**INCLUSIVE TECHNICAL SOLUTIONS FOR THE USE OF TRANSPORTS AND MOBILITY OF PERSONS WITH A VISUAL IMPAIRMENT**

**Directorate for Personal Autonomy, Accessibility, Technology and Innovation**

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1. **Introduction**

ONCE, as a member of the European Blind Union (EBU), presents this document to the **Best practices on accessibility to transport. Safe and independent mobility** contest, organised by this Entity for this 2019, compiling 2 technological solutions to improve the integral mobility of people who are blind or with a severe visual impairment.

Namely, we are going to show 2 projects of best practices, where ONCE has cooperated closely with several firms at national and international level, in developing and, above all, launching technological devices enabling autonomy and mobility, both when using any kind of public transport and for traveling routes, always bearing in mind that these technologies are complementary to any mobility aid (cane or guide dog).

Specifically, we address the Moovit App Project, used in over 80 countries and which enables us to manage mobility in any means of public transport; and the NaviLens Project, with which, through an App and tags, enables to obtain orientation and information.

1. **Project Moovit - ONCE**
* What is Moovit?

Moovit is one of the most relevant applications for the integral management of public transport all over the world. It has over 350 million users in more than 2,700 cities in 88 countries and 45 languages.

It makes it possible to accomplish different actions related to public transport, from knowing the whereabouts of a bus stop, identifying the time left for the needed transport to arrive, establishing routes by combining different means of transport, knowing the stop where the means of transport the user is to travel by will arrive, knowing different points of interest that are in the way. It has a service of notifications helping people to know about incidents and relevant information on the punctual situation of the means of transport in the cities where the users are, etc.

It enables to access important information on the incidents that may affect the means of transport by sending notifications on them to the users and through various other functions such as planning a route and knowing previously the different alternatives to take it, establishing preferred directions and routes etc., all of them directed at streamlining and facilitating the integral mobility of people in the cities where this App operates.

* Accessibility and usability of Moovit for persons with a visual impairment.

For roughly 4 years, Moovit and ONCE have cooperated to make this application fully accessible and usable for persons with a visual impairment in all its functions.

Regularly, ONCE and more specifically its Centre of Tiflotechnology and Innovation (CTI), has been maintaining a direct relationship with the representatives of this company in Spain, carrying out continuous evaluations of the functionality and accessibility of the various platforms (iOS, Android and web) for this group.

A user with a visual impairment who wants to use public transport in a city where this App operates, will be able to do so on an equal basis with a user without a disability using the same App and with the same functionalities in both cases.

A person with a Smartphone, both on iOS and Android, will be able to identify his or her routes through the cities combining the different transports and being able to reach the arrival point by streamlining times and travels. In this regard, from locating the nearest stop, knowing about delays, the following route or stations that make up the journey, having personalised information on the stop, information on places of interest near the route, etc. all make the user with a visual impairment able to feel integrated in the management and use of transports in a quick and accessible way.

Besides being able to receive, through the screen readers on the various kinds of mobile phones, the information through voice, a blind person will be able to receive it in Braille in the various devices each user uses to this end. This means an advantage and a support that helps integrate persons in a high degree of exclusion such as deafblind persons within the use of these facilities as they will be able to use this app on equal conditions as the rest of users.

* Relationship between Moovit and ONCE. Future expectations.

During the years when Moovit and ONCE have collaborated, besides a fluent and personalised relation, different users’ test dynamics have been established to collect the feedback of the latter in Moovit’s accessible use.

This information has been directly transferred, on the part of ONCE, to developers so that both functional improvement suggestions and detected flaws related to accessibility were contemplated and thus a state of use of the App with minimal deficiencies for users with a visual impairment is reached.

These collaborations continue to be endorsed in the continuous progress that this App presents in the scope of use by persons with a visual impairment, in a continuous progress, both functional and in benefits of special relevance for this group of users.

Moovit has collaborated closely with ONCE in various fora, users’ workshops, exhibitions such as Tifloinnova, etc.

Both companies have signed in March 2019 a document affirming the interest by both parties in collaborating and maintaining these relationships with the aim of enabling persons with a visual impairment the use of the Moovit apps in the best possible conditions in functionality, usability and accessibility.

To reach this goal, channels and strategies have been established enabling ONCE to transfer the information resulting from the various validation and verification dynamics of the apps to the final developers in Israel.

Besides, ONCE will participate as betatester in the different versions of the App developed at any moment before they are available to the general public in the various Markets and thus being able to identify flaws in accessibility prior to the launching of these Apps.

This relationship offers an important integration of users with disabilities in the normalised use of public transport in an accessible way and offering a set of possibilities that help foster the accessible and equal use of public transport in all its scope and varieties within cities, besides contributing to the personal autonomy of persons with a visual impairment.

1. **Project NaviLens - ONCE**
* What is NaviLens?

NaviLens is a system designed to facilitate information and orientation to persons with a severe visual impairment.

The solution is formed by an App for Smartphone (both iOS and Android already have operative systems) and some tags containing a new BIDI (bidimensional codes) system, of greater density and a longer detection scope. The solution, supported by an administration web, enables to associate the bidimensional code printed in the tag, an action that can have several objectives; identifying a space, accessing a personalised information in a concrete website, identifying a product, helping locate a space by guiding the user through sounds or verbal information, etc. Tasks that no doubt foster the autonomy of persons with a visual impairment in their daily lives to a great extent.

Its functioning is very simple, it only needs the mobile device’s camera to detect a tag, when it will offer information related to its whereabouts, besides all the information that is associated to that tag. It is possible to associate information related to schedules of buses, trains, of the place where the tag is located, etc.

The reference tag can have different sizes, which enables our Smartphone’s camera to locate it from a distance of up to 12 metres, giving a considerable versatility to persons with a visual impairment while making the “scanning” to locate the different tags that may be present in their environment.

The information necessary to locate the tag can be given in two ways, with acoustic signals or text messages. The latter option can be of interest for the group of deafblind people.

* Relationship between NaviLens and ONCE.

Since 2015, the Centre for Technology and Innovation of ONCE (CTI) cooperates with NEOSISTEC, a developer firm, in counselling tasks on matters of accessibility and divulgation of the system, as well as proposing new functionalities such as that of creating tags for personal use to help the user identify products in their closest surroundings such as their home or their workplace. The process consists of the interested person asking for tags through a Website; once these have been received, he or she can cut them autonomously, thanks to instructions that they are given.

In November 2017, at Tifloinnova, the international tiflotechnology fair organised by the CTI each three years since 2005, the NaviLens was used to help finding the various stands, accessing information on them, give service information such as the menu and drinks’ chart, locating rooms, toilets, etc.; this occasion being used to verify the functioning of the system within a broad environment, with a great amount of tags installed and a great number of users. As a fact, we must emphasise that Tifloinnova 2017 received 3,800 visits. These people showed through different channels the great autonomy the NaviLens system gave them.

The Metropolitan Transport of Barcelona firm, TMB, have been the first to implement the NaviLens solution in their network of metro and bus stations. Thus, persons with a visual impairment will be able to know the lines that go through a stop or station, the time left for their bus to arrive, or being able to orientate themselves through metro stations. Besides, this system is not exclusive for persons with a visual impairment; whoever has the app installed in his or her mobile device will also be able to access the already mentioned information given.

It is important to emphasise that the system does not require great efforts for its maintenance, but on the contrary, as it is only necessary that the tags are in a good state and their visualisation is accurate.

Thus we can say that NaviLens is a sustainable, accessible and inclusive solution. Sustainable for its low maintenance costs, accessible as it allows the group of persons with a visual impairment to easily access relevant information to identify objects and places, besides knowing the exact location of the tag, and inclusive, for anyone can use this application, with or without a visual impairment, enabling to find relevant information such as a bus’ service frequency, the time it will take for it to arrive, etc.

1. **Conclusions**

It is evident that technology can improve mobility and transport for cities to be sustainable, smart and efficient as well as inclusive: in other words, for them to address the various needs of persons. Besides, it enables town planners to better understand mobility needs when it comes to decision making on the design of feasibility and performance of public transport. Also the experience of public transport travel improves through applications providing information on schedules, service frequency and services.

In this context, institutions of persons with disabilities such as ONCE must play a double role. On the one hand, that of advocating for technological solutions and mobility policies are inclusive; that is to say, that they address the accessibility and usability needs of all persons and do not mean a new way of social exclusion for mobility in the so-called “smart cities”. And, on the other, cooperating with public administrations and firms in achieving these inclusion goals, founded on its broad experience in catering for services for such groups.

Thus, ONCE and, more specifically, its Centre of Tiflotechnology and Innovation (CTI) cooperates with those technological firms that may offer an improvement in the autonomy of persons with a visual impairment. An example of this are both experiences of best practices shown here enabling autonomy and mobility, both for the use of public transport and for travel routes.

Thus, cooperation with Moovit has translated into a fluent communication on the detected flaws in accessibility and usability in improvement proposals for their facilities; besides joint participation in users’ workshops and exhibitions such as Tifloinnova. To that end, communication channels and strategies have been established with the developers, with ONCE participating as betatester in order to identify flaws in accessibility, prior to its launching and presentation.

And the collaboration with NaviLens has been mainly pointed at counselling in accessibility in proposing new functionalities, such as the personal use tags to identify objects or products in their nearest environment, such as their home or workplace. Other results achieved are installing the NaviLens System in the network of metro and bus stations in the city of Barcelona, and at “Tifloinnova 2017” to enable, in a broad environment with a great number of users, to find rooms and the different stands, as well as to provide information on them.

The assessment of results of both cooperation projects, Moovit and NaviLens is highly satisfactory. The collaboration agreements with both enterprises have been an efficient instrument; they have made possible a fluent communication with the developers and the stability of the joint work to improve their products.

Ultimately, this is about thoroughly and optimistically addressing the new mobility challenges of persons with a visual impairment in the design of “Smart cities” so that they are **“Inclusive smart cities”.**