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The learning process of accessibility instrument developers: Testing the tools in planning practice

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ABSTRACT

Many planning support tools have recently been developed aimed at measuring and modelling accessibility (Accessibility Instrument or AI). The main difficulty for tool developers is designing an AI that is at the same time technically rigorous and usable in practice. Measuring accessibility is indeed a complex task, and AI outputs are difficult to communicate to target end-users, in particular, because these users are professionals from several disciplines with different languages and areas of expertise, such as urban geographers, spatial planners, transport planners, and budgeting professionals. In addition to this, AI developers seem to have little awareness of the needs of AI end-users, which in turn tend to have limited ability for using these tools. Against this complex background, our research focuses on the viewpoint of AI developers, with two aims: (1) to provide insights into how AI developers perceive their tools and (2) to understand how their perceptions might change after testing their AI with end-users. With this in mind, an analysis of 15 case studies was performed: groups of end-users tested different AI in structured workshops. Before and after the workshops, two questionnaires explored the AI developers' perceptions on the tools and their usability. The paper demonstrates that the workshops with end-users were critical for developers to appreciate the importance of specific characteristics the tool should have, namely practical relevance, flexibility, and ease of use. The study provides evidence that AI developers were prone to change their perceptions about AI after interacting directly with end-users.

1. Introduction

The term accessibility is used in transport planning theory and practice to refer to the ease of reaching given services or opportunities. This means that, in their most advanced stages, accessibility indicators not only reflect transport-related factors that weigh the disutility of travel in terms of time, monetary cost, and effort – as many transport indicators do. Accessibility indicators also designate the amount, quality and spatial distribution of opportunities while taking into consideration individual factors such as personal ability to travel and time budgets. To apply the concept of accessibility in practice, several accessibility indicators have been developed and used (Geurs and van Wee, 2004). Following these enhancements, an

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increasing number of Accessibility Instruments (henceforth AI) have been designed over the years (Hull et al., 2012b; Papa et al., 2016). AI are here defined as Planning Support Systems (PSS) that explicitly use accessibility indicators to facilitate analysis, design, monitoring and or evaluation of policies and projects. It has been observed (namely by Bertolini, 2007; Proffitt et al., 2015; Straatemeier and Bertolini, 2008; Straatemeier et al., 2010) that AI are the best PSS to facilitate the design and implementation of integrated land-use and transport policies. These policies are very helpful for achieving sustainability goals (Banister, 2008; Handy and Niemeier, 1997; Hickman et al., 2013; Meyer and Miller, 2001).

However, and despite all its potential merits, accessibility planning is far from being mainstream in professional planning practice (Banister, 2005; Geerlings et al., 2012; Tomer and Gutman, 2017) and therefore is no surprise that the use of AI is still uncommon. At the same time, while the literature on how to measure accessibility is extremely rich (Curl et al., 2015; Geurs et al., 2014; Geurs and van Wee, 2004; Paez et al., 2012), comparatively little research has been produced about the extent to which and how AI could indeed facilitate the design and implementation of integrated land-use and transport policies. Thus knowledge about their employability in planning practice and knowledge about the so-called "implementation gap" is not as abundant and detailed as desired (Hull et al., 2012b; Silva, 2013; te Brömmelstroet, 2012) with some noteworthy exceptions (e.g. te Brömmelstroet et al., 2014).

A wide variety of governance barriers impedes the implementation of AI, such as the absence of a legal framework for their use, (e.g. accessibility appraisal is in many instances rudimentary or non-existent) or the lack of coordination across land use, transportation and strategic development planning (which is required for accessibility planning to take place). Besides these institutional barriers (which are beyond the scope of this paper), some barriers are the direct result of how AI developers design and perceive their tools, as will be explained later. In this article, we look at the AI implementation gap from this perspective paying particular attention to AI developers' viewpoints, seeking to understand the choices they have to do when developing an AI. In line with this, the present research specifically aims at answering the following questions. First, what features AI developers perceive as essential for their tools? Then, how could a direct interaction with AI end-users change these views? Finally, which new perceptions regarding key features for AI emerge when developers interact directly with AI end-users?

These questions are not simple to answer. When developing an AI, it is hard to include all the relevant elements of both transport and spatial systems (Hrelja, 2015; Næss et al., 2013). It is also complex to solve conceptual issues and measurement problems caused by the intricacy of the concept of accessibility. To aggravate these technical complexities, different users will have different expectations towards an AI resulting from various procedural preferences. For example, budgeting professionals are likely to place emphasis on having policy alternatives econometrically assessed. Conversely, planners are likely to put emphasis on seeing strategic decision-making processes facilitated by the tool (Beukers et al., 2012). Key challenges for AI developers would then be to find a balance between scientific rigor and usability, or how to serve the procedural needs of different professional ontologies at the same time (for further insights see, for example, Bertolini et al., 2005), and, at last, but not the least, successfully integrating the spatial, transport, economic and environmental planning institutional domains.

To address this challenge, the COST Action TU1002 (Hull et al., 2012b; te Brömmelstroet et al., 2014), which the authors were part of, adopted a method and a protocol based on an interactive learning process (Vonk et al., 2005). The Action's participatory assessments of AI started from the idea that a fundamental limitation is the lack of communication between AI developers and end-users (te Brömmelstroet and Schrijnen, 2010) and between transport and spatial planners. During the Action, fifteen workshops were carried out in different European countries (plus Australia), involving AI developers and end-users (these included spatial and transport planners). In the workshops, developers and end-users experienced the use of an AI in attempting to solve a planning problem in the local context (te Brömmelstroet et al., 2014). A first survey was carried out before the workshops, aiming at collecting information about the AI and about the perceptions that the developers had about their features. A second survey was conducted after each workshop, to ascertain whether and to what extent the AI developers advanced new insights into accessibility concepts and different perceptions about the features of their AI. Note that in this paper we only refer to the developers' views. A detailed account focused on the perspectives of end-users can be found in te Brömmelstroet et al. (2014). In summary, this study critically examines the results of the before and after surveys. It also explores in detail one particular workshop conducted in Rome, critically describing the conclusions from the participant-observation process experienced in this workshop by the authors.

The paper is structured as follows. Section 2 describes the research methodology, including the data collection methods and the AI sample. Section 3 discusses the main results from the fifteen cases analysed with a focus on the workshop held in Rome. Conclusions are drawn in Section 4.

2. Methodologhy

This section aims at briefly explaining how the research that informs this paper was conducted. It is important to mention that the research method developed in this study is embedded in the methodology designed for the COST Action TU1002 and follows five main steps. First, information was gathered via a comprehensive literature review on accessibility tools. A second stage consisted of the so-called 'Accessibility Instrument Survey' distributed among a sample of AI developers, with the aim of analysing the AI essential characteristics and how they are being used and perceived by developers. In a third stage several workshop were conducted and developers had the opportunity to interact with end-users. A fourth stage consisted of