Guidelines for Public Access Terminals Accessibility - Printable Version

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- **1.10** Use the simplest language possible for instructions, prompts and outputs and, where possible, supplement it with pictorial information or spoken language.
- **1.11** If using cards, ensure that the card can be inserted into the card reader in its correct orientation without requiring vision.
- **1.12** If using biometric identification, provide an alternative access security mechanism for users who do not possess the required biological characteristic.
- **1.13** Do not cause the screen to flash at a frequency of above 2Hz.
- **1.14** When installing the terminal, ensure that users can get to it along an unobstructed path and operate it from a stable position.
- **1.15** Ensure that an equivalent service is available through an accessible channel for users who cannot use the terminal.

- **Priority 2**.
  - **2.1** Allow sufficient time to accommodate the slowest users.
  - **2.2** Provide a way for the user to cancel the whole transaction at any point and retrieve any items they have inserted
  - **2.3** Ensure that the user interface and task flow is similar across different functions and remains the same across repeated visits.
  - **2.4** When deploying more than one version of a terminal, ensure that the user interfaces are similar.
  - **2.5** Do not require users to remember a fixed supplied PIN
  - **2.6** Provide for users with multiple impairments.
  - **2.7** Provide training or assistance for new users.
  - **2.8** Ensure privacy and security during use.

Technology Introduction

Public access terminals include (but are not limited to):

- ATMs (Automated Teller Machines)
- Information kiosks
- Ticket vending machines
- Information displays (e.g. flight information)
- Point of sale customer card payment systems
- Card door entry systems

If the product or service combines a public access terminal with other technologies, then also refer to the guidelines for those other technologies. For example, if you are using a public

kiosk to deliver web-based services or HTML content, you should also follow the Web Accessibility Guidelines.

Guidelines Introduction

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Priority 1

Following priority 1 will ensure that the terminal can be used by most people with impaired mobility, vision, hearing, cognition and language understanding.

1.1 Ensure that all operable parts are reachable by people of all heights and people sitting in a wheelchair or buggy

The operable parts include such things as buttons and keypads, input slots for cards or money and dispensers for tickets, receipts or returned money. Users should be able to access all of these from whatever position and orientation they find themselves in naturally when using the terminal. Preferably, this should be a single position which does not require the person to reorientate themself during operation.

Rationale

Users who are extremely short or who sit in a wheelchair have substantially less reach than average sized users who are standing up. If they have to overstretch to reach things, they may risk injury or, in extreme cases, may not be able to operate the terminal or collect their outputs. Whilst tall users can extend their reach by stooping, this could be embarrassing for extremely tall users who may find themselves having to bend or crouch a long way.

Access to operable parts

Ensure that all operable parts are within reach.

Wheelchair users may find it awkward to reorientate themselves during use if this involves swivelling in a confined or crowded space. The following anecdotes describe some typical problems that this can cause in the case of card door entry systems.

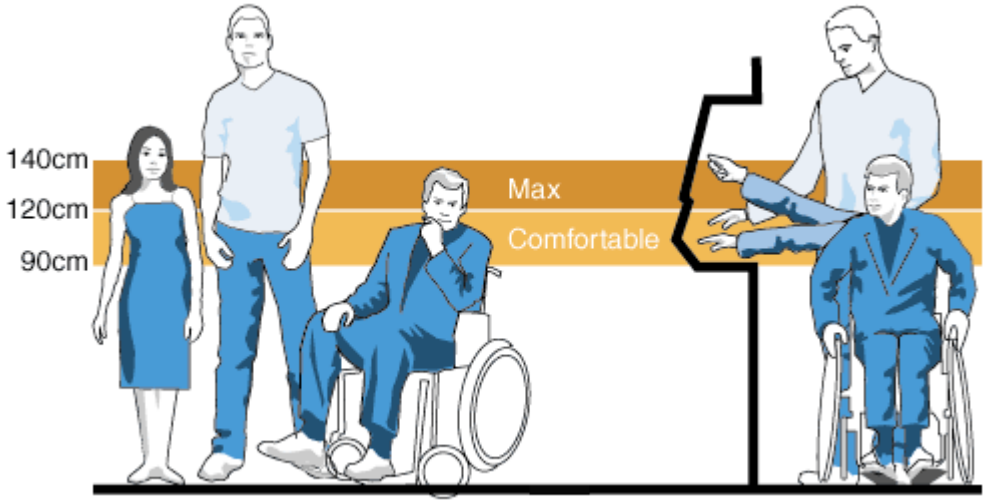
> " The biggest problem with card readers for opening doors is that they are positioned at a height I can't reach, or somewhere I can't manoeuvre into easily, like a corner. " - wheelchair user

> " The card reader was installed next to the hinge so that it was difficult to open the door after swiping the card. And if I was using it when someone came through the door from the other side they would trap me against the wall. " - wheelchair user

Directions and Techniques

Refer to anthropometrical data

Refer to appropriate physical design guidelines or building accessibility guidelines which give minimum and maximum heights and reach distances. The United Nations have a useful set of anthropometrical data covering ranges of height and reach when standing or sitting in a wheelchair, plus required path and turning space dimensions for wheelchairs.



Common reach zones

Ensure that users of all heights can reach all operable parts. The comfortable range is between 1200 and 900mm. The maximum acceptable reach height for wheelchair users is 1400mm.

Careful positioning

Be careful with the positioning of things like advice slip bins, which may make it difficult to get close to the terminal.

Provide a clear access path

Ensure easy access to the device for people using wheelchairs, buggies or mobility aids.

How you could check for this:

Self-test early prototypes

Designers can run simple reach tests themselves at the initial design or prototype stage. Using a mock-up with the controls placed in their intended positions based on appropriate physical design guidelines, you can simulate short and tall people and wheelchair users by sitting in a chair, standing on a raised area or kneeling down. Whilst this will not be a replacement for proper testing with real users, it will give some insight into what it is like to

be reaching for controls from the user's perspective and will help reveal any serious problems in the layout before further work is carried out. If standing on something, you should make sure it is sufficiently strong and stable and take care to avoid the possibility of injuries caused by falling off it.

Include user data in the design

If you are designing using a CAD package, it may be possible to include various simulated users as elements in the design, based on human anthropometrical data.

Test with real users

During development, you should test the prototype in a realistic situation with real people, particularly people who routinely use wheelchairs or motorised buggies.
About user testing

Knee clearance for wheelchair users
This image shows a terminal with knee clearance for wheelchair users.

1.2 Ensure that displays are within sight of people of all heights and people sitting in a wheelchair or buggy

A "display" encompasses anything from a single line LCD display through computer monitors to large public information display boards, such as those used at railway stations to indicate train times. In the latter case, the display comprises the complete PAT, since there are no user-operated parts.

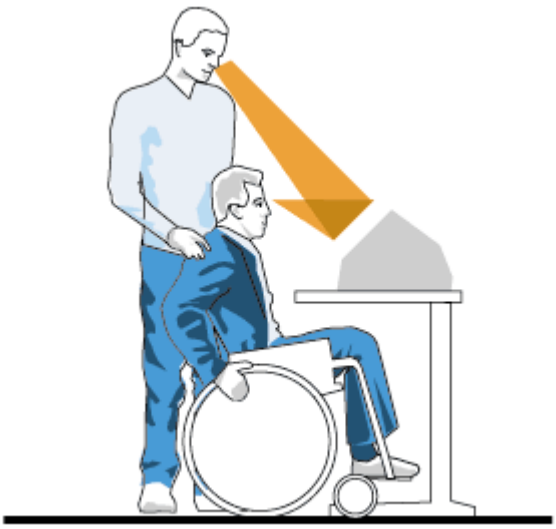
Being "within sight" means that the user's line of sight to the display is unobstructed at a distance and angle that enables the display to be read clearly by someone with 20:20 vision, within the environmental constraints such as ambient lighting (allowing for users with restricted vision is covered in other checkpoints). The display should be within sight from whatever position and orientation the user finds themselves in naturally when using the

terminal. This will be different depending on the person's height and whether they are sitting in a wheelchair or motorised buggy.

Rationale

A display that is positioned for optimal viewing by users of average height may present difficulties for other non-average users. Users who are extremely short, extremely tall, or who sit in a wheelchair will be looking either up or down at the display and from further away. The increased distance may mean that fine text or information is difficult to read. The more acute angle may also affect readability by changing the aspect ratio. Or it may mean that other parts of the terminal get in the way.
A particular problem for people looking upwards at the display is the effect of reflected light. Some terminals, particularly ATMs in the street, are completely unreadable when the sun is shining on them. Someone who is taller can often position their body between a light source such as the sun and the display, making it easier to read.

> " Light and reflections are always a problem due to the viewing angle. If you are looking down, your shadow covers the screen. Imagine you are sitting and have to stretch your head to see the screen. Once I withdrew too much money because I couldn't see the screen properly. " - wheelchair user



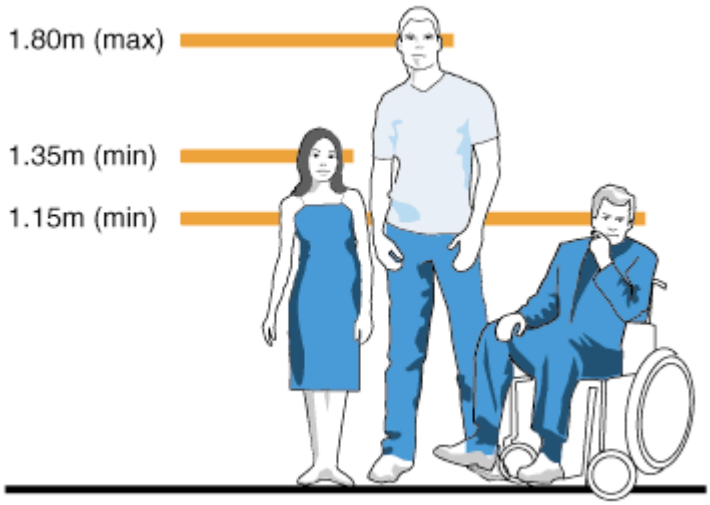
Line of sight
Ensure that there is a clear line of sight to the display from a range of angles. Check for glare on the screen from a range of positions.

Directions and Techniques

Refer to anthropometrical data

Refer to appropriate physical design guidelines or building accessibility guidelines which give minimum and maximum heights. The United Nations have a useful set of anthropometrical

data covering ranges of height and reach when standing or sitting in a wheelchair.



Eye height ranges

Ensure that users of all heights can see displays. The standing eye height for the largest person (95th percentile) is approx. 1.8m. The standing eye height for the smallest person is approx. 1.35m. Wheelchair users often have eye heights as low as 1.15m.

Reduce glare

Anti-glare displays can help reduce the problem of reflected light. The physical design of the terminal casing can also help by blocking light from reaching the display. However, be aware that anything that obstructs light from reaching the display may also obstruct the user's view.

Increase size

Increasing the size of text or other displayed information can help to make it more readable at an angle.

Consider adjustable or extra displays

In extreme cases, you may consider using height adjustable or rotatable displays or dual-display systems.

How you could check for this:

Self-test early prototypes

Designers can run simple sight tests on a prototype, simulating short and tall people and wheelchair users by sitting in a chair, standing on a raised area or kneeling down. Whilst this will not be a replacement for proper testing with real users, it will give some insight into what it is like to be viewing the display from the user's perspective and will help reveal any obvious problems before further work is carried out. If standing on something, you should make sure it is sufficiently strong and stable and take care to avoid the possibility of injuries caused by falling off it. Difficult lighting conditions are easily simulated by either using the prototype outside in sunlight or positioning artificial lights appropriately.

Include user data in the design

If you are designing using a CAD package, you may be able to simulate different viewing points before creating a prototype.

Test with real users

During development, you should test the prototype in a realistic situation with real people, particularly people who routinely use wheelchairs or motorised buggies.About user testing

1.3 Ensure that controls are adequately sized and sufficiently spaced to be operated by people with limited dexterity

The user should be able to operate any control, such as a button, key or knob, without accidentally operating any other control at the same time. This means that each control should be sufficiently large for the user to target and activate it, even if they suffer from limited dexterity through lack of motor control or shaking hands. Precise activation should be possible even with shaking hands. Controls should also be sufficiently spaced out that the user does not accidentally activate two at once.

Rationale

Many, particularly older, users have reduced dexterity in their hands due to degenerative conditions that affect their muscle control or that cause uncontrolled movements such as shaking. Small controls can be difficult to operate for these users because they either cannot accurately target them or because the uncontrolled movements cause their hands to stray off them. This makes the terminal difficult to use. In extreme cases, the user may accidentally strike the wrong button or key or strike two at the same time, causing errors. This can be particularly problematic with touchscreens or contact-sensitive controls where the user's hand may wander over the wrong area. The problem is made worse by the controls being closely spaced. Another problem may occur if controls require finely controlled activation or positioning, such as double-clicking or precise positioning of a rotary control.

Directions and Techniques

Make boundaries between controls clear

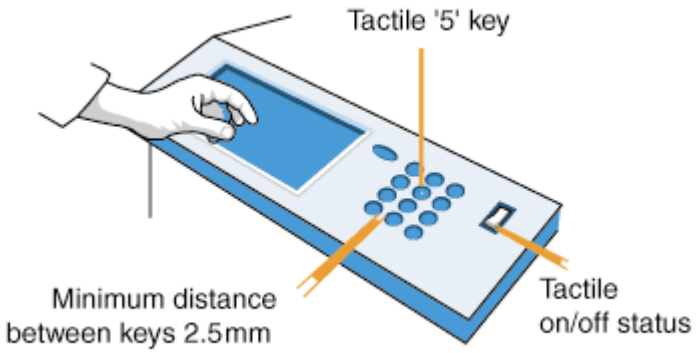
Clearly define the edges of buttons and keys using a ridged border which is darker or lighter than the control itself.

Well-designed keyboard

Keys should be well spaced, tactilely discernable and contrast visually with their surround.

Space controls sufficiently

Leave a gap of at least 2.5mm between the edges of adjacent buttons or keys.



Key and button design

Make buttons large and tactilely discernable. Leave at least 2.5mm between the keys.

Shape the input slots

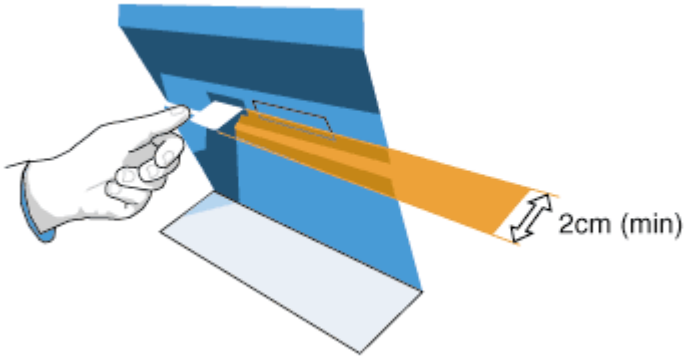
Design a funnel-shaped entry to the card input slot or other slots, to help guide the items in.

Avoid difficult physical actions

Avoid operations that require more difficult physical actions such as fine positioning of rotary controls or time-limited actions such as double clicks.

Present enough of the output for the user to grasp

Ensure that outputs such as tickets, money or receipts protrude at least 2cm from the slot surround.



Card and ticket protrusion
Ensure that cards and tickets protrude at least 2cm from the surrounding slot.

Allow user-selectable settings

Applying the previous techniques should result in a terminal which suits all users. However, in some cases, what is best for one group of users is not necessarily best for all.

If this is the case, it may help if the user interface can be adapted by the user, or automatically for the user, to fit their individual capabilities. For example, if the terminal uses a touchscreen, there is scope for offering alternative layouts of controls. Users with limited dexterity could choose a layout using large, widely spaced controls spread across two screens, whilst users with good dexterity could choose a more detailed layout in which everything is included on a single screen.

The choice could be made by the user selecting from a number of displayed options. Alternatively, information required for the terminal to switch automatically could be encoded on a user's smart card at their request.

How you could check for this:

Self-test early prototypes

Designers can run simple tests on an early prototype, although it is difficult to properly simulate low dexterity. One possible method is to try operating the prototype using a finger-shaped pointing stick rather than with your fingers. Because it will be more difficult to be accurate, you may get some idea if major problems are likely to occur. Another possibility is to try operating it while wearing workshop gloves. It would be possible to simulate a hand tremor by shaking the user's hand or arm or by shaking the prototype. However, you should take extreme care in doing either of these since both could be highly dangerous.

Test with real users

During development, you should test the prototype in a realistic situation with real people, particularly older people.About user testing

1.4 Ensure that operation requires minimal strength, grip and wrist twisting

Using the terminal may require a number of physical operations - pressing buttons or keys, turning knobs or other moving parts, inputting cards or other items and retrieving cards, tickets or other outputs. All these operations should be possible with minimal grip, pushing and pulling strength or twisting of the wrist.

Rationale

Many, particularly older, users have greatly reduced strength due to degenerative conditions that affect muscle power or restrict movements of the joints in the fingers, hands and wrists. Most operations on a terminal require finger or hand movements. If the controls are too stiff, the slots too narrow or the machine's grip on items too tight, some users may not have the strength to overcome this and will be unable to use the terminal.

Directions and Techniques

Favour pressing, but with modest force

As far as possible, avoid using controls that have to be gripped and turned rather than pressed. Allow for a maximum pressing force of 5lbf.

Don't grip outputs too tightly

Ensure that the machine's grip on outputs such as money, tickets, receipts and returned cards is no more than is necessary to prevent them being pulled out by the wind or other environmental conditions.

Make tearing easy

If tickets are delivered using perforated paper rolls, make sure the perforations are easily broken by a tugging motion.

How you could check for this:

Test with real users

To test for this, you should have a prototype used in a realistic situation by real people, particularly older people.About user testing

1.5 Ensure that the terminal can be operated using only one hand

If a user has use of only one hand, they should still be able to operate all the functions of the terminal without requiring assistance.

Rationale

> " Some ATMs are on a ramp which is good but if the part next to the machine is sloping you might need one hand to prevent the wheelchair rolling so you've only got one hand left to operate the machine. " - wheelchair user

Users often have no use of one of their hands, either due to a physical disability or because they are using it to hold onto something else, such as a child, a shopping bag, a physical support or a purse containing their valuables. It should still be possible for them to use the terminal without having to let go of any of these things.

Directions and Techniques

There are no specific techniques recommended for this guideline.

How you could check for this:

There are no specific test methods recommended for this guideline.

1.6 If using a touchscreen or contact-sensitive controls, do not require that it is touched by a body part

Using a touchscreen or contact-sensitive controls requires that it is touched by something that it can detect. Depending on the technology employed, it may or may not be able to detect touches by objects such as a pen, a pointing stick or a prosthetic device. It should be able to react to whatever a user might need to touch it with.

Rationale

A person who has lost a limb, such as an arm or hand, will use a prosthetic device such as an artificial hand. They may well have sufficient control to be able to accurately point at and press buttons or keys. However, the prosthesis may be made of metal, plastic, or some other material with dialectric properties that are different from those of a human finger. The terminal will therefore have to be able to detect this other material in order to react to the user's inputs.

Directions and Techniques

Avoid using screens that react to capacitance changes

How you could check for this:

There are no specific test methods recommended for this guideline.

1.7 Ensure that users with restricted or no vision can use all functions of the terminal

Users will normally access the functions of the terminal through controls such as buttons, keys and knobs. These may or may not be visible to users who are blind, partially sighted or colour blind. However, all users with restricted vision must still be able to use all the functions. Where possible, the controls should be designed so that at least users who have partial vision or colour blindness are able to perceive them, understand what each is for and know how to operate them. It may also be possible to design in such a way that users who are completely blind can still perceive, distinguish and operate the same controls. If this is not possible or extremely difficult, an alternative control method should be made available which these users can perceive and which can be used to access the full functionality.

Rationale

> " At the bank, when I'm paying a bill and I have to enter my PIN number on the little keypad they have on the counter. The keys are grey and the numbers on the keys are black, so it's hard to read. Also, the keys are very close together so it's difficult to see one from the other. " - partially sighted bank customer

Control labels, prompts and delivered information are usually provided as text but presented visually. Any user who cannot see to read the text will not be able to perceive the information it contains. The controls themselves have first to be perceived by the user before they can be operated. Again, this often relies on sight, so that people with restricted sight may be unable to use the terminal. A particular problem occurs with terminals that use unlabelled buttons for input, changing the prompt next to each button on successive screens. Knowing which button to press relies on visible correlations which are difficult to learn.

> " Because the keys have different meanings during the transaction, it's very difficult to use. It would be nice if it would quietly confirm each key press, so I know what's going on. " - partially sighted bank customer

> " Light and reflections are always a problem due to the viewing angle. If you are looking down, your shadow covers the screen. Imagine you are sitting and have to stretch your head to see the screen. Once I withdrew too much money because I couldn't see the screen properly. " - partially sighted bank customer

Directions and Techniques

Add voice output

Add voice output to speak the instructions. This can be achieved using either pre-recorded audio or speech synthesis. Speech synthesis, whilst more flexible, is often of much poorer quality and may be difficult to understand for some users and in noisy environments. If voice output is likely to be intrusive or if the instructions give away sensitive personal information,

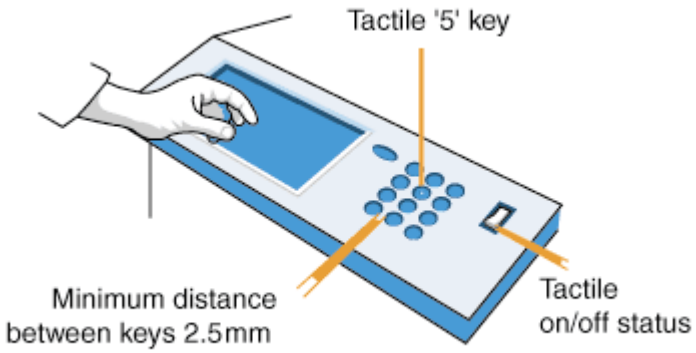
allow the audio to be turned off during a user session and provide a standard jack socket for connecting an earphone. Inserting a jack plug should switch off the output to the external loudspeakers.

Consider developing a separate audio menu

If the terminal relies on visible correlations between changing prompts and unlabelled buttons, users may still not be able to know which button is associated with each prompt. In this case, it may be best to develop a separate audio menu which prompts the user to press a number on the keypad for each choice. This can be done along the lines of telephone Interactive Voice Response (IVR) systems which ask the user to "press 1 for this option, press 2 for that option" etc.

Add tactile indicators to buttons and keys

It is standard practice to put a single raised dot on the 5 key to help users orientate their fingers on the keypad by touch. It is also possible to emboss Braille on keys and buttons, although this is not as widely effective as it may seem, since less than 2% of visually impaired people can read Braille. Also, Braille has less value in outdoor situations during cold weather, because tactual sensitivity is dramatically reduced at lower temperatures.



Key and button design

Make buttons large and tactilely discernable.

Raise or recess buttons and keys

Raise or recess the buttons and keys by at least 2mm over the surrounding area.

Provide tactile and audio feedback

Provide tactile and audio feedback to indicate the operation of controls. Tactile indication can be provided by requiring a gradual increase in the force to activate a control, followed by a sharp decrease as it is activated. Audio feedback can be given using a beep or click. For multiposition controls, feedback should be used to indicate the current position or status.

Label text, colour and contrast

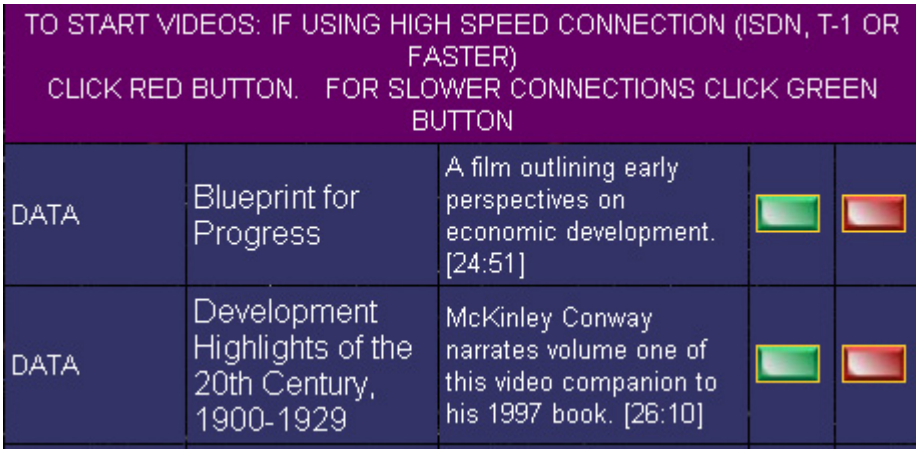
For label text, ensure that characters are at least 4mm high but avoid using all upper case which is more difficult to read than mixed case. For good contrast, use light coloured characters on a dark background, e.g. White or yellow on matt black or a dark colour. Avoid using pale colours or patterned backgrounds for text. Also avoid red on green or yellow on blue since these combinations may cause problems for people who are colour blind. Use a typeface designed for display, such as Tiresias, which has numerals with open shapes which are easier to distinguish for people with low vision.

Well-designed label text

For good contrast, use light coloured characters on a plain dark background.

Do not rely on colour for meaning

Whilst colour coding can be useful as an aid to recognition, it should not be relied on entirely, since over 8% of Irish males and some females have difficulty distinguishing between red and green (other forms of colour blindness are relatively uncommon).



Do not rely on colour for meaning

The buttons on this web page rely on the users ability to distinguish between red and green.

Raise the edges of input slots

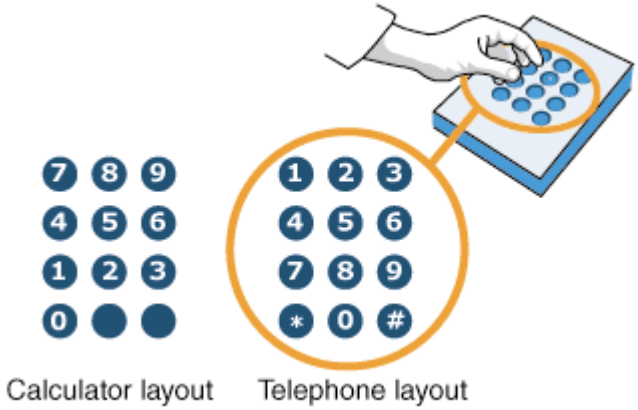
Design a raised ridge around input slots such as those used for entering a card or plugging in a headphone jack. This will make them easier to locate by touch.

Allow user-selectable settings

Applying the previous techniques should result in a terminal which suits all users. However, in some cases, what is best for one group of users is not necessarily best for all. If this is the case, it may help if the user interface can be adapted by the user, or automatically for the user, to fit their individual capabilities. For example, users who are visually impaired could choose voice output and large type, whilst users with good vision may prefer to have more detail and no sound. The choice could be made by the user selecting from a number of displayed options. Alternatively, information required for the terminal to switch automatically could be encoded on a user's smart card at their request.

Use the telephone layout for keypads, rather than the calculator layout

The telephone layout is recommended as the standard for public access terminals. Using this layout will ensure the most consistency with other terminals.



Keypad layouts
Use telephone layout for keypads.

How you could check for this:

Self-test early prototypes

Designers can run simple sight tests themselves on an early prototype, by simulating various types of vision loss. Complete loss of sight can be simulated either by wearing a blindfold, turning off the lights or putting the terminal in a black bag. To simulate partial sight, a test user who normally wears glasses could take them off. It is also possible to buy low vision simulation glasses which simulate various types of visual impairments. In all cases, extreme care should be taken to avoid injury through loss of balance or collision with unseen objects. This may require that the test user remains seated or, if they have to move around, obstacles such as floor cabling are removed in advance. Although this type of ad hoc testing will not replace proper testing with real users, it will give some insight into what it is like to be operating with reduced vision.

Test with real users

During development, you should test the prototype in a realistic situation with real people who have various forms of visual impairment. In particular, you should include people who are recently impaired and have not yet developed enhanced perception or coping methods.About user testing

1.8 Ensure that all outputs can be perceived by users with restricted or no vision

Users who are blind, partially sighted or colour blind should be able to perceive all of the outputs from the terminal. The outputs include any information that is presented and any physical items that are delivered, such as tickets, cash, receipts and returned cards.

Where possible, visually displayed information should be delivered in a form that users who have partial vision or colour blindness can see. Where this is not possible, or for users who are completely blind, an alternative form that they can perceive should be made available and it should provide the same information.Visually impaired users should also be able to notice when any delivered outputs have appeared and where. Preferably, they should be able to anticipate exactly when and where the delivered outputs will appear, so that they can be ready to grasp them as soon as possible.

Rationale

> " At night I can see the writing but by day I find it impossible to use. I know there's something written there but I don't know exactly what it says. " - partially sighted user

Information output is usually provided as text and presented visually. Any user who cannot see to read the text will not be able to perceive the information it contains. Not being able to see text well enough to read it is often due to a combination of poor vision, inadequate text quality and poor lighting. So by increasing the legibility of the text or the lighting, even users with some visual impairment will be able to read and understand it.

> " I hate scrolling displays. They're nice because they are dynamic and they get your attention but I can't actually read them because I can't focus on moving text. " - partially sighted user

Movement reduces legibility and some users who can read quite well are nevertheless unable to read the same text if it is moving.

> " Queuing systems are a problem. The Revenue one is good because it speaks out 'ticket number 42 to desk 7'. But in other places I have to listen out for the

> number of times the counter clicks forward and sometimes I lose count and miss my turn. " - partially sighted user

Often the only way the user knows something has happened is by listening to incidental noises, such as the click of the counter in a ticketed queuing system, the sound of the printer in a ticket machine or the whir of the motor in a cash dispenser. Even users who are totally blind can gather information about the outputs by listening for these noises. Although these noises are incidental, similar sounds can be included intentionally, ranging from simple clicks and beeps to spoken alerts.

> " A speaking ATM would be great, as long as the volume wasn't too loud, so there would be no problem with security. " - partially sighted user

When information outputs are displayed visually as written text, non-sighted users will need to be able to hear it spoken, although care should be taken not to compromise the user's security.

Directions and Techniques

Text size, contrast and typeface

Ensure that characters are at least 4mm high. Light characters on a dark background is best for contrast, e.g. White or yellow on black or a dark colour. Avoid using pale colours. Avoid red on green or yellow on blue. Avoid patterned backgrounds for text. Avoid all caps and underlining. Use a typeface that has numerals with open shapes such as Tiresias.

Avoid using scrolling text or animation

Provide adequate lighting and take steps to reduce glare

Most text displays use CRTs, LEDs or backlit LCDs so they provide their own light source. They should have enough power to provide a clear contrast between the light and dark areas in all conditions. If this is not the case, the display will have to be adequately illuminated form an external source.

Anti-glare displays can help reduce the problem of reflected light which reduces text legibility. The physical design of the terminal casing can also help by blocking direct or reflected light from reaching the display. However, be aware that anything that obstructs light from reaching the display may also obstruct the user's view.

Add voice output

Add voice output to speak any information that is displayed visually. This can be achieved using either pre-recorded audio or speech synthesis. Speech synthesis, whilst more flexible, is often of much poorer quality and may be difficult to understand for some users and in noisy environments. If voice output is likely to be intrusive or if the information is of a sensitive

personal nature, allow the audio to be turned off during a user session and provide a standard jack socket for connecting an earphone. Inserting a jack plug should switch off the output to the external loudspeakers.

Headphone sockets

If voice output is likely to be intrusive or to be of a personal nature, provide a standard headphone socket.

For all visual cues, provide corresponding audible cues

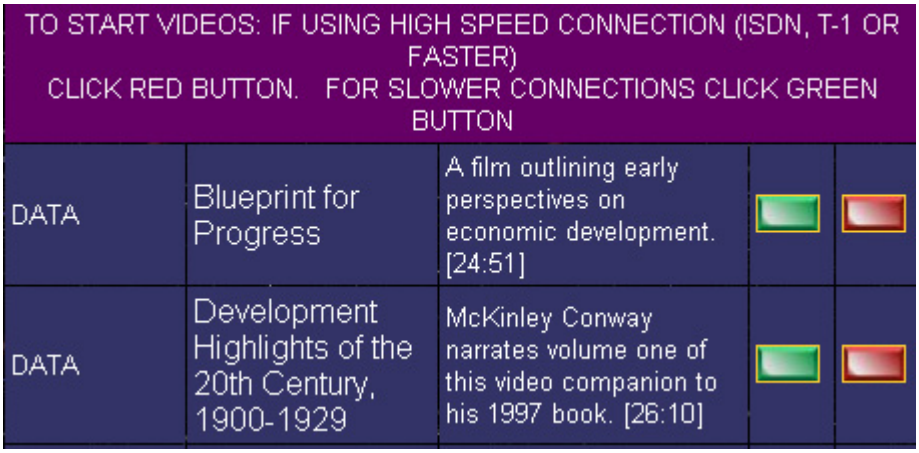
Supplement visual cues, such as flashing indicator lights, with simultaneous corresponding audible cues, such as clicks, beeps and spoken alerts.

Allow user-selectable settings

Applying the previous techniques should result in a terminal which suits all users. However, in some cases, what is best for one group of users is not necessarily best for all. If this is the case, it may help if the user interface can be adapted by the user, or automatically for the user, to fit their individual capabilities. For example, users who are visually impaired could choose voice output and large type, whilst users with good vision may prefer to have more detail and no sound. The choice could be made by the user selecting from a number of displayed options. Alternatively, information required for the terminal to switch automatically could be encoded on a user's smart card at their request.

Do not rely on colour for meaning

Whilst colour coding can be useful as an aid to recognition, it should not be relied on entirely, since over 8% of Irish males and some females have difficulty distinguishing between red and green (other forms of colour blindness are relatively uncommon).



Do not rely on colour for meaning

The buttons on this web page rely on the users ability to distinguish between red and green

How you could check for this:

Self-test early prototypes

Designers can run simple sight tests themselves on an early prototype, by simulating various types of vision loss. Complete loss of sight can be simulated either by wearing a blindfold, turning off the lights or putting the terminal in a black bag. To simulate partial sight, a test user who normally wears glasses could take them off. It is also possible to buy low vision simulation glasses which simulate various types of visual impairments. In all cases, extreme care should be taken to avoid injury through loss of balance or collision with unseen objects. This may require that the test user remains seated or, if they have to move around, obstacles such as floor cabling are removed in advance. Although this type of ad hoc testing will not replace proper testing with real users, it will give some insight into what it is like to be operating with reduced vision.

Test with real users

During development, you should test the prototype in a realistic situation with real people who have various forms of visual impairment. In particular, you should include people who are recently impaired and have not yet developed enhanced perception or coping methods. This is the only way to find out if your audio equivalents can be understood by users well enough to provide the intended information.About user testing

1.9 Ensure that all outputs can be perceived by users with restricted or no hearing

Users who are deaf or hard of hearing should be able to perceive all of the outputs from the terminal. The outputs include any information that is presented and any physical items that are delivered, such as tickets, cash, receipts and returned cards.

Where possible, audible information should be delivered in a form that users who are hard of hearing can hear. Where this is not possible, or for users who are profoundly deaf, an

alternative form that they can perceive should be made available and it should provide the same information.Hearing impaired users should also be able to notice when any delivered outputs have appeared and where. Preferably, they should be able to anticipate exactly when and where the delivered outputs will appear, so that they can be ready to grasp them as soon as possible.

Rationale

If audio output in the form of spoken language is used to present information, users who cannot hear well enough to understand what is said will not be able to perceive the information being given. Not being able to hear audio outputs well enough to understand them is often due to a combination of poor hearing, inadequate sound quality and background noise. So by increasing the sound quality and taking steps to reduce background noise, even users with some hearing impairment will be able to understand the spoken information.

Often, terminals rely on intentional sounds such as beeps and chimes or incidental sounds such as motor noises and coins being dispensed to inform the user that something has happened. This is particularly the case for outputs such as tickets that appear in a tray which it is difficult to see into. If there is no corresponding visual indicator, users who cannot hear the sounds may be unaware that something is happening or an output has occurred.

Directions and Techniques

Provide adequate quality sound

Speech output can be achieved using either pre-recorded audio or speech synthesis. If possible, use digitised pre-recorded speech which has been recorded in a professional studio and spoken by a trained announcer. Speech synthesis, whilst more flexible, is often of much poorer quality and may be difficult to understand for some users and in noisy environments.

Take steps to screen out background noise

Baffles or sound absorbing materials can be built into the terminal casing. In extreme situations, audio output can be provided via a headphone or earpiece. If audio output is provided via an audio transducer held to the ear, provide a means for effective wireless coupling to hearing aids.

The European Telecommunications Standards Institute (ETSI) symbol
Symbol for systems that facilitate people with impaired hearing.

Allow the user to increase the sound level

Allow users to increase the sound level by up to 20dB.

For all audible cues, provide corresponding visual cues

Supplement audible cues, such as clicks, beeps and spoken alerts, with simultaneous corresponding visual cues, such as flashing indicator lights.

How you could check for this:

Self-test early prototypes

Designers can run simple hearing tests themselves on an early prototype, by simulating various degrees of hearing loss or environmental conditions. Complete loss of hearing can be simulated by turning off the audio output from the terminal although this will not remove the sound of printers, motors or other moving parts which may provide useful clues about what is happening. Wearing earplugs, industrial ear protectors or noise-cancelling headphones can considerably reduce all sound, although it is difficult to reach complete loss of hearing.

Partial hearing loss may be even more difficult to simulate accurately, since the degradation is often not uniform across the frequency range. It may be greater at some frequencies, particularly the high or low ends of the hearing spectrum.To simulate noisy environments, it is best to test the prototype in situ if this is practical. Otherwise, recordings of background noise from typical environments can be used.In all cases, care should be taken when running these tests since the user whose hearing is reduced may not be able to hear other important sounds, such as verbal warnings from experimenters, alerts, or fire alarms.

Test with real users

During development, you should test the prototype in a realistic situation with real people who have various forms of hearing impairment. In particular, you should include people who are recently impaired and have not yet developed enhanced perception or coping methods.About user testing

1.10 Use the simplest language possible for instructions, prompts and outputs and, where possible, supplement it with pictorial information or spoken language

The language that is used for things like operating instructions, button labels and displayed information should be clear, unambiguous and easily digested. It should not contain unnecessary jargon, colloquialisms, idiomatic expressions or convoluted grammar. Where

possible, use explanatory icons, pictures or diagrams to aid understanding and provide for written text to be spoken for the benefit of users who have difficulty reading.

Rationale

Many people find it difficult to understand complicated written text. Overall, 25% of the Irish population are "functionally illiterate", meaning that, while they can read to some degree, they would have difficulty reading a newspaper, filling in a form or following the instructions on a medicine bottle. Similarly, people whose first language is not English, such as first generation immigrants or foreign visitors, may have some reading ability but it may be low.

Literacy is also a problem for people who are deaf. A 1993 NRB survey found that 80% of deaf adults in Ireland had the reading age of an 8-9 year old. This is due to the difficulties of learning through sign language, which has a different grammar and structure to spoken or written language, or by lip reading.

There are various cognitive impairments, the best known being dyslexia, which also cause difficulty in reading complicated written text.

Directions and Techniques

Keep it simple

The main technique is to keep it simple. Use everyday, jargon-free explanations. Avoid idiomatic expressions such as "on the one hand". Avoid long sentences by writing directly and concisely. You will often find that phrases like "on the one hand" are mere padding and can be removed without changing the meaning of the sentence. It is best if all instructions and information are written by experienced professional technical writers.

Supplement written instructions with audio

People who cannot read are often perfectly able to understand the same text if it is spoken. This can be achieved using either pre-recorded audio or speech synthesis. Speech synthesis, whilst more flexible, is often of much poorer quality and may be difficult to understand for some users and in noisy environments.

Supplement written instructions with pictures

Icons and diagrams can convey large amounts of information in an easily and quickly digested form. This may be the only medium that can be understood by people who are deaf and have poor literacy.

Supporting written instructions
Supplement written instructions with pictures.

Allow user-selectable settings

Applying the previous techniques should result in a terminal which suits all users. However, in some cases, what is best for one group of users is not necessarily best for all. If this is the case, it may help if the user interface can be adapted by the user, or automatically for the user, to fit their individual capabilities. For example, some users may wish to choose spoken output, graphical buttons or fewer choices, whilst others may prefer to have only written text and more detail. The choice could be made by the user selecting from a number of displayed options. Alternatively, information required for the terminal to switch automatically could be encoded on a user's smart card at their request.

How you could check for this:

Test with real users

Try to ensure that all instructions and information are covered in the user tests which should include users who have low English literacy, preferably for a number of different reasons (education, nationality, hearing or cognitive impairment).
About user testing

1.11 If using cards, ensure that the card can be inserted into the card reader in its correct orientation without requiring vision

The user should be able to distinguish the card from other similar cards, turn it the right way round and insert it into the reader without being able to see the card or the reader. If the card is still inserted in the wrong orientation, it should be immediately rejected and the user should be notified of the error and allowed to try again.

Rationale

> " If I use an ATM in another country or if I use my Visa card instead of the Pass card, it gets a bit fiddly because I'm never sure which way the card should go in

and I can't really see it. " - blind cardholder

In your wallet or purse, you probably have a number of different cards for identifying yourself to different authorities or operating different machines or doorways. Often, the only distinguishing features on the cards are visual - the colours and what is written on each card. Ask yourself "if it was dark or I was unable to see, how would I know which card to use?".

Having retrieved the required card, you will normally have to put it into a slot or run it through a swipe card reader in a particular orientation and direction. Ask yourself "how would I know which side is which and which end is which? And even if I knew, how would I know which end should go into the slot or past the reader and which side should be up or down or to the left or right?". The answer will usually have something to do with looking at both the card and the slot or reader.

A user who has poor or no vision or who is working in a dark place will have none of this information and will therefore have to resort to trial and error. If they choose the wrong orientation, they may be able to try again until they get it right. If they choose the wrong card, they may be in a much worse situation.

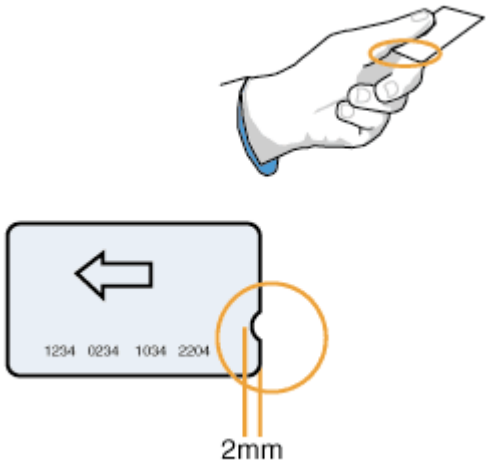
Directions and Techniques

Distinguish the card with tactile markings

Incorporate an embossed capital letter at least 10mm high with an embossing of at least 0.7mm. Note that, whilst Braille may seem a more obvious solution for tactile marking, less than 2% of visually impaired people can read Braille.

Incorporate an orientation notch on the card

A 2mm notch on the trailing edge of the card will enable the user to correctly orientate it for insertion into a horizontal slot by touch. This follows the CEN standard EN 1332 (Machine readable cards, related device interfaces and operations. Part 2 Dimension and location of tactile identifier for ID1 cards). Note that the slot should also be orientated in a way that fits the standard.



CEN 1332 card
CEN 1332 compliant card layout. The notch on the trailing edge helps visually impaired users to orientate the card.

Allow the card to be inserted in any orientation

If possible, the card reader could be designed so that the card can be inserted or swiped in any direction and with either side uppermost or leftmost. This will remove the possibility of errors. It does not, however, mean that there is no need to add an orientation notch on the card, since users who do not realise that any orientation is acceptable will then be unsure of what to do.

Generate an audible error indication when the card is inserted in the wrong orientation

If the card is inserted in the wrong orientation, immediately reject it and notify the user of the error using an audible indicator such as a low beep which suggests failure. Then allow the user to try again.

Consider using contactless cards

Contactless cards work at a distance. They do not need to touch the reader device or to be placed in any particular orientation. The maximum working distance is typically no more than 10cm for security reasons. Other types of cards include those that must be pressed onto a pad but can be in any orientation.

Consult international standards

International standards relating to card systems include:

- CEN (Comite Europeen de Normalisation) EN 1332
- ISO (International Standards Organisation) 7816 & ISO/IEC 10536

How you could check for this:

Self-test early prototypes

Designers can run simple tests themselves on an early prototype, by simulating sightless use. This can be done either by wearing a blindfold, turning off the lights or putting cards in a black bag. If working blindfolded or in the dark, extreme care should be taken to avoid injury through loss of balance or collision with unseen objects. This may require that the test user remains seated or, if they have to move around, obstacles such as floor cabling are removed in advance.

Test with real users

During development, you should test the prototype in a realistic situation with real people who have complete visual impairment. In particular, you should include people who are recently impaired and have not yet developed enhanced tactile abilities.
About user testing

1.12 If using biometric identification, provide an alternative access security mechanism for users who do not possess the required biological characteristic

Do not use a single biometric identification methods, such as fingerprint, iris pattern or speech pattern recognition, as the only user identification method. If any of these are used, provide users who do not have the required biological characteristics with an alternative method, such as a different biometric identifier or a PIN code.

Rationale

Biometric identification methods rely on identifying biological attributes which are unique to the individual human being, such as fingerprints, iris patterns or speech patterns. However, for each of these characteristics, there is some proportion of the user population who do not have the required biological part. They may, for example, have no hands, no irises or no ability to produce constant natural speech. However, they must still have a way to identify themselves to the terminal.

Directions and Techniques

There are no specific techniques recommended for this guideline.

How you could check for this:

There are no specific test methods recommended for this guideline.

1.13 Do not cause the screen to flash at a frequency of above 2Hz

Avoid all flickering or flashing with a frequency of more than twice per second. This includes flashing backgrounds or text, repeatedly turning graphics on and off or cycling between different images.

Rationale

Displays which flicker or flash can cause photosensitive epileptic seizures in susceptible individuals, particularly if the flash has a high intensity and is within the frequency range between 2 Hz and 60 Hz.

Directions and Techniques

There are no specific techniques recommended for this guideline.

How you could check for this:

There are no specific test methods recommended for this guideline.

1.14 When installing the terminal, ensure that users can get to it along an unobstructed path and operate it from a stable position

The path to the terminal must be free from obstacles such as steps, bins or signage that would obstruct the progress of users who are either walking or using a mobility aid such as a wheelchair or motorised buggy. This includes the path into any room or area containing the terminal. The user should be able to operate the terminal from a clear, flat area large enough to manoeuvre mobility aids such as a wheelchair or buggy.

Provide a clear access path

Ensure easy access to the device for people using wheelchairs, buggies or mobility aids.

Rationale

" Often it is things in the environment around it that cause the problem. Sometimes there are steps up to an ATM. Or it could be the height of the

> pavement, bins or other things around the terminal which mean you can't get at it. People who design these things have to realise that you have to take the whole lot into account. " - wheelchair user

Users with restricted mobility who use wheelchairs, motorised buggies or walking frames may have difficulty getting around obstacles placed in the path to the terminal. Steps can cause particularly severe or insurmountable problems. In order to operate the terminal they will have to manoeuvre themselves to be close enough to it. Then when they have finished they will have to manoeuvre themselves out again, preferably without having to go backwards.

> " Some ATMs are on a ramp which is good but if the part next to the machine is sloping you might need one hand to prevent the wheelchair rolling so you've only got one hand left to operate the machine. " - wheelchair user

Having reached the terminal, users will need a stable platform from which to operate it.

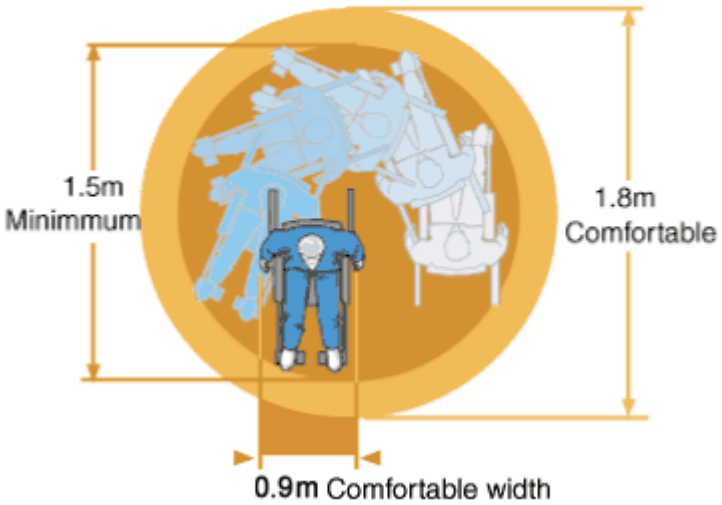
Directions and Techniques

Provide a shallow ramp rather than steps

If it is necessary to raise the operating area above normal street or floor level, provide a ramp with a maximum slope of 6%.

Provide a clear, level operating area large enough to turn a wheelchair or buggy

Provide a clear area of 1.5 metres radius directly in front of the terminal with a floor surface that is level in a direction parallel to the facia of the terminal. The gradient of any crossfall should not exceed 1 in 20.



Wheelchair clearance and turning circle

A wheelchair user requires a corridor of 0.9m in width to access a device and a minimum of

1.5m to make a complete turn comfortably.

Refer to anthropometrical data

Refer to appropriate physical design guidelines or building accessibility guidelines. The United Nations have a useful set of anthropometrical data covering required path dimensions for wheelchairs.

How you could check for this:

There are no specific test methods recommended for this guideline.

1.15 Ensure that an equivalent service is available through an accessible channel for users who cannot use the terminal

If the terminal meets all the previous priority 1 guidelines and there are still people who cannot use it, you should ensure that the services it provides are available through an alternative channel. Accessing the alternative channel should involve a minimal amount of inconvenience to the user and should be provided at no extra cost.

Rationale

Having met all the previous priority 1 guidelines, there may still be a small group of people who cannot use the terminal. If this is the case, they are likely to be users who either have extreme difficulties in one particular area or who have multiple difficulties so that no combination of the accessibility features meets their needs. For example, users who are deaf and blind cannot see displayed information or hear the spoken equivalent. They rely on tactile representations such as output via a refreshable Braille display which does not have to be supported under priority 1 of these guidelines. However, these users may still need to use the service to which the terminal provides access.

Providing an alternative channel through a human customer service agent has particular benefits, even for customers who can physically use the terminal but have some difficulty with the service. The human representative is able to interpret customers' requirements, answer their questions and give spontaneous information that the machine is not capable of. They also provide a 'face' to the organisation, which some users are far happier with.

Directions and Techniques

Use trained customer service agents

The best alternative service is through a trained customer service agent who will be able to deal with a wide variety of situations and needs in an intelligent way, something no machine can match.

How you could check for this:

There are no specific test methods recommended for this guideline.

Priority 2

Following priority 2 will make it easier to use and will include more people with cognitive impairments or multiple disabilities.

2.1 Allow sufficient time to accommodate the slowest users

Operations such as entering a PIN, choosing from a list of options or typing in information, should not be cancelled or interrupted by system prompts until even the slowest users have had sufficient time to complete the operation. This includes reminders and timeouts.

Rationale

Completing an operation on the terminal will require the user to carry out a number of separate activities. These may include reading and understanding the instruction, choosing the appropriate action, recalling information and making the inputs. Each of these activities will take some time and different users will require different amounts of time, depending on their abilities and confidence.

Users who have poor reading skills or have difficulty understanding written text may have to read the instructions very carefully a few times before they can understand them fully.Having read the instructions, choosing the appropriate action will take longer for users who have an intellectual impairment.Recalling information such as PIN numbers or personal details is more difficult for many older users or people who are tired or stressed.Making inputs by pressing buttons or typing on a keypad can take much longer for users who have physical difficulties.It can be very frustrating to be constantly prompted to complete a task and the stress that this can cause makes it even more difficult for the user. Ultimately, the worst thing is to be timed out after a lengthy process and asked to start again.

Directions and Techniques

Allow up to 10 times the average response time in order to accommodate the slowest users

To accommodate the slowest users, a good rule of thumb is to allow up to 10 times the average response time for each individual activity - reading and understanding, choosing, recalling information and making inputs.

Use timeouts only where necessary and reminders only where helpful

It is easy to include timeouts and reminders in software without much thought having been put into whether they are required for security and whether they are actually helpful to users.

Allow user-selectable settings

Applying the previous techniques should result in a terminal which suits all users. However, in some cases, what is best for one group of users is not necessarily best for all. If this is the

case, it may help if the user interface can be adapted by the user, or automatically for the user, to fit their individual capabilities. For example, users who need more time to read, think and act could choose longer timeouts and no reminders, whilst users who are quick may prefer to have shorter timeouts for security. The choice could be made by the user selecting from a number of displayed options. Alternatively, information required for the terminal to switch automatically could be encoded on a user's smart card at their request.

How you could check for this:

Gather time-to-task data

During user tests or after a first release, it is possible to gather data from a broad range of users about how long they take over each activity - reading and understanding, choosing, recalling information and making inputs. This can be then used to produce more accurate rules determining how long to allow. However, this should only be done by trained statisticians and the amount of data required for statistically significant calculations will be quite large.
About user testing

2.2 Provide a way for the user to cancel the whole transaction at any point and retrieve any items they have inserted

The user should be able to abandon any incomplete or unconfirmed requests at any time during a transaction. This should result in all inputs, such as money and cards) being returned and no further outputs being generated. The terminal should then return to the starting point of the transaction.

Rationale

> " The Return Card button always works as a get out method. " - blind user

Some users may get a certain way into a transaction before finding that they are unable to continue. This could be due to a variety of situations, such as having become confused, coming across instructions or information that they cannot understand or being requested to provide inputs that they cannot make. This could happen at any time. They may feel that they will be able to carry out the transaction successfully if they start again or they may have to give up completely and try an alternative service. In either case, they will need to have any money or cards returned to them.

Directions and Techniques

Provide a constantly available Cancel button

How you could check for this:

There are no specific test methods recommended for this guideline.

2.3 Ensure that the user interface and task flow is similar across different functions and remains the same across repeated visits

A uniform presentation and interaction style should be used for all functions of the terminal. This should not change between visits.

The steps required to complete a task should also remain the same between visits. This includes the instructions, the choices provided, what inputs are required and how these are made.

Having completed one task, the user should be able to complete a second task by carrying out a similar sequence of steps. Having carried out a task once, the user should be able to return to the terminal at some later time and repeat the task by carrying out the same steps.

Rationale

People with cognitive or learning disabilities find it difficult when the presentation, interaction style or task flow varies. Consistency helps enormously by making procedures easier to understand and enabling users to transfer the skills learnt on one task to other tasks. If there is no consistency between tasks or, even worse, if there is no consistency over time for a given task, users will have to repeatedly relearn the procedure.

> " I recently ran into problems with the ATM because the format had changed and while I was used to the position of the messages and could hit the right button to get my money out, when they changed the position I couldn't read the message and was foxed. " - blind bank customer

Consistency is also vitally important for users who have difficulty perceiving the instructions and controls. Memorising a routine sequence of button presses to withdraw cash is the main strategy employed by blind ATM users. If the interface changes at all, for example by the addition of advertising messages or unexpected questions into the screen flow, their standard sequence of steps may fail.

Directions and Techniques

Define and follow a standard style

Consistency is achieved by defining a standard style and following it. This can outline standards for aspects such as colours, control sizes, positioning, task order and writing style for instructions and information. It should be written down in the form of a style guide and one or more members of the development team should be assigned to act in an editorial role, reviewing the design to ensure it adheres to the style guide.

It may be possible to enforce the standard automatically, by using templates or some kind of content management system.

Don't insert extra steps into a process

Avoid inserting extra steps into the sequence, such as advertising or promotion messages.

How you could check for this:

Try to repeat a task by using a standard sequence of operations

While carrying out a task, write down the sequence of operations you perform, in terms of physical actions such as button presses. Try to repeat the task a number of times by following this sequence exactly, without looking at the displayed instructions. If the result is in any way different, then there is inconsistency.

2.4 When deploying more than one version of a terminal, ensure that the user interfaces are similar

If a service is delivered through a number of different terminals, they should use a similar presentation and interaction style. The layout of controls and keypads and the location and orientation of slots or dispensers for cards, money, tickets or receipts should be the same on each version of the terminal.

Having completed a task on one terminal, the user should be able to complete the same task on a different terminal by carrying out a similar sequence of steps.

Rationale

> " A friend taught me how to use the ATM near my office but I can't use any others because they all seem to work differently. " - bank customer

People with cognitive or learning disabilities find it difficult when the presentation, interaction style or task flow varies. If there is no consistency between different terminals, users will have to repeatedly relearn the procedure.

> " The layout of the number keys themselves always follow the same order but you'll often find the Enter key is in a different place. " - bank customer

Consistency is also vitally important for users who have difficulty perceiving the instructions and controls. Memorising a routine sequence of button presses to withdraw cash is the main strategy employed by blind ATM users. If the position of buttons is different from one terminal to another, their standard sequence is of no use to them.

Directions and Techniques

Adhere to standards

Achieve consistency with other public access terminals by using international or industry standards wherever possible. Standards exist for such things as symbols (e.g. ISO 7000 & 7001), colours and keypad layouts.

Use the telephone layout for keypads, rather than the calculator layout

The telephone layout is recommended as the standard for public access terminals. Using this layout will ensure the most consistency with other terminals.

How you could check for this:

There are no specific test methods recommended for this guideline.

2.5 Do not require users to remember a fixed supplied PIN

If access to the terminal requires using a Personal Identity Number (PIN) or other access code, do not require users to remember one which has been supplied to them but not chosen by them.

Rationale

In Europe, over 25 million people have dyslexia to the extent that they cannot reliably remember and use a four digit PIN, unless they can choose their own number.

In addition, people with intellectual impairment may have a problem keeping the number secret, so a biometric identification method would be more suitable for them.

Directions and Techniques

Allow the user to select their own PIN

Either allow the user to make up a PIN when they register or, if one is supplied to them, allow them to change it at any time or at least the first time they use the service.

Provide an alternative access method

Consider providing an alternative access security mechanism such as biometric identification for users who find PINs difficult to remember.

How you could check for this:

There are no specific test methods recommended for this guideline.

2.6 Provide for users with multiple impairments

Users with multiple impairments, such as those who are both visually and hearing impaired, should still be able to use the terminal. Features that are provided to accommodate users with different impairments should therefore be supplementary rather than mutually exclusive. That is, using one should not prevent the user from using others. If possible,

visually impaired users should be provided with facilities that do not require good hearing. And hearing impaired users should be provided with facilities that do not require good vision or reading ability.

Rationale

Loss of vision, hearing and dexterity often occur together, particularly as the person gets older. For example, approximately 35% of people with a visual impairment also have a hearing impairment. A high proportion of people who are deaf also have low literacy. A 1993 NRB survey found that 80% of deaf adults in Ireland had the reading age of an 8-9 year old. This is due to the difficulties of learning through sign language, which has a different grammar and structure to spoken or written language, or by lip reading.

Directions and Techniques

Make modes of use complementary

Where alternative or enhanced input and output modes are provided, such as large text, graphical buttons, large buttons, audio output and tactile indicators, ensure that users can use them together. For example, instead of providing a choice between one user interface with large text and large buttons and another with spoken text and an spoken prompts, allow the user to choose any combination of these helpful features. The choice could be made by the user selecting from a number of displayed options. Alternatively, information required for the terminal to select options automatically could be encoded on a user's smart card at their request.

How you could check for this:

There are no specific test methods recommended for this guideline.

2.7 Provide training or assistance for new users

Initial training or on-site assistance should be provided to help new users understand the terminal and learn how to use it.

Rationale

Some users will find the terminal difficult to use at first, but will be perfectly able to use it after some initial training or assistance. This may be true for users with any perceptual, cognitive or learning impairment. It may also be true for older users who use public access terminals rarely and find them intimidating, simply because they are not familiar with them. However, many terminals are used in a place where support and help is not readily available or convenient. For example, if someone is using a bank cash dispenser for the first time, asking for assistance from other members of the public may compromise their security.

Directions and Techniques

There are no specific techniques recommended for this guideline.

How you could check for this:

There are no specific test methods recommended for this guideline.

2.8 Ensure privacy and security during use

Terminals should be designed in a way that reduces the chance of sensitive personal information being perceived by other people in the vicinity. The installation of the terminal should minimise the risk to personal security.

Rationale

Terminals may provide sensitive private information which the user will not want anyone else to know. However, users with perceptual impairments may require the information to be more easily perceived by themselves. They may also have less ability to detect whether other people can perceive it. As far as possible, being easier for the user to perceive should not mean that sensitive information is also easier for others to perceive.

Many users, particularly older people, are deterred from using terminals like cash dispensers due to worries about personal security.

Directions and Techniques

Do not output the user's PIN

The user's PIN should never be displayed, broadcast or printed.

Provide for audio output via a headset which disables external loudspeakers

If audio output is provided through external loudspeakers, users can be given the option of connecting a headset via a standard mini jack socket. Plugging a jack plug into the socket should then disable the loudspeakers.

Provide good illumination around the terminal

General illumination in the vicinity of the terminal should be good enough provide personal security. Illumination at floor level should be at least 50 lux so that users can easily locate dropped objects.

How you could check for this:

There are no specific test methods recommended for this guideline.

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http://universaldesign.ie/Technology-ICT/Irish-National-IT-Accessibility-Guidelines/Public-Access-Terminals/Guidelines-for-Public-Access-Terminals-Accessibility-Printable-Version/Guidelines-for-Public-Access-Terminals-Accessibility-Printable-Version.Html