Chapter 5
Smart Sensoring and Barrier Free Planning:
Project Outcomes and Recent Developments

Antônio Nélson Rodrigues da Silva
University of São Paulo, Brazil

Fabíola de Oliveira Aguiar
Center of Technological Sciences - Maranhão State University, Brazil

Peter Zeile
University of Kaiserslautern, Germany

Georgios Papastefanou
GESIS Leibniz Institute for the Social Sciences, Germany

Benjamin Sebastian Bergner
University of Kaiserslautern, Germany

ABSTRACT

As more and more people face mobility constraints due to the natural aging process of the population, barrier-free planning becomes an important urban planning issue. It is elemental to know the place of spatial barriers associated with the negative emotion - the "stress" of probands. To achieve this, a method of psycho-physiological monitoring was developed, using a special technical device to measure autonomic bodily functions as indicators for emotions - a Smartband. This chapter presents the main characteristics and the outcomes of two projects that have applied the method, one in Germany and the other in Brazil. Future research directions are also discussed in this chapter. In summary, the next steps are to automate the interpretation of the collected data and to combine the existing methods with the development of a smartphone-based app to allow people to give some qualitative hints about urban parameters.

DOI: 10.4018/978-1-4666-4349-9.ch005

INTRODUCTION

This study is part of a joint effort of two research groups, one located in Brazil and another one in Germany. The first motivation for this cooperation was the study of Zeile, Exner, & Streich (2009), presented at the 2009 meeting of the Conference on Computers in Urban Planning and Urban Management in Hong Kong, when the German partners discussed the potential of "human as sensors". After a few years of technology exchange, new results on the topic were produced by both groups in two independent projects, as discussed in Zeile et al. (2011). Interestingly, the topic "planning for people with disabilities" was the central issue in both projects. Such an interest is certainly not limited to those two countries, as shown by the international literature (Axelson, Wong, & Kirschbaum, 1999; Beale et al., 2000; Blennemann et al., 2003; Church & Marston, 2003; Childs et al., 2005; ECMT, 2006; Yairi & Igi, 2009; just to mention some).

Only through a high level of accessibility in a city, the subjective quality of life of disabled and handicapped people increases. In the past, a "measurement of life's quality," an analysis and assessment of quality of life, was only possible by using surveys and retrospective self-reports. Urban planning practice is a mix of two approaches: top-down (urban planning regulations / DIN standards) and bottom-up (here: a survey of affected, handicapped population groups). This process is also known as "mixed planning". Especially in planning processes, concerning the topic "planning for handicapped people", there is a large gap between planners' opinions and surveys to a special topic, made for mobility-impaired users, where they could express their subjective impressions or situation, to another situation actually experienced.

A method for "objectively measuring the mental state" in connection with the identification of barriers in the city for people with disabilities is currently not available. It is not yet possible to detect barriers for disabled people from their conscious and unconscious perception. Spatial planning needs primarily objective and valid data to identify issues for this special planning topic. From this motivation, there is a need to create a methodology for objectification and validation of such subjective, target group-specific data in spatial planning. These topics are further discussed in this chapter by looking at the outcomes of the projects above-mentioned and at the new technological developments recently proposed by the German team.

BACKGROUND

The idea of using smart sensoring methods for identifying "points of negative emotions" is not new. It came from the concept of "Mental Maps," in which Lynch (1960) explored the idea that humans are able to memorize paths and to recall them if needed. These maps contained the following elements: paths, borderlines, areas and focus points, as well as landmarks. Thus, paths are the predominant aspects of a city, because they are like canals through which the spectators can move. Moreover, some areas have been marked as they have been experienced as pleasant or threatening (Lynch, 1960). Critics of this technique point out that not every participant had the drawing skills needed to adequately express his/her exact imagination using a graphical plan. The use of GPS technology and the automatic tracking of a walk in a city can now help to reduce these deficiencies, as demonstrated by Phillips et al. (2001), for example. In another study, Elgethun et al. (2003) used the GPS technology to identify areas with potential exposure to environmental contaminants. The integration of "feelings" or "well being" into GIS was introduced by Sorin Matei, with his Mental Maps. His work is strongly oriented on the previous studies of Lynch. Matei mapped feelings for the first time on a map and visualized them additionally in a three-dimensional VRML