



**Consumer
Focus**
Campaigning for a fair deal

Smart meter in-home display design

Usability good practice guidance

About Consumer Focus

Consumer Focus is the statutory consumer champion for England, Wales, Scotland and (for postal consumers) Northern Ireland.

We operate across the whole of the economy, persuading businesses, public services and policy-makers to put consumers at the heart of what they do.

Consumer Focus tackles the issues that matter to consumers, and aims to give people a stronger voice. We don't just draw attention to problems – we work with consumers and with a range of organisations to champion creative solutions that make a difference to consumers' lives.

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1 Introduction

1.1 Purpose

The purpose of this document is to provide industry guidance on how to increase the accessibility and usability of In-home Display (IHD) design. It is intended for use by display manufacturers, companies and other organisations involved in the design and development of IHDs. It is also designed to serve as a guide for energy companies, landlords or other parties when procuring IHDs. While based upon research undertaken in Great Britain its findings should be applicable internationally.

1.2 Use

These guidelines are intended to inform the whole design process. It is recommended that they are used in conjunction with other relevant safety and design standards and guidelines, and not as an alternative.

It is important to note that this document provides advice only. Applying the Guidance should increase accessibility and usability but will not *guarantee* a product meets the needs of everyone. Design companies are encouraged to innovate and do their own research as part of an iterative design-test process. It is not the intention of this Guidance to stifle innovation or to reduce variation in design.

1.3 Background – GB Context

The Government has proposed that all homes in Great Britain have smart meters installed by 2019. Alongside their smart meter every customer will be offered an IHD capable of displaying near real-time information on their energy consumption. Consumer Focus has been working to encourage manufacturers to design IHDs in a way that provides the greatest benefit to customers. It is important that all consumers, including those that are older or have a disability, receive an IHD which they find easy to use.

In the UK there are currently 14 million people over the age of 60 years. This number is set to exceed 16 million by 2020.

Table 1: Number of older people living in the UK, and projected numbers¹

	Today	2020	2050
Aged over 60	14.0 million	16.4 million	23.4 million
Aged over 85	1.4 million	1.9 million	5.0 million

¹ Agenda for later life 2011, Public Policy and an Ageing Society, Age UK, 2011

According to the Government's *Life Opportunity Survey*² (LoS) almost one third of adults in GB have some kind of impairment. As the population continues to increase and age the number of people with a disability is also expected to increase. Today in the UK:

- 2 million people have some form of sight loss³
- 10 million people have arthritis, the most common cause of a manual dexterity impairment⁴
- 10 million people have some form of hearing loss⁵

Features that make products more usable for people with disabilities can often make them easier to use for everyone. This is particularly helpful when people have to cope with short term impairments.

Other advantages of designing inclusively include:

- Less need to develop multiple 'specialist' IHDs for consumers with impairments
- Reduced complaints and demand on consumer support lines
- Positive reviews which strengthen reputations
- Helps products and suppliers stand out in a competitive market
- Reduced risk of legal action. (The Equality Act 2010 requires suppliers to take 'reasonable steps' to ensure the information displayed on the IHD, the controls and instructions, or other supporting information, are provided in an accessible way so not to disadvantage people with a disability)

1.4 Verification

This document was produced and based on research by the specialist usability organisation Ricability in collaboration with Consumer Focus. The Guidance has been verified by usability experts from the Royal National Institute of Blind People (RNIB) and Intertek Research and Testing Centre.

² *Life Opportunities Survey – Interim Wave One Results*, 2010 Statistical Bulletin

³ <http://bit.ly/P6Xdk7>

⁴ <http://bit.ly/MSIAmR>

⁵ <http://bit.ly/RMzw2k>

2 Usability guidelines

We recommend that the following are considered throughout the IHD design process.

2.1 Handling and positioning

The IHD should:

- Be easy and comfortable to hold with one hand, and use with the other
- Be balanced and sit comfortably in the hand. If the centre of gravity of the device is situated towards the centre of the IHD the likelihood of it toppling out the hand or being knocked over on a surface will be minimised
- Support one handed operation – when placed on a flat surface the controls should be usable without the IHD sliding – consideration should be given to a ‘grippy’ base feet or similar
- Be easy to remove and replace from the wall or from any mounting/cradle, if the IHD is designed for wall mounting or use with a cradle. It should not be fiddly or require a high degree of precision to put in or take out of the cradle

2.2 Power

If using a mains power adapter

- Ideally the adapter head⁶ should not require specific orientation ie it should be capable of being inserted any way up. If it requires specific orientation, a tactile marking should be located on the top of the head to indicate that it is the top
- The adapter head should be easy to grip
- The adapter head should be able to be plugged in to the IHD power socket and removed with one hand
- The IHD power socket should not be covered when unplugged; covers can be difficult to remove. It should also be easily detectable by touch and by sight
- When setting up the IHD the installer should try to ensure that the IHD power socket is not obstructed, eg by a fold out stand, when inserting the adapter head. The user should be able to maintain a good grip of the adapter head
- Consider also using a built in rechargeable battery for increased unit mobility. Built in batteries are less fuss than normal batteries

If the IHD is designed to work with removable batteries:

- The battery cover should be easy to locate both visually and by touch
- The battery cover should be easy to remove
 - If the cover slides off, gripping points should be provided and the force required to remove and replace it should be low, but firm enough so that it is removed only when the action is deliberate
 - If the cover uses a clip, it should be large enough to grip or flick with ease and require minimal force and dexterity
- The batteries should be easy to remove and replace, this should not be fiddly

⁶ ie the part of the charger that fits into the IHD power socket

- The orientation of how to insert the batteries should be clearly labelled visually and tactually (eg by having springs which indicate the location of the negative flat end of a battery)

2.3 Buttons

Buttons (touch screen & physical):

- Should be grouped if they provide similar functions or, are used together to complete a command
- Those that are used most frequently may benefit from being larger and positioned in the most accessible location
- Should be large enough to ensure the correct button can be pressed, and accommodate a degree of user inaccuracy
- Should be considered together in terms of size and spacing to minimise the opportunity for accidentally pressing the wrong button or pressing two buttons at the same time
- Should contrast strongly with the background to make them easier to detect by sight
- Should be easily accessible and not obstructed by other parts of the display
- Should be positioned on the front of the device to allow buttons and screen to be easily viewed at the same time. Buttons on one side would also be acceptable, but buttons on the back should be avoided to minimise accidental operation and the need to turn the IHD in order to check which buttons are being pushed
- Should have a single press operation. Having to press a button more than once, or multiple buttons within a short time frame or at the same time should be avoided
- Buttons which require being pressed together at the same time should be avoided

Careful consideration should also be given to the pros and cons of buttons having dual functionality. Limiting the number of buttons will not necessarily make the IHD simpler to understand and use if one button has multiple functions which could be confusing.

2.3.1 Touch screen buttons

- Capacitive touch screens (screens that respond to a light touch) tend to be much more responsive and reliable than resistive ones (screens that require a tap). If using a resistive touch screen consider providing a stylus (a handheld pencil-like pointer), this will help some people provide the right kind of contact. However, it should be borne in mind, that any stylus might be lost or broken by the consumer. If this happens and the stylus needs to be replaced, it could result in additional costs, inconvenience and time for the provider and the customer
- Buttons positioned in consistent locations help people orientate around the screen easier. The same functions (eg Menu) on different screens should be positioned in the same location
- Any stylus, particularly the tip, should contrast strongly with the display

2.3.2 Physical buttons

- When positioned square to one another buttons help people orientate themselves more easily by touch
- Should be easily detectable by touch. Consideration should be given to shape and tactile markings so they can be differentiated easily eg a nib on a centre button
- Should protrude from the surround. Buttons level with the surround or recessed should be avoided
- Should be designed to ensure they are not over sensitive and will not be accidentally pressed while the user is locating a button by touch

2.3.3 Feedback and response

- Buttons should provide feedback when pressed. Touch screen buttons should provide a visual change on the screen while physical buttons should provide haptic feedback when pressed (eg feeling the 'click' of a button). Some kind of audible feedback may also be useful
- There should be no observable delay between a button press/touch and a response from the IHD
- Error messages should be provided in clear easy to understand language and should give the user information of what to do next

2.3.4 Button labels

Button labels (icons or text) should:

- Be intuitive and accurately describe the function of the button
- Be positioned on the button when the button is large enough, or directly above or next to the button. With touch screens labelling should ideally be on the button
- Contrast strongly with the background to make them easier to detect by sight
- Be close enough to the button to indicate clear association with it and not any other surrounding buttons. But, not so close that a protruding push button obstructs the sightline to the label
- Only use standard abbreviations when the full text does not fit. Abbreviations are often difficult to understand and remember
- Be durable, (ie not easily worn off)
- Be large enough to comfortably recognise and/or read and contrast strongly with the background
- Bold line thickness makes labels easier to recognise and read
- Use a clear and legible font avoiding decorative features and italics
- Use sentence case, with occasional exceptions eg OK

In addition, icons should:

- Ideally conform to standards or be icons that are familiar to people, where applicable
- If no standard exists, be kept simple minimising detail to increase legibility

- If space allows, ideally be accompanied by text. Text can often be easier for people with sight problems who may be more able to guess a word from its general shape. However, icons are often easier for dyslexic people or for people for whom English is a second language

2.4 IHD screen information

- Clearly labelled information, this will reduce ambiguity and make it easier to understand
- Clear use of zones helps to separate unrelated information and makes it easier to read
- Text, numbers and graphics should be large enough to comfortably recognise and/or read and contrast strongly with the background
- No more than four text sizes should be used to differentiate between information
- Text should be in sentence case, with occasional exceptions eg OK
- Bold line thickness makes them easier to recognise and/or read
- The background should be plain (ie do not use a picture, patterns or grading colour)
- Text should be in a clear and legible font avoiding decorative features and *Italics*
- Avoid using lines and/or dots to form characters – these can be difficult to read
- Avoid using scrolling or flashing information – these can be difficult to read
- If information is on a cycle (loop), a second way of accessing to the information should also be provided so that the information can be held on the screen
- Only use standard abbreviations when the full text does not fit. Abbreviations are often difficult to understand and remember
- Backlighting should be provided to increase the brightness when the device is being used; information will be easier to see, particularly in low level lighting environments
- Ghosting (shadows appearing behind on screen text, caused by lighting) should be avoided
- Colour alone is not enough to differentiate between information – a second visual cue should be provided eg the word 'high' appears when a red warning light appears. Where a 'traffic light' system is used having three separate lights will be more useful than a single light which changes colour as the latter can be confusing, particularly for those with colour-blindness or other sight problems
- Glare can reduce screen contrast; consideration should be given to anti-reflective screens
- Information should be presented in a simple manner, using plain English

2.5 Audible alarms

- Consideration should be given to audible alarms but with an option to mute them
- High pitches should be avoided

2.6 Text to speech (TTS)

- Consideration should be given to text to speech (TTS) functionality but with an option to mute it. If it is included a non-synthetic voice would be preferable
- If using TTS the main principle is to make sure that all information that is visually inherent and needed should be available through TTS in a logical and useful way ie any numbers require the context as well eg 'Electricity so far this month, 5.67 pounds'
- Consideration should be given to speech recognition software



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