lack of resources. Interestingly, the organised workshops and the experiences that the participants had might be a part of the solution. In the post-workshop survey more than 70% of the participants

stated that they would use insight created by the session in their daily practice. In addition, more than 50% stated it was likely that they would select the accessibility instrument used in the workshop for use other planning decisions.