

Auxiliary Location-Based Services for Persons with Disabilities: What do City Planners and Non-Profit Agencies Think?

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ABSTRACT

Deploying auxiliary location-based services to complement GPS-based services has been a recent phenomenon to enable greater independence in navigation and wayfinding for persons with disabilities in unfamiliar environments. All work in this domain has been technical in nature with little known about the perceptions of city planners and non-profit agencies about the long-term sustainability and impact of such technologies on their communities. This work presents results and insights from a study on the perceptions of both city planners and non-profit agency personnel from a medium-sized city in the U.S.A about the importance of auxiliary location-based services and their potential impact.

Author Keywords

Navigation, wayfinding; community perspectives, impact

CCS Concepts

• Social and professional topics~Assistive technologies

INTRODUCTION

Advances in GPS-based mapping applications (e.g. Google Maps, Apple maps, BlindSquare [1], GetThere [2], and Microsoft SoundScape [3]) has increased the wayfinding and navigation capabilities of everyone, including persons with disabilities (PWD). With GPS being limited in most indoor spaces and some outdoor spaces, such areas have been a challenge to navigate, especially for PWD in unfamiliar environments. There have been many recent efforts to design and evaluate prototype auxiliary location-based services (ALBSs) in GPS-limited areas utilizing Bluetooth Low Energy (BLE) beacons, Wi-Fi, and/or computer vision that complement GPS-based location services for persons with disabilities (PWD) [4,5,6,7,8] promising greater independence in navigation and wayfinding. Expectedly, most of the initial focus has been on solving technical challenges and implementing systems and services and evaluating prototypes for effectiveness. The perceived long-

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ASSETS '19, October 28–30, 2019, Pittsburgh, PA, USA.

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ACM ISBN 978-1-4503-6676-2/19/10.

<https://doi.org/10.1145/3308561.3354631>

term sustainability of such systems and services is not clear however primarily because not much is known about the perceptions of those city planners who will likely deploy and manage such technologies within communities. On the other hand, such systems are primarily advocated in communities by non-profit agencies that serve PWD who may offer a different perspective than city planners on the importance of ALBSs and their potential impact and who should take responsibility for operating such services. With no publicly available study on what these entities think about ALBSs, their applications, and impact at this time, this work presents the results from a study to document the perceptions of both city planners and PWD-serving non-profit agency personnel. This study is expected to be useful in planning next steps for utilizing ALBSs for serving PWD.

METHOD

The study was done in Wichita, a medium-sized city in the U.S. with population of about 600,000. Many of the suburban towns with much smaller populations were also involved given that they were part of the “Greater Wichita” region. The data gathering was conducted in two stages. The first stage was a stakeholder summit where various known stakeholders (such as city planners, persons with disabilities, and non-profit organizations serving PWD) in the community were invited to learn about the technology behind ALBSs and to identify appropriate applications for serving community needs. Feedback from the summit was synthesized to identify a broader set of stakeholders (those who could not make it to the summit or were identified as a stakeholder to engage) and what additional information needed to be gathered. An online survey was developed and deployed to collect data from this new set as stage two.

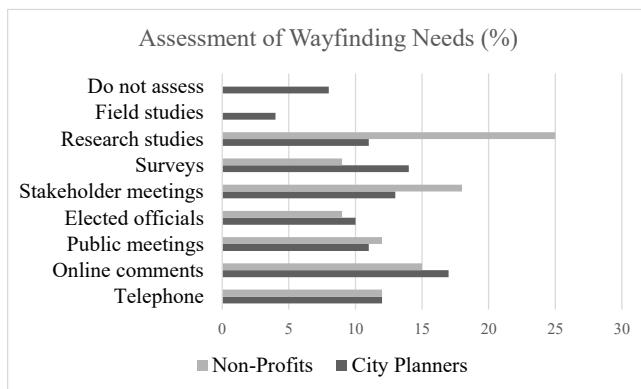
MAJOR RESULTS

There were 30 participants from non-profit organizations and 40 participants identifying as city planners on the survey. The profile of the majority of the respondents from the city planners group was management in local government and the other group was employees (both blue collar and white collar) from the regional PWD-serving non-profits. The collected data was synthesized to answer the following questions deemed important to the objectives of the study.

Q1. What is the current perception about ALBSs?

Both city planners and non-profit agencies were in agreement that wayfinding innovations have generally resulted in mobility improvements for people with disabilities. Additionally, they were on the same page with the statement that efforts to provide better wayfinding services for people with disabilities also improve wayfinding for the general population. For the statement “The federal, state, and local governments are adequately funding infrastructure, institutions, and services to meet the future needs of the people with disabilities,” non-profits disagreed with this statement much more (88% vs 55%) than city planners, perhaps because non-profits had no responsibility to fund such services whereas city governments have some role and felt it was not easy to do.

Q2. What are the ways in which organizations typically assess wayfinding needs within the community?



Both groups have relied on many ways to assess wayfinding needs in the community as seen above in the figure. The two groups differ in that city planners additionally use field studies while non-profits rely on formal research studies.

Q3. Why don't we see more ALBSs deployed in our communities to meet needs?

Both groups agreed that competition for attention and funding is the primary challenge in supporting the deployment of auxiliary location-based services. The secondary challenge identified was the perception that wayfinding assistance is not necessary except for a very small percentage of the population.

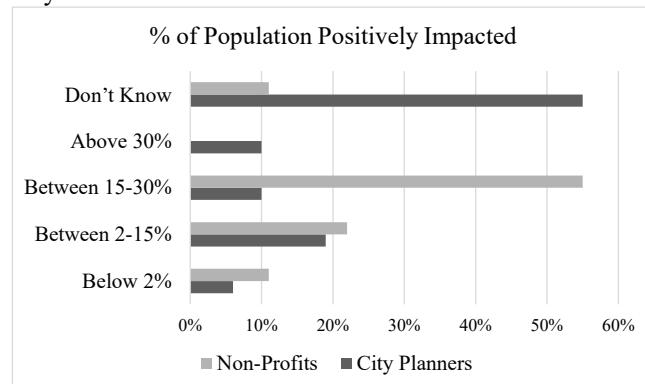
Q4. Who should take responsibility of providing ALBSs?

Both groups overwhelmingly agreed that joint public-private partnerships are the best path towards providing ALBSs in communities. Interestingly, some city planners (18%) favored the public sector to play a role greater than the private sector (8%), while non-profits saw no role for the public sector and only a small one (8%) for the private sector.

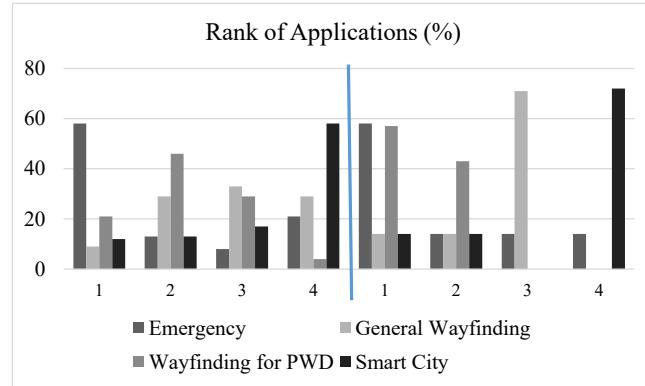
Q5. How many people are likely to benefit from ALBSs? How often will a person utilize such services?

The figure (top right) shows that city planners were not quite sure about how many people may be impacted by ALBSs. Non-profit personnel on the other hand felt that 15-30% of a

population are likely to be impacted. When asked how frequently ALBSs may be utilized by PWD when there is a need for wayfinding, city planners felt about half the time. For the same question, non-profit personnel felt that ALBSs may be utilized more than three-fourth of the time.



Q6. What applications will be most well-served by enabling auxiliary location-based services?



Among city planners (left in above figure), emergency applications like evacuations was considered the highest priority for using ALBS with wayfinding for PWD being the second highest priority. Among non-profit personnel (right in above figure), emergency applications and wayfinding for PWD are jointly considered the highest priority. Both groups did not see much value of the community being called a smart city in general by enabling ALBS.

CONCLUSIONS

Both city planners and PWD-serving non-profit agency personnel found a need for adequately funding ALBSs. They additionally recommend ALBS funding be provided through private-public partnerships. ALBSs have been identified to be desirable for safety (emergency and evacuation) needs along with navigational needs of PWD, who are currently helped by family and friends. City planners and non-profit personnel differ in their perception of potential impacts of ALBSs with a need for education of all stakeholders.

ACKNOWLEDGMENTS

We thank all the participants who shared valuable feedback/data with us for this research. This work was made possible through funding from NSF (#1737433).

REFERENCES

- [1] 2015. BlindSquare Indoor Navigation. (2015). <http://blindsquare.com/indoor/>
- [2] 2019. GetThere GPS nav for blind. (2019). <https://play.google.com/store/apps/details?id=com.LewLasher.getthere>
- [3] 2019. Microsoft Soundscape. <https://www.microsoft.com/en-us/research/product/soundscape/>. (2019).
- [4] 2019. Wayfindr Open Standard. (2019). <https://www.wayfindr.net/>
- [5] Dragan Ahmetovic, Cole Gleason, Chengxiong Ruan, Kris Kitani, Hironobu Takagi, and Chieko Asakawa. 2016. NavCog: ANavigational Cognitive Assistant for the Blind. In Proceedings of the 18th International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI '16). ACM, NewYork, NY, USA, 90–99.
- [7] Dragan Ahmetovic, Masayuki Murata, Cole Gleason, Erin Brady, Hironobu Takagi, Kris Kitani, and Chieko Asakawa. 2017. Achieving Practical and Accurate Indoor Navigation for People with Visual Impairments. In Proceedings of the 14th Web for All Conference on The Future of Accessible Work (W4A '17). ACM, New York, NY, USA, Article 31, 10 pages.
- [8] S.A. Cheraghi, V. Namboodiri, and L. Walker. 2016. Guidebeacon: Beacon-based indoor wayfinding for the blind, visually impaired, and disoriented. IEEE Pervasive Communications (PerCom) (2016).
- [9] Jee-Eun Kim, Masahiro Bessho, Shinsuke Kobayashi, Noboru Koshizuka, and Ken Sakamura. 2016. Navigating Visually Impaired Travelers in a Large Train Station Using Smartphone and Bluetooth Low Energy. In Proceedings of the 31st Annual ACM Symposium on Applied Computing (SAC '16). 604–611.