



# White Paper: Accessible GPS

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## Abstract

Accessible GPS [Global Positioning System] technology has moved beyond what can be called and “emerging adaptive technology” and is rapidly becoming a basic “way finding” also spelled “wayfinding” tool for independence for people who are blind, visually disabled or deaf/blind. For people without disabilities, It is rapidly becoming a “basic navigational tool” for daily living. This genre of way finding technology introduces tools that can be used by people who are blind, visually disabled or deaf/blind. Funding agencies traditionally have approached clients who are blind, visually disabled, or deaf/blind as falling into separate categories of adaptive technology. Accessible GPS tools challenge this model. “Accessible way finding tools” can be used by anyone who falls into the above mentioned categories.

**Note:** It is not the intent of this paper to promote or support the funding of stand alone devices such as cell phones, PDA’s, or Windows Mobile devices or any ongoing connection/data transfer charges that might be applicable on these devices. It is the accessible way finding technology for those devices for which assessment, recommendations, funding, and training should be provided. Devices such as the Maestro, PacMate, and BrailleNote are currently considered adaptive note taking devices for people who are blind, visually disabled, or deaf/blind and are included under funding criteria. It is the inclusion of an accessible GPS component for navigational support or way finding is the focus of this white paper.

## Glossary

**Accessible GPS.** A Global Positioning System technology specifically modified/developed for people who are blind, visually disabled, or deaf/blind. Accessible GPS provides auditory, magnified, and/or Braille access to maps, directions, self-generated points of interest, and menus/dialogs of the mapping application. Several “flavours” of mainstream GPS have been adapted by developers of adaptive technology for use by people who are blind, visually disabled or deaf/blind.

**GPS or Global Positioning System technology.** The use of satellites and devices to calculate the position of objects on Earth [or space]<sup>1</sup>.

**PDA or “Personal Digital Assistant.”** A hand held device that runs Windows Mobile providing access to “Mobile” or “lite” versions of Microsoft Office applications. Traditional PDA’s do not have cell phone or SmartPhone capabilities.

**Symbian Phones.** The Symbian operating system is an open source operating system for cell phones. It was developed by several cell phone companies to allow sharing and connectivity between devices<sup>2</sup>

**Way finding or wayfinding.** The Wikipedia definition of wayfinding begins with the traditional definition of how animals and humans orient themselves and navigate their surroundings<sup>3</sup>. This definition includes reference to a book published in 1984 by Romedi Passinini, “Wayfinding in Architecture” which includes signage, auditory and

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<sup>1</sup> Google Search Results for “what is GPS”: [http://www.google.com/search?hl=en&rls=com.microsoft:en-US&defl=en&q=define:GPS&sa=X&oi=glossary\\_definition&ct=title](http://www.google.com/search?hl=en&rls=com.microsoft:en-US&defl=en&q=define:GPS&sa=X&oi=glossary_definition&ct=title)

<sup>2</sup> Google Search results for “what is Symbian”: [http://www.google.com/search?hl=en&rls=com.microsoft:en-US&defl=en&q=define:Symbian&sa=X&oi=glossary\\_definition&ct=title](http://www.google.com/search?hl=en&rls=com.microsoft:en-US&defl=en&q=define:Symbian&sa=X&oi=glossary_definition&ct=title)

<sup>3</sup> Wikipedia definition of wayfinding: <http://en.wikipedia.org/wiki/Wayfinding>

tactile clues for navigating an environment. The definition also mentions the ability to use maps, a compass, and astronomical navigational tools to find the way in “unlabelled” or unmarked territory.<sup>4</sup>

**Windows Mobile Devices.** As lines blur between the PDA and SmartPhone, Windows Mobile devices are emerging. These devices can combine the functionality of a SmartPhone with that of a PDA.

“Wayfinding.” This term is used to describe GPS systems. GPS systems assist in finding one’s way around one’s environment. Generally they are not used independent of other tools or technology.

## What are the Issues?

When thinking of way finding consider a trip you might take from Toronto Ontario Canada to Paris Ontario Canada. You get into your car after looking at a map and head out. Now consider that none of the highways or on and off ramps have signage, none of the rest stops have signage, nor do any of the cities or towns you pass through. You have to remember all the information you saw on the map, count on and off ramps, count the number of rest areas, evaluate what you think is a city or town, and decide which roads to take to reach your destination. One mis-count or memory lapse in remembering any part of the map you looked at before venturing out can take you miles off course.

In this scenario, although there may have been orientation to the route and a “mobility aid” [in this case a car, motorcycle, or bicycle], without the way finding information or clues and cues along the way, you are easily lost. It is this supportive information that an accessible GPS provides to someone who is blind, visually disabled, or deaf/blind.

There are several issues that exist for people who are blind, visually disabled or who are deaf/blind in accessing way finding tools for daily activities:

1. There is currently no funding category in most agencies and organizations to provide assessment, recommendation, funding, and training on this genre of technology.
2. There is currently no “repository” of valid and concise information on what the accessible GPS tools are, how they work, or what the costs are.
3. Accessible GPS provides access for clients in what are traditionally considered separate areas of assessment and training: people who are blind, have visual disabilities, or people who are deaf/blind.
  - a. Due to the small displays on mobile devices, technology that has previously been suited to one category for assessment purposes is now essential for assessment, recommendation, funding, and training for people who are blind **OR** visually disabled **OR** deaf/blind.
4. There are three types of accessible GPS:
  - a. PDA based which is stand alone and can be used anywhere without additional charges.
  - b. An accessible GPS tool that can be integrated into a note taking device such as the [BrailleNote by HumanWare](#)<sup>5</sup>, [PacMate by Freedom Scientific](#)<sup>6</sup>, or [Maestro by HumanWare](#)<sup>7</sup>.

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<sup>4</sup> Wikipediia definition of wayfinding: <http://en.wikipedia.org/wiki/Wayfinding>

<sup>5</sup> BBrailleNote by HumanWare: [http://www.humanware.com/en-new\\_zealand/products/braille\\_and\\_speech/brailnotes](http://www.humanware.com/en-new_zealand/products/braille_and_speech/brailnotes)

- c. Windows Mobile/on-board Symbian or SmartPhone devices where use of the accessible GPS may incur roaming, data transfer charges and/or subscription charges in addition to standard cell phone fees.

## Misconceptions

As an emerging technology there are some misconceptions surrounding the purpose of way finding tools and their role in the more global genre area of adaptive technology.

1. Accessible GPS tools are intended to replace more traditional “orientation and mobility” aids such as a white cane or guide dog. This is not true.
  - a. Accessible GPS systems are another tool to provide more information about a person’s environment. In most cases guide dog providers offer accessible GPS training as part of “graduate services<sup>8</sup>.” For people who use mobility aids such as a white cane or guide dog, accessible GPS augments and supports these tools, it doesn’t replace them.
  - b. Someone who has a visual disability may not require the use of a white cane [traditionally people with visual disabilities do not qualify for guide dogs.]. Although the person may have functional vision, details of the environment they are attempting to navigate assist in reaching their destination more efficiently and effectively.
2. Mainstream GPS tools with audio output and input are accessible for people who are blind, visually disabled or deaf/blind. This is not true.
  - a. Mainstream GPS tools still rely on the person using them having vision enough to read information on the screen and in some cases use a touch-screen. Accessible GPS provides auditory, magnified, and/or Braille support for all on-screen activities.
  - b. Due to the variety of accessible GPS tools available, it is essential that people who are blind, visually disabled or deaf/blind have access to assessment, recommendations, funding, and training for these devices. There is currently no “repository” of consolidated information to guide the purchase and use of an accessible GPS system.
  - c. If required, you cannot use a Braille display with mainstream GPS tools.
3. GPS works inside a building. This is not true. There are areas of cities which may not be accessible using a GPS tool due to building density. GPS does not work inside a building to assist in floor or room navigation.

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<sup>6</sup> PacMate by Freedom Scientific: <http://freedomscientific.com/products/pacmate-hq.asp>

<sup>7</sup> Maestro by HumanWare: [http://www.humanware.com/en-new\\_zealand/products/braille\\_and\\_speech/handheld\\_computers/details/id\\_28/maestro.html](http://www.humanware.com/en-new_zealand/products/braille_and_speech/handheld_computers/details/id_28/maestro.html)

<sup>8</sup> Graduate Services at Guide Dog Foundation: <http://www.guidedog.org/progserv/Trekker/overview.htm>

## Details on Accessible GPS

An accessible GPS tool provides information about one's location and/or surrounding environment using auditory, magnified, or Braille output. Every part of the application or "user interface" is accessible to someone who can't see it clearly "on a screen." Typically accessible GPS solutions on devices such as the BrailleNote, PacMate, or Maestro do not have a visual display. Accessible GPS on a SmartPhone may have a visual display; however, the size of the display and text on it make it difficult or impossible to read.

There are a number of accessible GPS tools available:

- [HumanWare's Trekker](#)<sup>9</sup> which uses [Navteq](#)<sup>10</sup> GPS technology. This is a "stand-alone" unit.
- [HumanWare Trekker Breeze](#)<sup>11</sup> can be considered a "lite" version of the Trekker. This is another stand-alone accessible GPS solution.
- [Freedom Scientific's StreetTalk](#)<sup>12</sup> for the PacMate which uses [Destinator](#)<sup>13</sup> GPS technology. This is integrated into the PacMate.
- [HumanWare's BrailleNote](#)<sup>14</sup> which uses GPS technology from the [Sendero Group](#)<sup>15</sup>. Another example of integrated GPS on a note taker..
- [Code Factory](#)<sup>16</sup> and [Wayfinder](#)<sup>17</sup> combined technology of [Mobile Speaks, Mobile magnifier](#)<sup>18</sup>, and [Wayfinder Access](#)<sup>19</sup>, and either a Symbian or Windows Mobile phone/device. The GPS is integrated into the cell phone.
  - With three different "flavours" of adaptive technology the list of supported phones/devices is broad and can be accessed from the Code Factory products web page.

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<sup>9</sup> HumanWare Trekker: [http://www.humanware.com/en-new\\_zealand/products/gps/trekker](http://www.humanware.com/en-new_zealand/products/gps/trekker)

<sup>10</sup> Navteq GPS Technology: <http://www.navteq.com/>

<sup>11</sup> HumanWare Trekker Breeze: [http://www.humanware.com/en-usa/products/gps/trekker\\_breeze/details/id\\_101/trekker\\_breeze.html](http://www.humanware.com/en-usa/products/gps/trekker_breeze/details/id_101/trekker_breeze.html)

<sup>12</sup> Freedom Scientific, StreetTalk: [http://www.freedomscientific.com/fs\\_support/documentation/StreetTalk/Users%20Guide/01\\_streettalk.htm](http://www.freedomscientific.com/fs_support/documentation/StreetTalk/Users%20Guide/01_streettalk.htm)

<sup>13</sup> Destinator GPS Technology: <http://www.destinatortechnologies.net/us/products/index.html>

<sup>14</sup> HumanWare, BrailleNote GPS: [http://www.humanware.com/en-canada/products/orientation/gps/details/id\\_31/brailnote\\_gps.html](http://www.humanware.com/en-canada/products/orientation/gps/details/id_31/brailnote_gps.html)

<sup>15</sup> Sendero Group GPS: <http://www.senderogroup.com/v40changes.htm>

<sup>16</sup> Code Factory products page: <http://www.codefactory.es/products.htm>

<sup>17</sup> Wayfinder home page: <http://www.wayfinder.com/index.en.php>

<sup>18</sup> Code Factory Mobile Speaks and Mobile Magnifier products page: <http://www.codefactory.es/products.htm>

<sup>19</sup> Wayfinder Access web page: [http://www.wayfinder.com/products/wayfinder\\_access.en.php?link\\_id=submenu\\_dynamic](http://www.wayfinder.com/products/wayfinder_access.en.php?link_id=submenu_dynamic)

- As of June 2008, Code Factory has its own accessible GPS solution called [Code Factory Mobile Geo](#)<sup>20</sup>. It is not clear at this point if data transfer charges will be incurred by the end-user. This is also integrated into a cell phone.
- Wayfinder Access can use either [Nuance Talks](#)<sup>21</sup> or Code Factory's MobileSpeak/Magnifier screen reading software.
  - Unlike previous versions of Wayfinder Access, you don't need Nuance Talks on the cell phone to run Wayfinder Access. You do; however, need MobileSpeaks/Magnifier.. It is one or the other but you don't need both.
  - In the list of supported phones<sup>22</sup> most of the models are Nokia with only one Samsung model which may impact its usability if the phones are not available from the local service provider.

These devices and tools demonstrate the ability to provide additional information to people who are blind, visually disabled, or deaf/blind about their physical environment. Due to the variety of devices and financial resources required for each one, it also demonstrates the need to provide assessment, recommendations, funding, and training for these tools.

Agency or organizational assessment and subsequent recommendations and funding should evaluate:

- Availability of maps for the client's area or travel areas. Accessible maps may not be available for some areas [for example rural areas or small towns].
- Ability of client to use the technology. Accessible GPS is not for everyone.
  - Due to the use of accessible GPS by people with visual disabilities as well as people who are blind or deaf/blind, "orientation and mobility" skills may not include the use of a white cane or guide dog. This component can be added for people who are blind or deaf/blind, but does not necessarily apply for people who are visually disabled.
  - Just as with people who do not have disabilities, accessible GPS may not be the appropriate solution for someone. There is a need to distinguish "good marketing" from "usable tool for client."
- Additional costs to use the GPS tools. [Map updates, usage fees, and, connection fees, subscription fees and so forth.]
- Which service providers support accessible GPS tools. Not all system infrastructures have access to a GSM network or an infrastructure supporting access to GPS tools.

Unlike mainstream GPS tools with audio output and input, accessible GPS provides additional support for menus, dialogs, maps, points of interest, and building locations. For example, the person using these devices is notified of the coffee shop they are passing or the department store they are in front of. Information that would

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<sup>20</sup> Code Factory Mobile Geo: <http://www.codefactory.es/en/products.asp?id=250>

<sup>21</sup> Nuance Talks from Nuance: <http://www.nuance.com/talks/>

<sup>22</sup> Nuance Talks supported phones: <http://www.nuance.com/talks/phones.asp>

be available using icons or pictures on a mainstream device has been made accessible to people who can't see or distinguish these information beacons on small screens.

Accessible GPS systems are often criticized for having multiple parts. The reality is that a device such as the [Maestro](#)<sup>23</sup>, [PacMate](#)<sup>24</sup>, or [BrailleNote](#)<sup>25</sup> are required to contain the screen reading or in this case "map reading" technology. All three devices have note taking, connectivity, and tools for reading Digital Talking Books making them valuable tools in and of themselves. The way finding/GPS component is another tool that can be added to an existing device which in turn optimizes the number of tools available through one device.

Another criticism of the GPS technology in general is its reliability within a few feet or meters of an actual physical location. The immediate scenario is the person who is blind, visually disabled or deaf/blind finding themselves in the middle of a street instead of at the door to their favourite restaurant. Mainstream GPS has the same reliability factor. Again it is stressed that accessible GPS is not intended to be a substitution for a white cane, guide dog, or common sense. Accessible GPS is a tool that provides more detailed information to the person who is blind, visually disabled or deaf/blind about their exterior surroundings that they would not typically have. If a person uses mobility aids, they are still required for navigation inside buildings as well as outside environments. This is also why training is essential for accessible GPS tools.

Accessible GPS technology lets a person who is blind, visually disabled or deaf/blind create their own route to a destination, save it for future reference, and check their progress along the route to verify direction and landmarks.

## **Independence Solutions for People who are Blind or Visually Disabled**

Accessible GPS tools assist people who are blind, visually disabled or deaf/blind in independently learning more about their environment. The resulting detailed information may be used in combination with a white cane or guide dog to find places more effectively and efficiently. Some people with visual disabilities may use accessible GPS independent of a white cane or guide dog depending on their functional vision.

## **Conclusions**

This paper has offered several perspectives about accessible GPS:

1. Accessible GPS is a navigational or way finding tool that supplements and supports existing mobility aids such as a white cane or guide dog. It does not replace a white cane, guide dog, or common sense.
  - a. Accessible GPS can be used independent of a white cane or guide dog for people with visual disabilities who have functional vision that does not require the use of a white cane or guide dog.

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<sup>23</sup> HumanWare Maestro: [http://www.humanware.com/en-canada/products/braille\\_and\\_speech/handheld\\_computers/details/id\\_28/maestro.html](http://www.humanware.com/en-canada/products/braille_and_speech/handheld_computers/details/id_28/maestro.html)

<sup>24</sup> Freedom Scientific PacMate: <http://www.freedomscientific.com/PACMATE-HQ/PACMate-hq.asp>

<sup>25</sup> HumanWare BrailleNote: [http://www.humanware.com/en-canada/products/braille\\_and\\_speech/brailnotes](http://www.humanware.com/en-canada/products/braille_and_speech/brailnotes)

2. Assessments, recommendations, funding, and training for accessible GPS should be provided to people who are blind **OR** visually disabled **OR** deaf/blind. Tools such as accessible GPS fall into the “category” as a tool for all groups.
  - a. Without a “repository” of consolidated accurate information to turn to, there is no method for examining or comparing accessible GPS tools. Because these tools are rapidly becoming an integral part of every day life, it is necessary to provide a way to “get the right tool for the task” and the person..
3. People who are blind, visually disabled, or deaf/blind cannot access all of the tools available through mainstream GPS systems. Accessible GPS technology provides additional information and activity support to the end-user using audio, magnification and/or Braille display.

## **Appendix A: Types of Accessible GPS**

There are three types of accessible GPS:

- GPS added to an “adapted” Windows Mobile device which provides access to talking books, e-mail, contacts, calendar, and/or word processing and the Internet.. [BrailleNote, PacMate, Maestro]
- GPS that is a stand-alone tool with no other functionality. [Trekker, Trekker Breeze]
- GPS accessed using Symbian SmartPhone. [Wayfinder Access or Mobile Geo]

### **Accessible GPS Attached to an Accessible Windows Mobile Device**

In the case of the Windows Mobile device with additional accessible GPS hardware and software, another peripheral is required to access GPS tools. Typically this is a hardware GPS receiver and maps that may be on SD cards [secure digital], Compact Flash cards, or other portable storage devices.

Maps cannot be use “off the shelf” because they have to be made accessible for the adaptive technology. There may be delays in updating maps because of this.

### **Maestro and Trekker by HumanWare**

The Maestro comes with screen reading as well as other tools such as note taking and communication software. There is no capability for screen magnification. This does not preclude its use by people with visual disabilities. The Trekker is a stand alone accessible GPS that can be added to the Maestro if additional tools such as note taking or connectivity are required by the end-user.





**Figure 1 HumanWare Maestro device which is the foundation device for the Trekker and can be purchased and used on its own as a note taker.**



**Figure 2 HumanWare Trekker accessible GPS with hardware component. Maestro tools do not have to be activated/used.**

Information can be given to the person using either speech or a separately purchased Bluetooth Braille display. This set of tools can be purchased as either the Maestro, the Trekker or a combination of both tools..

The Trekker Breeze is an inclusive tool as shown below. It is not as verbose in features as the Trekker and its use is for more limited GPS needs. For example someone who is not traveling or who wants a simplified tool.



**Figure 3 Image of the Trekker Breeze from HumanWare.**

There is no additional charge for accessing this technology whenever the person needs to. There may be costs to update maps, purchase additional maps, or device upgrades.

**PacMate by Freedom Scientific**

There are several PacMate versions: Braille keyboard, QWERTY keyboard, or either version with a Braille display added. There is no option for screen magnification for the PacMate but this does not preclude its use by people with visual disabilities.



**Figure 4 Freedom Scientific PacMate BX or Braille display model.**

StreetTalk can be purchased as software alone or in a bundle that includes StreetTalk software, GPS software, maps, GPS receiver, and compact Flash Bluetooth Connection. It does require a PacMate. If the StreetTalk software is purchased separately, the other components will need to be purchased in order to use it.

There is no additional charge for accessing this technology. There may be costs to update maps, purchase additional maps, or device upgrades.

### **Wayfinder Access**

Wayfinder Access can be used on a “mobile phone using the s60v2 and s60v3 platform”<sup>26</sup>

Even if you use Mobile Speaks, you will need to purchase Nuance Talks, a GPS Bluetooth receiver **AND** data subscription (GPRS, EDGE or 3G/UMTS) from your mobile operator/wireless carrier<sup>27</sup>.



**Figure 5 Windows Mobile device supported by Mobile Speaks Pocket.**

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<sup>26</sup> Wayfinder Access “what you need” product specifications:

[http://www.wayfinder.com/products/wayfinder\\_access.en.php?link\\_id=submenu\\_dynamic](http://www.wayfinder.com/products/wayfinder_access.en.php?link_id=submenu_dynamic)

<sup>27</sup> Wayfinder Access “what you need” product specifications:

[http://www.wayfinder.com/products/wayfinder\\_access.en.php?link\\_id=submenu\\_dynamic](http://www.wayfinder.com/products/wayfinder_access.en.php?link_id=submenu_dynamic)

## Accessible GPS on a Symbian Device

Mobile Speaks and Mobile Magnifier have versions for Symbian devices. Wayfinder Access is an additional cost. Any connection or roaming charges to access the accessible GPS would be extra and considered costs incurred by the end-user not the funding agency [see specifications in the Wayfinder Access section on the previous page].



**Figure 6 Example of a Symbian based phone for Mobile Speaks or Mobile Magnifier.**

Nuance Talks is the screen reading technology used for the Wayfinder Access accessible GPS tool. Unlike the Code Factory product, it does not have versions for Windows Mobile devices or SmartPhones. The end-user must have a compatible cell phone. As with Code Factory tools, any connection or roaming charges to access the accessible GPS would be extra and considered costs incurred by the end-user not the funding agency [see specifications in the Wayfinder Access section on the previous page].



**Figure 7 Example of a Symbian phone for Nuance Talks.**

## Appendix A: Additional Resources

These resources provide a summary of product information, training resources, and articles for more information and product reviews on accessible GPS.

Northcentral Technical College, Wausau WI provides assessments and training on Trekker..

### Accessible GPS Product Information

These resources are also in the body of this white paper.

- [BrailleNote and Accessible GPS](#)<sup>28</sup>

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<sup>28</sup> BrailleNote Accessible GPS: [http://www.humanware.com/en-canada/products/orientation/gps/details/id\\_31/brailnote\\_gps.html](http://www.humanware.com/en-canada/products/orientation/gps/details/id_31/brailnote_gps.html)

- [Code Factory Product page](#)<sup>29</sup>
- [Nuance Talks](#)<sup>30</sup>
- [StreetTalk Accessible GPS for PacMate](#)<sup>31</sup>
- [Trekker Accessible GPS](#)<sup>32</sup>
- [Wayfinder Access \[Accessible GPS\]](#)<sup>33</sup>

## Training

Training is being combined with or done through organizations which provide mobility aids such as guide dogs:

- [Leader Dogs: On the Move with Trekker \[training\]](#).<sup>34</sup>
- [Guide Dog Foundation, Graduate Services, Trekker Training](#)<sup>35</sup>.

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<sup>29</sup> Code Factory products page: <http://www.codefactory.es/products.htm>

<sup>30</sup> Nuance Talks product page: <http://www.nuance.com/talks/>

<sup>31</sup> StreetTalk Accessible GPS for the PacMate: [http://www.freedomscientific.com/fs\\_products/StreetTalk.asp](http://www.freedomscientific.com/fs_products/StreetTalk.asp)

<sup>32</sup> Trekker Accessible GPS: [http://www.humanware.com/en-canada/products/orientation/gps/\\_details/id\\_30/trekker.html](http://www.humanware.com/en-canada/products/orientation/gps/_details/id_30/trekker.html)

<sup>33</sup> Wayfinder Access [Accessible GPS]:  
[http://www.wayfinder.com/products/wayfinder\\_access.en.php?link\\_id=submenu\\_dynamic](http://www.wayfinder.com/products/wayfinder_access.en.php?link_id=submenu_dynamic)

<sup>34</sup> LeaderDogs, On the Move with Trekker [Training]:  
<http://www.leaderdog.org/site/PageServer?pagename=techtrekkservices>

<sup>35</sup> Guide Dog Foundation, Graduate Services, Trekker Training: <http://www.guidedog.org/progserv/Trekker/overview.htm>

## Articles

The following articles provide perspectives and product reviews for accessible GPS.

- [Adaptive Technology Consulting, A GPS System for the Blind](#)<sup>36</sup>.
- [Assessment Of Satisfaction And Use Of An Orientation Aid \(Trekker\) By A Group Of Individuals With Visual Impairments \(Pilot Project\)](#)<sup>37</sup>
- [AFB Product Review, Getting from Here to There: A Short Review of Trekker](#)<sup>38</sup>.
- [BBC OUCH, A GPS to Guide? Or a Guide to GPS?](#)<sup>39</sup>
- [BBC News Technology, GPS navigation Plan to Help Blind](#)<sup>40</sup>.
- [Braille Monitor, GPS Technology for the Blind: A Product Review](#)<sup>41</sup>.
- [NFB, GPS to Help the Blind Navigate](#)<sup>42</sup>.

This article from the New York Times August 4, 2008 demonstrates the increasing inclusion of SmartPhone devices into the “every day life” thus making applications on them basic tools for life.

“[Applications Spur Carriers to Relax Grip on Cell Phones](#)<sup>43</sup>”

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<sup>36</sup> Adaptive Technology Consulting, A GPS System for the Blind: <http://adaptivetech.net/products/trekker.htm>

<sup>37</sup> Assessment Of Satisfaction And Use Of An Orientation Aid (Trekker) By A Group Of Individuals With Visual Impairments (Pilot Project): <http://www.csun.edu/cod/conf/2006/proceedings/2815.htm>

<sup>38</sup> AFB AccessWorld, Product Review, Getting from Here to There: A Short Review of Trekker: <http://www.afb.org/afbpress/pub.asp?DocID=aw040403>

<sup>39</sup> BBC OUCH, A GPS to Guide? Or a Guide to GPS?: <http://www.bbc.co.uk/ouch/closeup/gps.shtml>

<sup>40</sup> BBC News Technology, GPS Navigation Plan to Help Blind: <http://news.bbc.co.uk/1/hi/technology/6458005.stm>

<sup>41</sup> Braille Monitor, GPS Technology for the Blind, A Product Review: <http://www.nfb.org/Images/nfb/Publications/bm/bm06/bm0602/bm060206.htm>

<sup>42</sup> NFB, GPS to Help the Blind Navigate: <http://www.nfb.org/Images/nfb/Publications/bm/bm06/bm0602/bm060206.htm>

<sup>43</sup> NYT article on applications and cell phones: [http://www.nytimes.com/2008/08/04/technology/04open.html?\\_r=1&partner=rssnyt&emc=rss&oref=slogin](http://www.nytimes.com/2008/08/04/technology/04open.html?_r=1&partner=rssnyt&emc=rss&oref=slogin)