Way-finding in the Built Environment

"Wayfinding refers to techniques used by people who are blind or visually impaired as they move from place to place independently and safely.

Wayfinding is typically divided into two categories: orientation and mobility. Orientation concerns the ability for one to monitor his or her position in relationship to the environment; and mobility refers to one's ability to travel safely, detecting and avoiding obstacles and other potential hazards.

In general terms, wayfinding is the ability to know where you are, where you are headed, and how best to get there; recognise when you have reached your destination; and find your way out — all accomplished in a safe and independent manner."

US Department of Education's National Institute on Disability and Rehabilitation Research

CRC Construction Innovation
BUILDING OUR FUTURE

CRC AUSTRALIA

Way-finding

The *Way-finding in the Built Environment* project is a worldwide review identifying those way-finding systems and technologies that could be used to make it easier and safer for people with a sensory impairment (and in particular a vision impairment) to find their way around buildings and large public spaces. The project makes recommendations on how these technologies and systems may be incorporated, by law or otherwise, into Australia's building and construction practice.

Way-finding aims to ensure that people with a sensory impairment know where they are in a building or an environment, where their desired location is, and how to get there from their present location. It is unlawful to discriminate against people with a disability under the *Disability Discrimination Act 1992.*

Products available

Way-finding products include:

- *mobile portable devices or electronic travel aids (ETAs)*
- *electronic mobility devices*
- *mobility aids*
- *obstacle detectors*
- *navigational aids*
- *tactile signage and other inbuilt physical features.*

This project reviewed systems that may be used in both buildings and other external public places. While the importance of good design practices and the role of orientation and mobility training is acknowledged, this review focusses on the technical nature of systems and technologies. Systems considered include physical electronic or tactile items that interact to perform a task, such as interactive handheld electronic devices, and administrative procedures, such as building management procedures.

Passive systems

The passive systems identified by the review, such as tactile ground surface indicators, are extensively used in Australia in public spaces to guide people with a vision impairment. Raised tactile (embossed) and Braille signs are also readily available to supplement vision-based direction and other signs.

Dynamic systems

Many mobile portable systems were identified by the review that require a power source to operate audio and/or tactile feedback to vision-impaired users. These dynamic devices are typically designed to be used by vision-impaired persons in conjunction with a traditional long cane or guide dog. Examples are tactile compasses, talking compasses, infrared or ultrasonic obstacle locators and other handheld devices which are available to assist vision-impaired users in particular to navigate around buildings and other spaces. These systems are essentially proprietary and therefore effectively independent of one another. However, there is a need to develop communication protocols which would allow new generation devices to communicate with each other to provide multifunctional use.

In addition to the portable devices, there are a range of stand-alone inbuilt systems that require installation and maintenance of infrastructure in buildings and other venues. These devices can assist vision-impaired users by providing additional audio and/or other feedback and are both cost effective and reliable. These include the audio and tactile signs often found in lifts and in the general circulation areas of facilities such as exhibitions, conference halls, museums and other public buildings.

These stand-alone inbuilt systems do not demand the user carry interactive handheld devices but instead rely upon audio, vibration or tactile indicators. Typically these systems adapt existing systems, such as street crossing lights, exit signs and lift controls and thus do not require an additional system for the benefit of sensory impaired users only. Generally they are aimed at improving health and safety rather than improving general accessibility and have proved to be a relatively simple and cost-effective adaptation to existing systems. More recently, directional sound evacuation systems have also been developed to provide a dual function of assisting vision-impaired users to find exits in the event of emergency as well as to assist non-sensory impaired users in the event of smoke obstructing the illuminated sign.

Typical directional tactile surface tiles

Smoke-obscured illuminated exit sign

http://www.soundalert.com/images/exit_fog3_small.JPG

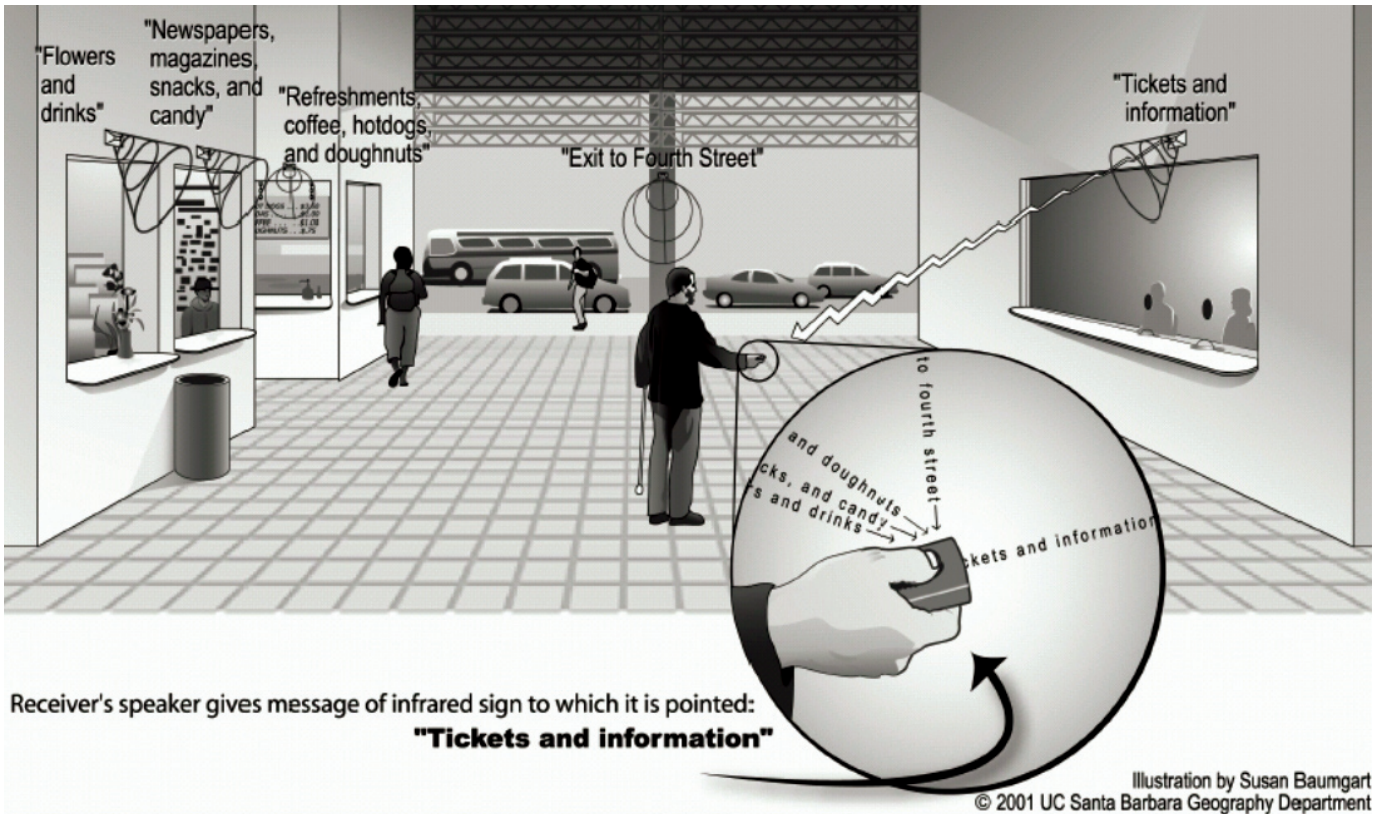
Image by Sound Alert Technology plc
(reproduced with permission)

Raised tactile ground surface indicators

Infrastructure-based systems

The final group of systems which are in general use are inbuilt electronic systems which communicate with the user via a personal handheld receiver. Typically these systems consist of inbuilt beacons located at key locations to transmit information relevant to that location to the user. One application is to transmit information by infrared or radio transmissions describing the location of an entrance to a complex, opening hours and the location of key services within the facility.

For broader-scale location and orientation, specialised geographic information systems (GIS) are also available to provide access to map-based information and other systems that are in more limited use. In the future, devices using information from satellite-based Global Positioning Systems (GPS) will also become more accurate for individual location tasks.



Talking sign CalTrain installation schematic http://www.geog.ucsb.edu/~marstonj/DIS/DIS_MARSTON_files/image014.jpg

Key findings

While individual users and venues may benefit from the installation and use of the more advanced systems identified in this report (such as satellite-based GPS), they are currently not sufficiently developed to justify general application to all buildings and public venues.

Systems and technologies which require handheld devices that are useful only within particular buildings and venues, and which must be provided and maintained by the building or venue manager, would also not be suitable for use in all buildings and other spaces. The development and implementation of a suitable communication protocol or standard that could enable the universal use of devices in different buildings and venues is regarded as a high priority.

Some passive systems and technologies, including tactile ground surface indicators, raised tactile (embossed) and Braille signage systems, as well as some active systems including audio/verbal information signs and digital sound evacuation systems, are currently sufficiently well developed to be introduced generally as a minimum requirement for all buildings which are presently required to have systems installed for people with no sensory impairment, and for some other venues. These systems will only go part of the way to eliminating access barriers to people with a sensory impairment.

The extent to which these systems could or should be required to be incorporated into buildings and other venues and how the Building Code of Australia and other related legislation should be amended to take these established systems into account, needs further investigation.

Conclusions and the groups/stakeholders likely to benefit from the particular research findings/recommendations

Conclusions		Beneficiary
Immediate time-frame action	• Consider building code requirements that allow vision-impaired persons to: – be warned of an emergency and directed to exits – move safely between key entrances and exits, and key entrances and key locations within a building. • Technology to provide safe movement could include ground surface indicators, raised tactile and Braille signage, infrared audible signage (i.e. speaking signs, transmitting beacons, talking lifts and handheld devices). • Priority is given to codes and standards related to passive systems (i.e. ground surface indicators) and inbuilt active systems (i.e. infrared audible signage). • An international standard or protocol to be prepared and adopted to provide a foundation for handheld navigation devices to interoperate with different systems.	• building regulators • code/standards writers • vision-impaired persons • venues • product manufacturers
Medium term time-frame action	• Information that is 'tailored to the individual' be made available to individual users from in-built location-specific transmitters. • Portable devices such as based on mobile/cell phones could be modified to provide way-finding information for building users.	• vision-impaired persons • venues • product manufacturers
Longer term time-frame action	• Widespread availability of personal 'Virtual Reality' devices of a small, light, powerful yet discreet nature. • Availability of advanced 'smart clothing' able to sense and provide feedback. • 'Robotic Guides' cumbersome; more intrusive.	• vision-impaired persons • venues • product manufacturers

Partners

*The **Way-finding in the Built Environment** project (2002-053-C) is supported by five industry, government and research partners.*

Building Commission

ABCB

CSIRO

QUT

Queensland Government
Department of Public Works

Way-finding in the Built Environment
(Project 2002-053-C)

For further information contact

Project leader: Dennis Hogan (Building Commision)
Phone: 03 9285 6484
Email: **d.hogan@construction-innovation.info**

CRC for *Construction Innovation*
Level 9 – L Block, QUT Gardens Point,
2 George Street, Brisbane Qld 4000
Tel: 07 3864 1393 **Fax**: 07 3864 9151
Email: enquiries@construction-innovation.info
Web: www.construction-innovation.info

November 2004