

# Diffusion of Collaborative Maps about Accessibility

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## Abstract

Recently, neogeography projects focused on collaborative mapping of localized accessibility knowledge have resulted in applications that are designed to collect ratings of how accessible certain venues (e.g., buildings) are for people who travel in wheelchairs, people with low to no hearing or vision and older adults. Each application is the product of different creators, yet there are striking similarities in their purpose and features. These applications are crowdsourcing systems for information sharing that allow users to add meaningful information to a personalized web map; however, little research has analyzed how these applications have been created and adopted overtime. This paper reviews several existing applications and presents a framework for analyzing their diffusion over time.

**Keywords:** Neogeography projects; geospatial web; accessibility maps; web maps.

**doi:** 10.9776/16609

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## 1 Introduction

The advances of new web collaboration tools have led to interesting neogeography projects in recent years. One type of application enabled by these new web tools is the collaborative mapping of localized accessibility knowledge. These neogeography projects, called accessibility mapping systems (AMS) in this paper, are designed to collect ratings of how accessible certain venues (e.g., buildings) are for people who use travel in wheelchairs, people with low to no hearing or vision and older adults.. The term accessible is defined by the Uniform Federal Accessibility Standards (UFAS) as a term “[describing] a site, building, facility, or portion thereof that complies with [UFAS] standards and that can be approached, entered, and used by physically disabled people” (UFAS, 1984). So accessibility in this case means the ability to approach, enter and use a building and its surrounding pedestrian pathways. Today, accessibility is still a significant challenge for many people, especially in under-developed countries (Green 2011).

The first AMS was created over five years ago yet little research has been conducted into why these applications were created, who created them and how have they evolved over time. Some have investigated technical aspects of these applications (Neis and Zielstra 2014) but no one has investigated the motivations for their creation and use. The research framework presented in this paper is part of a larger project to identify the motivations for the creation of AMS, and their adoption and use overtime. The main research questions for this project are, What are the motivations for the creation of AMS and how have they impacted adoption of these applications? How have AMS been adopted and used overtime? A framework based on the diffusion of innovations theory and a historical time-slice methodology is proposed to address these questions.

## 2 Accessibility Mapping Systems

Harnessing the ability to contribute localized data using crowdsourcing (Yuen et al. 2011) and geo spatial web technologies (Haklay et al. 2008), a new field of mapping called neogeography, has emerged. Neogeography is described as a “process whereby varied groups of people use an eclectic set of online geospatial tools to describe and document aspects of their lives, society, or environment in terms that are meaningful to them” (Warf and Sui 2010). This definition captures the essence of an AMS. Six existing AMS are described by the source of the creation and maintenance, the communities of people with disabilities they aim to support, and the stated purpose of the platform (Table 1).

Most AMS use a Google Maps mashup approach where base data such as streets and political boundaries are fetched from Google’s map server, and the venues are existing locations, within Google’s database, that a user searches for and then provides a rating. In the case of planat, a user may add a new venue if it is not found in a search which is not afforded in the other Google Maps based systems. In addition to Google Maps, Access Together, merges the accessibility annotations with Foursquare data allowing users to push their newly rated venue to the Foursquare database. Wheelmap is the only system

using base data from OpenStreetMap, pushing the accessibility ratings to this database. Finally, MapAbility discusses its desire to be compliant with OpenStreetMap requirements but this could not be confirmed due to lack of access to some of the application.

Each AMS is created by a different set of people with different resources. Access Together was created by a researcher at NYU while AXS Map is part of a larger campaign in the When I Walk film series by Jason DiSilvia. Other systems are the result of groups of people at non profit organizations or foundations like Wheelmap and planat.

All AMS support physical accessibility criteria for communities who have limited mobility. Three AMS, Access Together, AXS Map, and planat, include accessibility criteria for communities with low to no hearing and vision, and older adults with Access Together offering the only support for general sensory sensitivity.

The self-descriptions of AMS provide a view of how the creators of these systems situate their work within the wider domain of web applications and societal benefit. Some are focused on the mapping aspects of the system, others the use of the system as a tool, and the rest focus on gateways to accessibility knowledge. Many of the AMS also have open agendas for making the world a more accessible place.

On the surface, these different creators collectively aim to build an accessible world and use AMS to expose inaccessibility. There is some evidence that they are engaging in campaigns to promote their AMS via different communication channels and partnering with national and local organizations often relating to the systems target communities; however, there is no research that has investigated how these tools are actually maintained overtime.

Innovation	Source	Target Communities	Purpose
Access Together, 2011	Academia	Mobility, Vision, Hearing, Sensory, Seniors	"tool for collecting, displaying, and acting on community accessibility data"
AXS Map, 2010	Filmmaker	Mobility, Seniors, Hearing (limited), Vision (limited)	"user database" to "obtain or input information about physical accessibility of public places"
MapAbility, 2010	Startup Company	Mobility	"portal dedicated to urban accessibility"
Planat, 2011	Public Foundation	Mobility, Vision, Hearing, Seniors	"online tool that allows you to post and search reviews on the accessibility of places..."
Rollsquare, 2011 (defunct)	Organization related to tourism	Mobility	"user generated map of places accessible to persons on a wheelchair"
Wheelmap, 2010	Non-profit organization	Mobility	"map for wheelchair accessible locations"

Table 1. Accessibility Mapping Systems

### 3 Research Framework

The research framework proposed for this research utilizes the diffusion of innovations (DOI) theory (Rogers 1995). DOI theory, as presented in Rogers (1995) is explained in the next few sentences. The main components of DOI framework are an innovation, a communication channel, time, and a social system. The process by which an innovation is integrated into everyday practice has five stages:

Knowledge, Persuasion, and Decision, Implementation, and Confirmation. Innovations generally have five attributes: relative advantage; compatibility; complexity; trialability; and observability. Commonly used adopter categories include: innovators; early adopters; early majority; late majority; and laggards. The diffusion of innovations through a network is strongly linked to the effect of opinion leaders within the network and the presence of a critical mass of adopters. The consequences of an innovation can be desirable/undesirable, direct/indirect and anticipated/unanticipated.

Relying on these characteristics of an innovation, its creators/promoters and its adopters, this research will review data in historical slices from the Internet Archive and collect text data from blogs run by the creators of each application in order to gain an understanding of the applications overtime, and survey users of these applications to understand how these applications are currently diffusing through society. The historical slices collected from the Internet Archive include news materials discussing a system and snapshots of the interfaces of AMS overtime and any historical descriptions of the site or promotional materials. The data will be analyzed using a mixed method consisting of statistical analysis and qualitative content analysis.

#### 4 Conclusion

This paper reviewed the creators, community support, and purpose, of a set of existing AMS. AMS allow users to add meaningful information to a personalized web map and to search for accessible destinations when planning for travel or engaging in everyday navigation. Communities of users with limited mobility are well supported in AMS while only half of AMS support communities of users with hearing, vision, sensory limitations and seniors. The purposes of AMS differ yet they all aim to map the accessibility of the physical environment. More specific purposes include creating a collaborative map, providing tools for accessible information sharing, and a user centered gateway to accessibility information. These applications have the potential to increase the quality of life for many individuals, yet their creation and adoption has not been given serious attention in the research literature. A historical view of these applications overtime combined with interviews of existing users is necessary to understand adoption and use which in turn may help to improve these applications so that they may benefit everyone in our society.

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