

Barriers and Challenges in Developing Personal Mobility

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Abstract: High hopes have been placed in the development of personal mobility. It loses in all situations of mass mobility for bus, tram, or train. More individual mobility lessens congestion, reduces emissions, and improves accessibility for less well-situated individuals. Whereas previous mobility revolutions brought advances for everyone, the personal mobility revolution is discussed with more caution. Mobility for everyone comes at the price of growing inequities regarding those who cannot or those who do not wish to participate. Hence, since the 1990s, the idea of assistive personal mobility has been proposed for individuals with mobility problems who are unable to use traditional aides. The idea is to harness advanced technology to closely monitor the environment and assist the user in mobility. Questions about these developments, however, concern the conflicting expectations of what personal mobility can bring: the fear of losing control over one's life vis-à-vis the hope of regaining lost control. In the paper, these conflicting expectations will be discussed, after a short introduction to the various planned developments of personal mobility. The key findings of this review paper are that these developments in personal mobility incur multiple barriers. Five barriers chain emergence and impact challenges: a lack of affordable and cheap products, a lack of professional care, a lack of user confidence, a lack of a supportive legal framework, and a lack of active user involvement in development. So far, the barriers to the development of personal mobility are not explicitly addressed, even though they are necessary to overcome in the transition from plans to integral strategies [2]. Having mapped the barriers, the paper explores already ongoing or potentially feasible strategies to overcome them through three claimed beneficial intersections with issues currently on the mobility agenda: the transition to an automated car-based transport system, the emergence of a future aerial mobility system, and the reduction of dependence on fossil fuels, which not only have climate but also mobility equity implications.

Keywords: *Personal Mobility, Barriers Mobility, Old Adults Fell, Capability, Transportation.*

Introduction

Personal mobility provides a solution to many problems we face in our everyday life. This personal mobility system should be large enough to serve many people, but also small enough for an individual to take home to the living room to play games or do productive work. The concept will make it possible to extend the workspace more than ever before, so that it is not limited to the office only. And on the way to work, lunch, or shopping, it is possible to use the time to watch the news, catch up with email, and control the home environment on the net. It is also essential to control the temperature and lighting inside the house, where elderly people are on their own. Daily work tasks can also be handled on the way home. After that, all information will be saved to the net server and can be used later for work. No papers will be needed anymore in working life since everything is controlled, saved, and sent on paperless computers nowadays. This system enhances participation in live interaction with electronic media[1].

The growing world's population and the increasing demand for urbanization change the structure of cities. The centers of the cities are transformed into crowded places and pollution increases rapidly. The conventional concept of personal mobility is an obstacle to the development of urbanization. Presently, a car is the most common method of transportation. This increases the number of cars in use and exhaust gases are produced in large quantities. The teeming traffic jams and the lack of parking places in city centers are common problems. Trains and subways cannot cover the accessibility of all locations. Conventional public transportation can be used for this purpose, but it cannot meet the demand for fast transportation for individuals in an efficient way. It cannot provide good service, especially during rush hours. Bicycles are environmentally friendly; however, the expansion

of bicycle stations would be costly and not all individuals can or want to use them. At the moment, the alternative personal mobility concept does not exist.

Cultural and Societal Factors

Cultural beliefs, values, and practices are strong influence in the acceptance, adaptation, or exclusion of a personal mobility solution. However, there are cultures with customs and practices that prevent few personal mobility solutions to fit into the culture [3]. In such cases, examining the cultural aspect of the personal mobility solution can help in tuning a solution closer to cultural expectation. Existence of certain cultural factors prevents development of personal mobility landscape that adopts a personal mobility solution. There are barriers such as public anger towards some transport services to act as a block to the development of personal mobility import. Behaviour and preference of users describe how personal mobility solution is utilized, accepted, rejected, exploitation manner, and characteristic of the target user. In certain cases, personal mobility solution takes too long to adapt the matured territory, partially adopted, or malfunctioned beyond expected limit which leads to requirement of corrective measures. Target user group of a personal mobility solution exhibited similar characteristic can lead to similar treatment of a personal mobility solution. In case different user groups exhibited different behaviour of a personal mobility solution, it leads to requirement of multiple tuning of personal mobility solution to address all targeting specification of the same personal mobility solution. This situation often leads to wastage of resource to adapt and tune repeatedly of personal mobility solution. Societal structure, organization, and expectation builds a context for personal mobility solution to develop more easily or hardly [1]. A personal mobility solution is very hard to develop if it conflicts with societal structure. For instance, in case of traffic accident, transportation, and parking, in a society with prior permission car parks should only be allowed. This personal mobility solution may be acceptable in current scenario; however, once there is conflict with existing modality then development of the personal mobility solution is more complicated, contested, and time consuming. Comparison of present day monitoring personal mobility solution in Singapore with its competitive cities of consider developing territories leads to examine how societal structure and expectation of current personal mobility solution act as enablers or barriers.

Individual Differences and Learning Styles

Personal mobility is a diverse research domain where mainly cognitive, behavioral, and psychological factors with influence on how personal mobility solutions are perceived, approached, and used by individuals are being investigated. Here, individual differences in their preferences, styles, competence levels, and mobility experiences are researched. Since these dimensions, specifically concerning personal mobility, are diverse and often complex, general profiles or types of users cannot be derived. Precisely because of that; they refine one of the biggest challenges in dealing with mobility solutions from a design perspective.

Different definitions of individual differences, preferences, and styles can be given, but in general, they hold a collective meaning towards the cognitive, behavioral, and psychological factors that shape individuals, and that influence how both active and passive personal mobility solutions are approached, engaged with, and experienced. This subject is examined in a context of user involvement and user-centered design [4]. Recent literature dealing with the user-centered design process emphasizes the need to focus on the user side rather than solely on the technology perspective when establishing a better fit between both parties. In this light, different studies on the individual user-centered design approach were executed. Thereby, it became evident that such approaches seem to focus primarily on more or less static, contextualized user requirements that are not necessarily personalized for each individual user.

Resource Constraints

Resource Constraints are the most critical issues hindering citizen mobility. Resource constraints include economic as well as infrastructural resources, technology, development skills, or other resources required for the effective provision of personal mobility solutions.

When citizens are unable to access or afford various mobility options within their city, a widening gap emerges between those who have effective mobility resources and those who do not. This gap may exclude people

from vital services and economic advancements, rendering the mobility disadvantaged from rising personal wealth [5]. For instance, mass transit options may be too limited for those in rural towns or who cannot afford rapid transit ticketing. Economic barriers to mobility can also arise from rapid transitions away from vehicle ownership or once-affordable transport options, such as when bus routes are discontinued due to financial cuts. Many who were once avid users may become 'mobility poor' overnight when essential transport routes are erased from their locale.

In the provision of personal mobility solutions, there also lie several challenges in the approach taken. These have arisen from the increasing privatization and marketization of previously public mobility choices. Technological resource barriers can include incompatible digital platforms or experiences that come from already established travel providers, and which are unable to communicate between these platforms [6].

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