

General recommendations of multimodal ways of banking

Needs and capabilities of senior citizens

With the aim to provide general design requirements of banking services for older users, we first should know which ones are their specific characteristics, in order to adapt the technology and the interfaces to them. We mention some changing abilities of older users that we should take into account when designing interfaces for them.

Ageing and hearing loss

Hearing starts to decline at around 50 years and affects a person's ability to hear higher pitched sounds as well as discern the foreground from background audio such as music or other sounds. Some hearing loss is experienced by 47% of people 61 to 80 years and 93% of people over 81 years. Moderate or severe hearing loss or profound deafness is experienced by 20% of people aged 61 - 80 and 75% of people over 80.

Impact	Prevalence
Audio can be difficult to discern	47% of people 61 to 80 years
Higher pitch sounds can be missed	93% of people 81+ years

Ageing and vision decline

Vision decline includes:

- Decreasing ability to focus on near tasks, including a computer screen
- Changing colour perception and sensitivity - less violet light is registered, making it easier to see red and yellows than blues and greens, and often making dark blue and black indistinguishable
- Decreasing contrast sensitivity from pupil shrinkage - resulting in the need for more light and higher contrast (an 80 year old typically has 80% less contrast sensitivity than a 20 year old)

Vision decline often starts in a person's mid-40s with, for example, 86% of Australians over 40 for example require reading glasses to correct for near vision. Significant vision loss affecting everyday life is estimated to affect 16% of people 65 to 74 years, and 46% of those over 85 years in the UK.

Impact	Prevalence
Decreasing ability to focus on near tasks	16% of people 65 - 74 years
Changing colour perception and sensitivity	19% of people 75 – 84 years
Decreasing contrast sensitivity	46% of people 85+ years

Ageing and physical decline

Motor skill decline impacts on dexterity and can result from many conditions, for example arthritis with associated joint stiffening and reduced fine motor control, and essential tremor or Parkinson's Disease with associated hand trembling, making mouse use difficult or impossible for some and also affecting keyboard use. In particular, older people with physical impairments may have difficulty clicking small links, selecting radio buttons, and using many fly-out or pull-down menus.

Arthritis is estimated to affect at least 50% of people over 65; essential tremor (one of many forms of tremor) is estimated to affect up to 5% of those over 40 and up to 20% of people over 65; and Parkinson's affects around 4% of those over 85.

Impact (Motor skill decline can result from many conditions including arthritis and Parkinson's Disease)	Prevalence (Conditions most commonly reported)
Difficulty using mouse or keyboard	Arthritis At least 50% of people over 65 affected
Difficult to click small areas	Essential tremor Affects up to 20% of people over 65
Strain from non-ergonomic tasks	Parkinson's Disease Approximately 4% of people over 85 affected

Ageing and cognitive decline

Cognitive decline is also common, though only dementia and mild cognitive impairment are commonly reported. While Dementia (including Alzheimer's disease) is experienced by some older people (1.4% of people 65-69 years increasing to 24% of people over 85 years in the UK), forms of mild cognitive impairment (or MCI) are much more common, affecting over 20% of those over 70 years in the UK. MCI can result in:

- short term memory limitations (which may result in a person forgetting the purpose of a website visit if they lose orientation on the site)
- concentration and distraction issues (consider the volume of information on some pages, and the multiple animated advertisements that are sometimes present)

Impact. Navigation, comprehension, and task completion can be affected by:	Prevalence (Conditions most commonly reported)
Short term memory problems	Dementia: 1.4% of people 65-69 yrs 24% of people 85+ yrs
Difficulty with concentration	Mild cognitive impairment (MCI) is more common: Around 20% of people over 70 years are estimated to experience MCI
Distraction from movement or irrelevant material	
Difficulty coping with	

General design guidelines

To begin with, we have included seven principles of "Design for All" (as, it includes older people) which might be helpful to be considered as a starting point summary:

- **Equitable Use.** The design must be useful and marketable to any group of users.
- **Flexible in Use.** The design must accommodate a wide range of individual preferences and abilities.
- **Simple and intuitive** to use. The design must be easy to use and understand, regardless of the user's experience, knowledge, skills or concentration level.

- **Perceivable information.** The design must communicate necessary information effectively to the user, regardless of ambient conditions or the user’s sensory abilities.
- **Tolerance of error.** The design must minimize hazards and the adverse consequences of accidental or unintended actions.
- **Low physical effort.** The design must be usable efficiently and comfortably and with minimum fatigue.
- **Size and space** approach and use. Appropriate size and space must be provided for approach, reach, manipulation and use, regardless of the user’s body size, posture or mobility.

Specific requirements depending on user profile

We have identified two profiles, low and high tech profile, depending on the use of ICT and banking services. The next requirements are split for both profiles:

The **functionalities and security** requirements of each interface depending on user profile are the following:

Features	Low Profile	High Profile	
ATM	Bank services	- Withdraw money ¹ . - Actualize bankbook.	- Withdraw money. - Actualize bankbook. - Check Balance. - Get extracts ² .
	Additional services and features		- Impressed summary of income/expense in form of - graphics. - Increase speed of operation.
	Security	- Increase security but also security perception. - Send information messages when withdraw high amounts of money. - Support telephone for emergencies.	- Use of individual ATM and avoid outdoor ATM. - Use of contactless system. - Check last charges. - Access to other activities (e.g. buy tickets). - Report with progress of incomes/expenses.
Web	Bank services	- Check balances and movement.	- Check balance and movements. - Secondary services: transferences, fluctuations of retirement saving plans, delay bill payments.
	Additional services and features	- Use of TV.	- Personalized advice to perform more complex operations: buy/sale of investments and bonds. Clarify the concept of each expense. - Magnification glass. - Show most frequent or basic operations in the first screen. - Statistics, graphics and report of

¹ Currently, this profile does not use ATM.

² Only few users will use the following services: pay bills, insert credit on mobile phones.

Mobile			<ul style="list-style-type: none"> expenses/incomes. - Not need bank permission to perform high money transfers. - Delay payments.
	Security		<ul style="list-style-type: none"> - Notify account access. - Use of cards with “coordinates”.
	Bank Services	<ul style="list-style-type: none"> - Check movements and balance³. 	<ul style="list-style-type: none"> - Check movements and balance
	Additional services	<ul style="list-style-type: none"> - Receipt SMS in response to a new income/expense. 	<ul style="list-style-type: none"> - Access using tablets. - Check the historic bank account activity and the retirement saving plan. - Receipt SMS in response to a new income/expense.
	Bank Services	<ul style="list-style-type: none"> - Check balances and movement. 	<ul style="list-style-type: none"> - Check accounts.
	Additional services	<ul style="list-style-type: none"> - Voice feedback or avatar to explain steps process. - Simple tutorial. 	<ul style="list-style-type: none"> - Access with keyboards, touch or voice control. - Statistics and graphics of expenses/incomes. - Activate/deactivate and personalize SMS reception in relation with income, expense.
TV			

The **usability** requirements are detailed in the previous tables, the main differences between both profiles are:

	Low Profile	High Profile
ATM	<ul style="list-style-type: none"> - Help to perform all operations - Detail each step of the process - Make easier bill payment, transfers. - Increase comprehension of screen message - Reduce memory demands of messages - Show all operation steps before starting. - Provide feedback of the step/task - performed. - Problems with tactile interface - Step by step tutorial 	<ul style="list-style-type: none"> - Make easier the following services: deposit - money, transfers - Help (voice or Avatar) to perform least - frequent operations.
Web/TV		<ul style="list-style-type: none"> - Increase letters size and contrast - Reduce the number of elements in the main screen. - Increase menu and its visibility - Increase buttons contrast. - Clarify technical terms - Provide symbols or graphical information to - the technical terms. - Avoid pull menus

³ It is difficult that this profile, and even, the high profile use mobile phone to access bank services.

Mobile	<ul style="list-style-type: none"> - Unique button or application to check the balance and the last bank movements. - Reduced number of options 	<ul style="list-style-type: none"> - Unique button or application to check the balance and the last bank movements. - Reduced number of options
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The **aesthetic and emotional** requirements are the following:

Interface	Low Profile	High Profile
ATM	<ul style="list-style-type: none"> - Incentive use of ATM - Increase security perception 	<ul style="list-style-type: none"> - Make more fun the experience
Web	<ul style="list-style-type: none"> - Formation initiatives and training on use it - Increase trust on web security 	<ul style="list-style-type: none"> - Increase security perception on transfers - Reduce commercial advertisements.

Although previous tables detail the requirements for each profile, some requirements will vary depending on user characteristics. Therefore, the following requirements should be **personalized**:

- Font size.
- Contrast.
- Sound level.
- Number of options showed at the main interface.
- Type/s of feedback.
- Type of control (specially for TV).
- Help mode.

Moreover, the interfaces should be able to save user profiles, especially regarding sensorial requirements, avoiding its configuration each time of system access. In general, it is recommendable to configure the interface with the usability parameters previously defined.