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"An app should assist me with everyday life, be easy for me to use, and bring me enjoyment."
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Charles Clerc
Former presenter of Swiss Tagesschau news program
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Age-Appropriate Mobile Applications

Basic Principles and Recommendations

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Preface

In today's digital information age, the significance of mobile internet and the mobile usage of applications (apps) continues to grow. Older generations, too, are increasingly using smartphones or tablet computers. However, accessible use of a mobile application assumes that the particular needs of older people have already been incorporated at an early stage of mobile application development, by both those commissioning the applications and those developing them. Raising awareness of this issue among those involved in the process is therefore extremely important. The recommendations presented in this paper should help to avoid or eliminate unnecessary barriers to usage. The paper entitled "Altersgerechte Webseitengestaltung" ("Age-Appropriate Website Design") (ZHAW [Zürcher Hochschule für Angewandte Wissenschaften – Zurich University of Applied Sciences] 2013 ¹) has already started to raise awareness around this subject. The paper also made reference to the increasing mobile usage of the internet and similar recommendations were sought in this regard. This second paper now aims to deliver these recommendations.

This paper is aimed not only at people who commission, design, or develop applications, but at anyone who has an interest in age-appropriate mobile applications. The paper provides an overview and then goes into further detail. It starts by outlining mobile usage of the internet and applications by older people and addresses potential age-related limitations and needs.

The main part of the paper sets out ten areas of age-appropriate application design. Principles that are important to consider when designing applications for this target group have been formulated for each area. Specific checklists with recommendations for implementation have also been provided. The principles apply primarily to those commissioning mobile applications, while the checklists will provide the application development experts with specific information regarding age-appropriate design.

The aim of this paper is to help ensure that, in the day-to-day life experienced by older generations today, it is not only living spaces and outdoor space that are being designed in an increasingly accessible way, but also virtual spaces and mobile applications.

Zurich, im May 2016
Alireza Darvishy
Carl August Zehnder

¹ Available at: www.ageweb.ch

Background

Nowadays, electronic devices play a part in almost every area of our day-to-day life, whether it be the alarm clock waking us up in the morning, our mobile phone connecting us to our nearest and dearest, or the computer that we use to surf the internet. Younger people today with their computers and smartphones live in a digitalized environment. However, it is a different story when it comes to older people who have not grown up with this technology and so have less contact with it. Often, they lack the necessary technical expertise or they see no benefit in using the new devices and therefore avoid them.

A recent study² collected data about the use of technology and media by people aged 65 and above. This involved surveying 1,037 people across the whole of Switzerland. The results of the study show that 36% of these people are very interested in new technology, but 41% slightly or fully agreed with the statement: "I find it difficult to use modern technical devices." 58% of the people surveyed, however, could not imagine their lives without these technical devices.

The older generation of today has not grown up with computers, let alone with smartphones or tablets. We use the term "computer" in the following to refer to PCs and laptops. We use the term "mobile devices" to cover both smartphones and tablets. Smart watches and other wearables have not been taken into account for the purposes of this paper. In the last few years, the importance of mobile devices has increased significantly. These mobile devices enable us to keep in touch when we are out and about, but we can also use them to surf the internet on

the move, for example. In Switzerland, 38% of people aged 65–79 and 11% of people aged 80 and above already own a smartphone nowadays. 30% of people aged 65–79 and 13% of those surveyed above the age of 80 already own a tablet computer.

Older people who use a mobile device also use it to access the mobile internet – usually every day. While 60% of those people surveyed aged 65 and above already use the internet today, only 34% of them use the mobile internet. Comparing these forms of usage (on a computer or a mobile device) shows that all applications investigated are used more on a computer. Mobile devices are mainly used in a supplementary way. The older people surveyed also tend to use mobile devices to access general applications such as email, to search for information, to retrieve timetables, and for directions. 20% also read newspapers and magazines on their mobile device. Fewer than 3% use applications for buying and selling goods, internet banking, social networks, and internet forums on their mobile device.

On the one hand, the use of mobile devices can be impeded by not having the necessary expertise or support or by having false expectations. On the other hand, the mobile applications often create hurdles themselves by having a design or means of operation that is not very user-friendly.

In order to examine the needs of the 65-plus generation with regard to user-friendly applications more closely, comprehensive literature research was carried out, various experts were consulted, and two focus groups made up of older participants who use a smartphone (average age of 71) were held. The objective of the focus groups was to find out the views of older users and to identify specific barriers encountered when using mobile (native) applications. To do this, specific usability tests for four selected applications were carried out, as well as open discussion phases. The results from the focus groups confirmed the recommendations and findings from the literature research and from the expert consultations. The findings from all of these sources have been incorporated in these ten recommendations.

² Seifert, A; Schelling, H. R. (2015) Digitale Senioren (Digital Seniors). Zurich: Pro Senectute Verlag

Characteristics of Mobile Applications

When we talk about mobile applications, we must distinguish between “native” and “non-native” applications. Native apps are applications that have been developed for a specific operating system or a specific platform. Non-native apps are applications that can be used on different devices and are not just compatible with one specific environment. Web applications in particular, which can be viewed and used on various operating systems (e.g. Android, iOS) in a browser, fall into this category.

This paper focuses on native apps, which from now on we will refer to as “mobile applications.” The “Altersgerechte Webseitengestaltung”³ paper covers the guidelines for age-appropriate websites and web applications. Many guidelines for mobile applications are identical or are at least very similar to the guidelines for age-appropriate websites. However, various points are of particular importance for mobile applications. Furthermore, due to the inherent differences between mobile devices and computers, there are entirely new areas to consider.

There are fundamental differences between using and operating applications on mobile devices and using them on computers. We often use mobile applications when we are out and about. The context in which these applications are used (e.g. on the go, on foot, in the car, on public transport, alone, with colleagues, in company) therefore plays a much more important role than with desktop applications. With this in

mind, the design of mobile applications should involve the users consistently right from the outset (user-centered design). This also means that usability tests should be carried out from the outset and as the applications are being developed (e.g. with mock-ups). Where possible, these tests should be carried out with real target group users based on real scenarios and in the real context of usage. When doing this, the entire service should be tested, not just the actual interaction with the application.

Mobile applications are mostly used in order to achieve a particular objective or to complete a particular task (e.g. to search for news, information or a location, to order tickets, etc.). A mobile application should therefore consistently concentrate on this core functionality in order to provide users with optimum support in achieving their objectives, making decisions, and carrying out the relevant actions.

We should also bear in mind that users of mobile applications do not have long to get to grips with an application and are often distracted by events going on around them.

This has various implications for usability factors such as layout, operation, visual design, navigation, and user guidance. The operation of mobile applications is completely different to the operation of websites and applications on a desktop computer. For example, this may involve using a touchscreen, a screen keyboard or voice or gesture recognition instead of a mouse and keyboard. The way in which information is shown is also very different. The screen is considerably smaller (with smartphones), acoustic output is usually hindered because smartphone speakers are less powerful and ambient noise can also make it difficult to hear. However, mobile devices do offer new output options such

³ Darvishy, A. & Seifert, A. (ZHAW 2013): “Altersgerechte Webseitengestaltung” (Age-Appropriate Website Design); <http://ageweb.ch/>

Characteristics of Mobile Applications

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as vibration and enhanced visual feedback (e.g. flashing when an email is received).

In addition to the aspects mentioned above, security is a particularly important factor for older people when using mobile applications. In several respects, older people like to feel secure when using an application. Of particular importance here are the issues of privacy and data protection.

Furthermore, there are huge differences between the different operating systems that are available nowadays, which can also make them difficult for older people to use, e.g. if they are changing to a new mobile device that uses a different operating system with which they are not yet familiar.

It is also important to bear in mind that mobile applications are usually part of a mobile service. It is therefore important to align the service as a whole – not just the mobile application – with the needs of older people. In particular, this also includes how the application is downloaded, installed, and updated. Although these service design aspects are just as important when it comes to usage as the mobile application itself, we are not able to go into more detail on this subject within the scope of this paper.

Finally, it must be noted that all common operating systems for mobile devices, such as Android, iOS, and Windows, provide application developers with many different standards, guidelines, and style guides, etc. An important principle for user-friendliness is ensuring adherence to these guidelines and style guides. This has the key advantage that users will get used to certain interaction patterns across different applications and will therefore be able to find their way around new applications much more quickly because they look similar and operate in a similar way.

Usage of Mobile Devices – Age-Specific Characteristics and Difficulties

As we get older, the way in which our body functions changes and use of technology can be restricted or get more difficult. This means that age-related physical impairments (e.g. visual, hearing, or tactile impairments) or cognitive impairments affect how mobile devices are used. Furthermore, socioeconomic resources can play a role if, for example, someone is unable to afford a mobile device because their pension is not very much. There may also be personal barriers to overcome if, for example, people get anxious when faced with technical challenges. As well as

age-related considerations, we should also take into account the experience that people have had with technology over their lifetime. Because each generation has grown up with or been exposed to different technical devices, different technology generations can differ from each other, depending on the birth cohort. Significant limitations are listed in the following table, together with the effect they have on the use of mobile applications. By customizing the design of mobile applications and making them accessible, these barriers can be overcome.

Table 1
Potential age-related
limitations

Limitations		Effect on use of mobile applications
Visual	Focusing	Increasing problems focusing on fast-moving objects
	Adjusting to light and dark	Ability to adjust to light and dark decreases. Increased sensitivity to glare
	Discerning color	Difficulty distinguishing between colors on the green-blue-purple spectrum
	Discerning text	Smaller font sizes difficult to read without being enlarged
Auditory		Limited ability to discern frequency
Tactile		Limited dexterity and fine motor skills make using the smartphone and clicking on small icons difficult
Cognitive	Reaction time	Need more time to take in information. Difficulty multi-tasking
	Ability to learn	Slower to take in new information and to recall knowledge
	Concentration	Difficulty ignoring irrelevant stimuli (e.g. pop-ups, animation)

Usage of Mobile Devices – Age-Specific Characteristics and Difficulties

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Other potential limitations

Economic resources		Lack of financial means to buy a mobile device in some cases
Social resources		No support within the social environment for learning about or using mobile devices or applications
Experience with technology		Older people have been less exposed to smartphones and tablets when younger or at work. They have to learn these things for the first time at an older age
Personal attitudes	Fear of technology	Fear of using new technology in some cases due to lack of experience with technology; also the fear of breaking something or not making progress
	Benefit	Older people form a strong opinion of new technology for themselves immediately after using it; therefore, hardware and software (applications) of mobile devices must meet user expectations

Smartphone users (based on the study by Seifert & Schelling³) highlighted the following main difficulties encountered when using the internet (see Figure 1). Although these obstacles relate to internet usage, they can also reveal general difficulties with using mobile applications. Security concerns are a key issue, along with the belief that mobile applications are too complicated to use and that it will take too long to learn how to use them. These aspects should be tak-

en into account when designing an application for older people.

The participants in the study were also asked what is important to them in a smartphone (see Figure 2). From the graph, it is clear that being able to use a smartphone easily and thereby use mobile applications is very important to the participants. Based on these findings, it is not just the hardware that should be user-friendly, but also the applications on a mobile device.

³ Seifert, A; Schelling, H. R. (2015) Digitale Senioren (Digital Seniors). Zurich: Pro Senectute Verlag

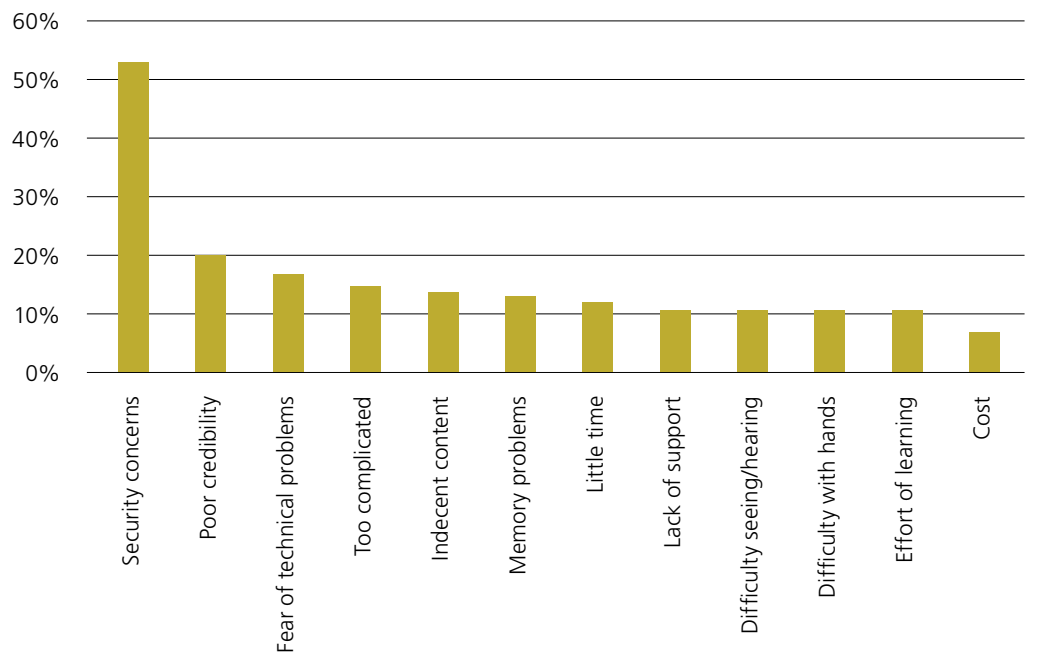


Figure 1
 Current obstacles experienced by older users when using the internet
 Source: Seifert & Schelling 2015

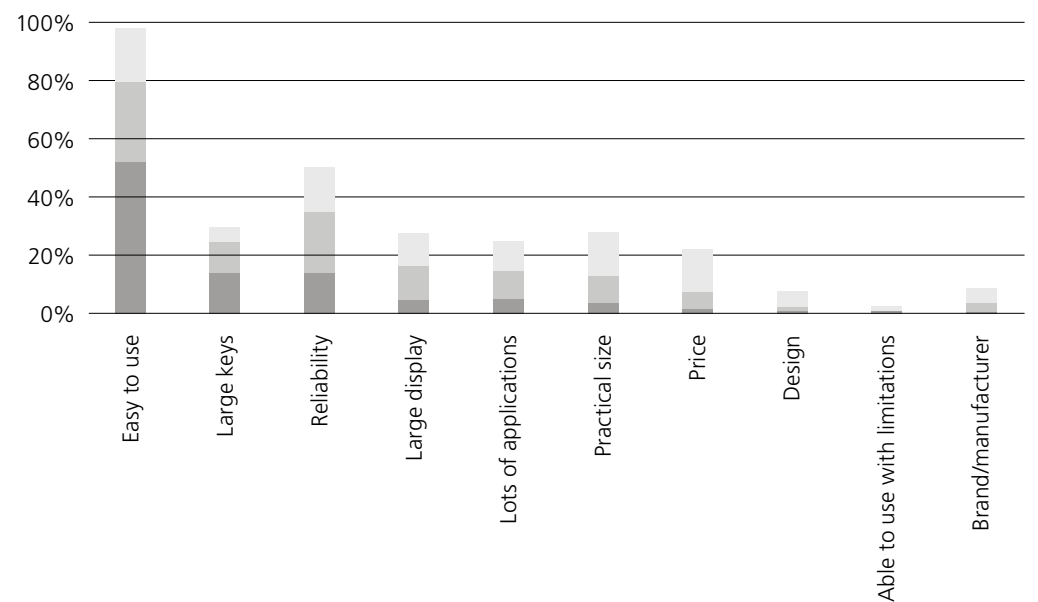


Figure 2
 Important aspects for a smartphone (people aged 65 or over; ranked according to frequency of first aspect(s))
 Source: Seifert & Schelling 2015

■ First important aspect
 ■ Second important aspect
 ■ Third important aspect

Usage of Mobile Devices – Age-Specific Characteristics and Difficulties

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From the focus groups of older smartphone users, it emerged that the following points must be specifically taken into account:

- **Support:** Some participants would like more support with learning about the applications and how to use them. For example, a bank offering online banking could provide local support (training) or training videos.
- **Clarity:** When designing an application, it is important to bear in mind that the content should be presented in a clear, transparent, and consistent way.
- **Navigation:** Menu navigation and general navigation within the application should be logical and should keep to the bare essentials. The majority would like to be guided to what they are looking for using clear steps and as few steps as possible.
- **Access to technology:** With the target group of older users, uncertainties and individual characteristics relating to usage of new technology should be taken into account.
- **Operation:** The operation of applications should be intuitive and self-explanatory and the system response should be transparent and predictable.
- **Security:** The aspect of security, i.e. fears about loss of data, misuse of data, and criminally motivated attacks on the application, is an important issue. Applications where security is critical (e.g. online banking) are therefore only used with a great deal of reservation. These difficulties are viewed to be greater still with mobile applications than with the stationary use of computers.
- **Mobile usage:** Because smartphones and tablets are smaller than the conventional com-

puter, it is even more important for displays within an application not to be overfilled and for operation not to be overly complicated. Mobile devices are used in an extremely wide range of locations and while on the go and must therefore cope with different conditions to when working at home on a computer with a large screen.

If support functions are inadequate or elements of mobile applications are inaccessible due to age-related impairments or due to the applications not being user-friendly, older people tend to avoid the application concerned. It is therefore important for providers of applications to actively respond to the expectations and requirements of the older generation.

Ten Areas for Age-Appropriate Design of Mobile Applications

The following section examines the ten areas for age-appropriate design of mobile applications in more detail. The most important recommendations and instructions for implementation are provided for each area. The order in which the areas are presented is not important. Most of the areas listed here can also be found in the paper published earlier entitled "Altersgerechte Webseitengestaltung." Many of the recommendations listed in the earlier paper also apply in the same way or in a similar way to mobile applications, but are even more important here than for website design.

Areas

1. Forms of control
2. Clarity and layout
3. User guidance and navigation
4. Text and language
5. Graphics, animation and multimedia
6. Links
7. Searching, filtering, and sorting
8. Consistency and robustness
9. Support functions
10. Registration and forms

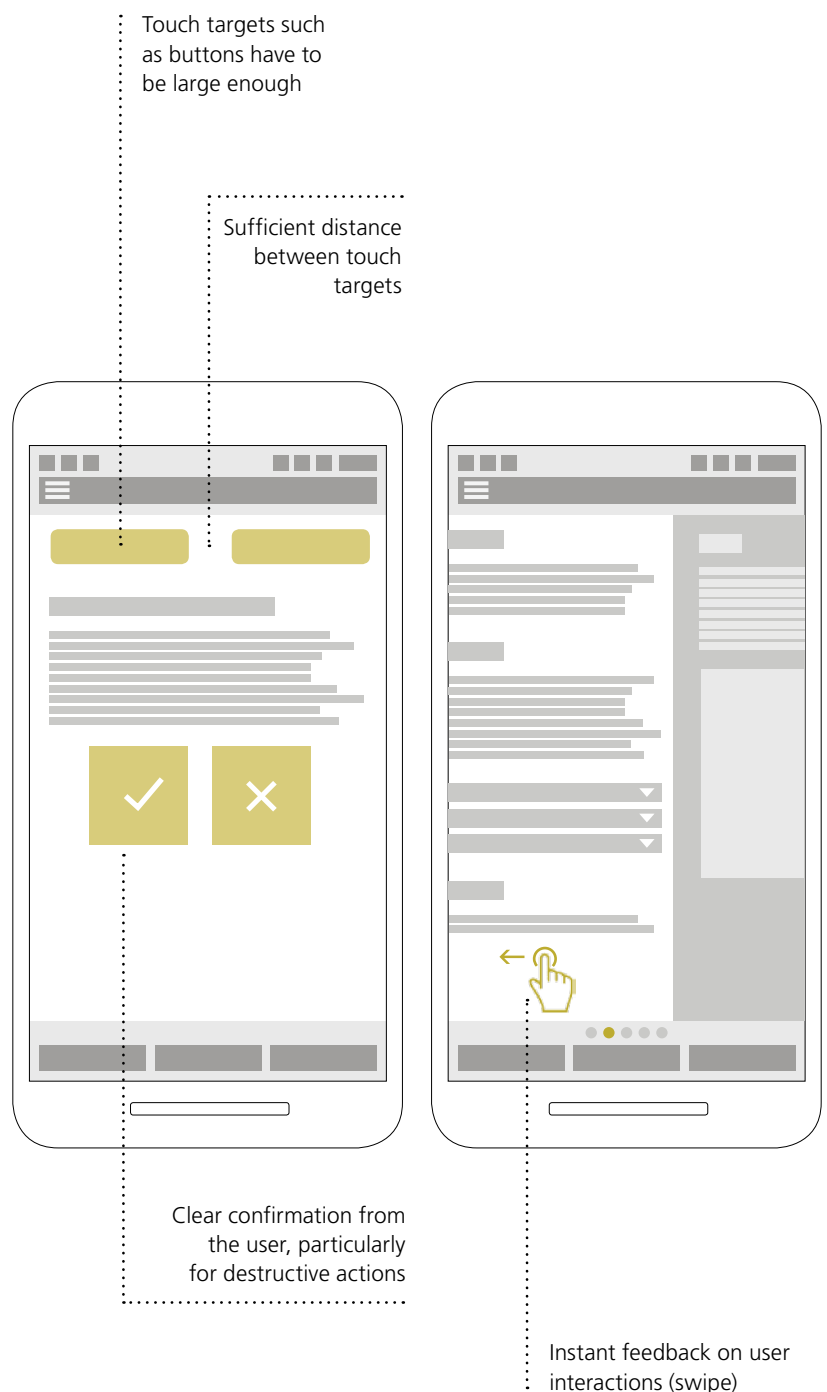
1.

Forms of Control

Using a mobile device is really different to using a computer. Most mobile devices offer more than one way of interacting, such as a touchscreen and speech control. Accordingly, specific points must be taken into account in this area so that older people can take advantage of these means of interaction as well and so that they do not experience any limitations when using mobile applications. One of the most important ways of entering data on mobile devices is by touching the screen (touchscreen). It is important that elements such as buttons, text fields, etc. are big enough so that they can be used reliably and so that, as far as possible, users do not select incorrect items by mistake. This is particularly important for older people who have limited motor and possibly cognitive skills.

Principles

- To design elements that may be touch targets so that they are big enough
- To include sufficiently large gaps between individual elements, particularly between elements such as buttons that are touch targets
- To ensure that support functions of the operating system, such as speech input, are accessible and usable throughout the relevant areas of the application



Topics	Recommendations and requirements	Instructions for implementation
Touch-Targets	Elements that are touch targets must be large enough.	<ul style="list-style-type: none"> • The height and width of interaction elements should be 12 mm as an absolute minimum, regardless of the resolution • The touch-sensitive area should be at least 15 x 15 mm
	Elements that are touch targets must be recognizable as such.	<ul style="list-style-type: none"> • Use clear instructions so that elements are immediately recognizable as touch targets
	The unintentional triggering of actions must be prevented.	<ul style="list-style-type: none"> • Elements that trigger destructive actions should be clearly separated from the rest of the elements to prevent actions from being triggered unintentionally • Destructive actions must be explicitly confirmed by the user
	Users must have the opportunity to cancel unintentional actions.	<ul style="list-style-type: none"> • Users should have the opportunity to move the cursor/finger off the element in order to prevent triggering the action
Layout	Sufficient space must be left between elements in order to avoid accidental touch interaction.	<ul style="list-style-type: none"> • As a guide, the space between individual interaction elements should be at least 6 mm, regardless of the resolution
Touch gestures	Only provide multi-touch gestures as an alternative for triggering an action.	<ul style="list-style-type: none"> • If complex gestures are used, they should only be used as a shortcut for actions that can also be triggered in another way
	Provide context-sensitive support and information regarding touch gestures to bring the functionality to the users' attention.	<ul style="list-style-type: none"> • A little context-sensitive information can bring means of interaction that are not visible at first glance to the users' attention (e.g. "Did you know that you can also...?")
Shake and tilt	Shake and tilt should not be the only methods of triggering an action.	<ul style="list-style-type: none"> • If shake and tilt are used as a form of interaction, always provide an alternative through touch control
Accessibility	The application should also be accessible to users with impairments (e.g. visual, acoustic).	<ul style="list-style-type: none"> • Provide all elements with corresponding metadata so that they can be correctly identified and reproduced by the mobile device's assistive technology • Applications should provide options for enabling or disabling individual assistive technologies or support functions • Support options should be enabled as standard provided that they do not impede use of the application
Operating system support	Assistive technology provided by the operating system should be accessible throughout the application.	<ul style="list-style-type: none"> • The application should provide options that are easy to find and allow users to specifically enable and disable individual support functions • The application should provide appropriate metadata so that screen readers and other assistive technology are compatible with the application
Interaction	Immediately provide feedback for each action so that users understand the effect their action has.	<ul style="list-style-type: none"> • Pages to scroll continuously • With carousels, start rotating straight away, even if the swipe gesture has not yet been completed • For pinch-zoom, zoom in and out in small steps (not 100%, 200%, but 100%, 125%, 150%, etc.)

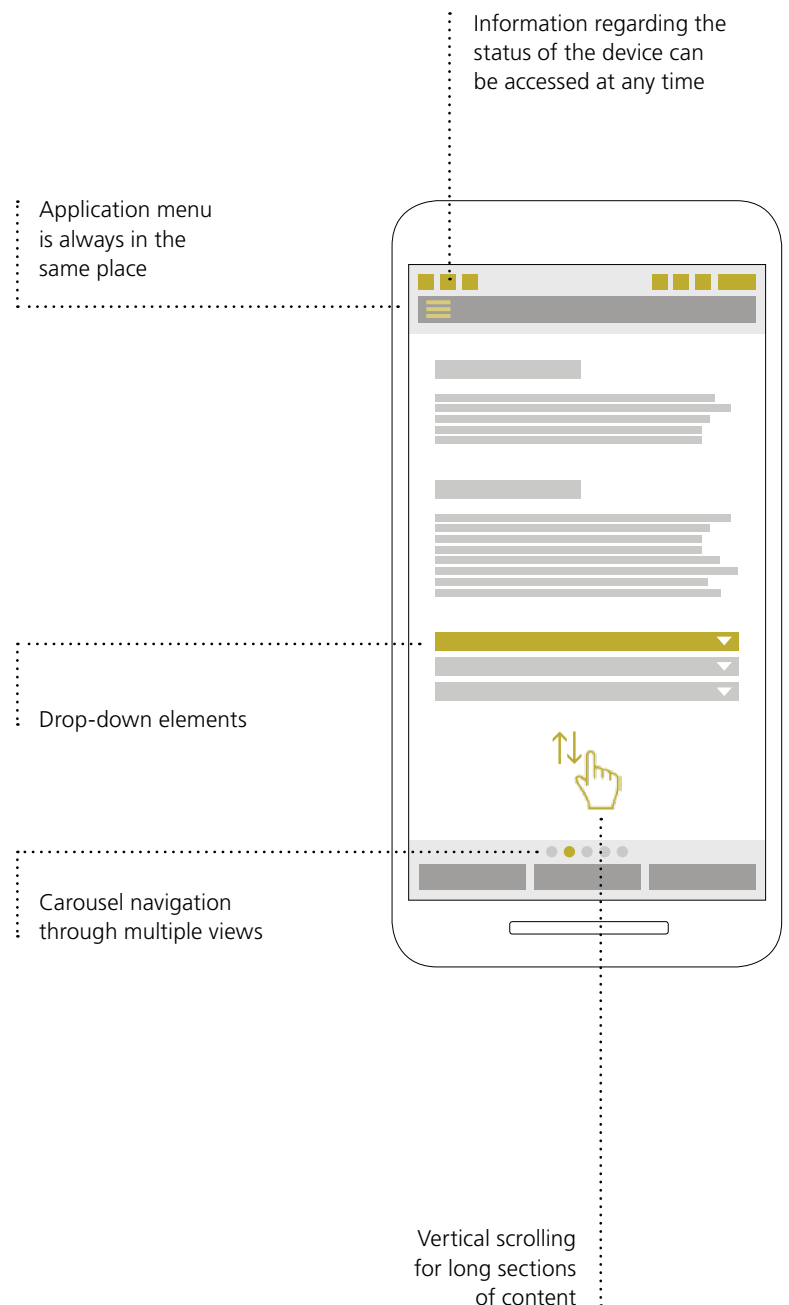
2.

Clarity and Layout

Clarity and the good, logical layout of an application are important, if not the most important requirements when it comes to user-friendliness. Older people would like user guidance that is as self-explanatory as possible, a clear hierarchy of information, and a focus on the essential elements. It has become evident that older people prefer to use specific applications with particular functions over general applications, i.e. a weather or news application rather than a general internet search. Therefore, it is important that applications are primarily limited to a specific function.

Principles

- The purpose of an application and its logical layout should be clear at first glance. For this to happen, the various content and navigation areas must be well-structured and their benefits and function must be self-explanatory. The chosen layout must be used as consistently as possible across all application views
- The scope of an application's functionality should be limited to a core functionality. If need be, functions that are not directly linked to the main functionality can be provided in a separate application
- Well-structured menu items and content make it easier to read and navigate. Lengthier sections of content must be structured in a sensible way



Topics	Recommendations and requirements	Instructions for implementation
Clarity	The purpose of an application and its logical layout should be clear at first glance.	<ul style="list-style-type: none"> • The information and functions in a view focus on the user's objective and are limited to the bare essentials • Make further, more detailed information that is not absolutely essential available in views at lower hierarchical levels
	The application should be limited to one core functionality.	<ul style="list-style-type: none"> • Each application should be based on a core functionality and the whole application should be built around that core functionality • Any additional functionality should be connected to the core functionality
Layout	Style, design, and layout elements must be used consistently across all views.	<ul style="list-style-type: none"> • Use a consistent layout with consistent logic • Ensure terms, buttons, menus, navigation elements, icons, etc. are consistent
	The various views of an application must be easily distinguishable and their benefits and function must be immediately recognizable.	<ul style="list-style-type: none"> • Use a consistent layout, clear labeling, or another clear means of identifying the areas within a view (e.g. using familiar icons)
	Content must be clearly structured.	<ul style="list-style-type: none"> • Use headings and subheadings, possibly connected to links (within the application)
	Multi-page content should be avoided where possible or spread across several subviews.	<ul style="list-style-type: none"> • If possible, use a single-page layout with vertical scroll for lengthy texts • If it is not possible to use a single-page layout, use drop-down elements • Avoid pop-ups or opening new applications • If necessary, spread text across several subviews that are connected to one another by scrolling horizontally (carousel). The user must be able to easily identify these (e.g. using dots)
	Buttons, menus, and links should be clearly identifiable as such.	<ul style="list-style-type: none"> • Always provide clearly visible menus, in the same style and in the same place • Use standards (design, location) where possible • Buttons must be identifiable as such and it must be obvious which elements they can interact with and which they cannot • It is imperative that navigation elements are provided with metadata so that these elements can be correctly identified and reproduced by the mobile device's assistive technology
The layout of the application must correspond with the user's mental model as accurately as possible.	<ul style="list-style-type: none"> • The distribution of the content of the views at the top navigation level should correspond with the target group's mental model as accurately as possible. This must be worked out with users in advance. Any deviation from this mental model must be justified and explained through the services provided or through appropriate application support functions and must be easy to understand 	
Status information of the mobile device	Various pieces of information regarding the status of the mobile device must be visible at all times (battery status, mobile network, time/date).	<ul style="list-style-type: none"> • Ensure that the status bar of the mobile device is visible at the top edge of the screen in every view of the application or is easy to access (e.g. by swiping vertically at the top edge of the screen)
Findability	The application must be easy to find on the home screen.	<ul style="list-style-type: none"> • Use a distinctive application icon that is easy to recognize • Use unique, recognizable, and memorable application names

3.

User Guidance and Navigation

Consistent, logical user guidance that provides self-explanatory step sequences allows people to quickly get to grips with the application and interact with it confidently, even if this is interrupted by external influences. Expedient navigation is particularly important for older users in mobile applications. With mobile applications, it is especially important that the current status of the application is immediately obvious and that clear feedback is given for each change in status. This is because mobile applications are often used on the go and older people in particular could find themselves distracted by the many sensory stimuli in their environment. Standard navigation elements such as the back button should also be used consistently across applications in accordance with the usual standards and their functionality should be implemented by the application accordingly.

Principles

- Navigation elements should be self-explanatory, consistent, and identifiable as such
- If icons are used for navigational purposes, these should be easily identifiable in terms of their function
- Information about the current menu item helps users to navigate
- Each interaction element should be displayed in such a way that the function of the element and the way that it works are obvious to users. Example: How well do interaction elements such as buttons or sliders show what they are used for and how they are used?

Application menu is always visible

Floating navigation for navigating beneath the main navigation level

Carousel navigation through multiple views

Back button enables the user to navigate to the last view with ease



Topics	Recommendations and requirements	Instructions for implementation
User guidance	The status and changes in the status of the application (following a user action or a system event) must be clearly identifiable.	<ul style="list-style-type: none"> • Incorporate clear, unambiguous visible and acoustic feedback (configurable by the user) • Incorporate vibration feedback for specific or unexpected changes in status (configurable by the user) in order to get the user's attention
	User guidance must be clearly identifiable as such, consistent, clear, and expedient.	<ul style="list-style-type: none"> • A number of clear features should be used to make navigation elements and user guidance stand out from the remaining interaction elements in a view • Features that address the various senses (visual, acoustic, and tactile signals) should always be used • Do not use purely visual or purely acoustic features (such as buttons that are only distinguishable by color, for example)
Navigation	The navigation element of the top navigation level should be accessible at all times and displayed consistently regardless of the current view.	<ul style="list-style-type: none"> • Same location • Same functionality • Corresponds with the desired mental model of the application • If need be, use a fixed navigation bar at the top edge or "floating" navigation (which disappears when scrolling down and reappears when the user scrolls up) • Above all, when using floating navigation, always include an option that enables the user to immediately jump to the top
	Users with impairments should also be able to operate the navigation elements.	<ul style="list-style-type: none"> • Keep the number of navigation elements to a minimum • Design navigation elements so that they are large enough to be operated on any mobile device (using fingers!) • Mobile operating systems feature assistive technology such as text enlargement and screen readers. The navigation elements should support this technology
	Users should intuitively know at all times where they are in the application and where they have come from.	<ul style="list-style-type: none"> • The navigation structure should be horizontal rather than vertical. Navigation that has too many levels will cause the user to get lost in the application. This makes it more difficult to create a mental model • As a guideline, applications should only provide one navigation level below the main navigation level
	The functionality of the navigation elements must be consistent and clear across all views.	<ul style="list-style-type: none"> • Define the navigation at an early stage of the application design process and regularly review it with future users
	Operating elements that are relevant to navigation, such as icons and symbols, must conform to existing standards and must be large enough and self-explanatory.	<ul style="list-style-type: none"> • Consult the relevant style guides. Review the font size, contrast, functionality, and how recognizable the icons are
	Unwelcome switches to other views or unintended actions on the part of the user should be easy to undo.	<ul style="list-style-type: none"> • Correctly implement the functionality of the back button as "back" and allow the user to return to the previous view in the application • Do not use a back button that is integral to the application if this has already been provided by the operating system • Consistent back-button functionality across multiple screens

4.

Text and Language

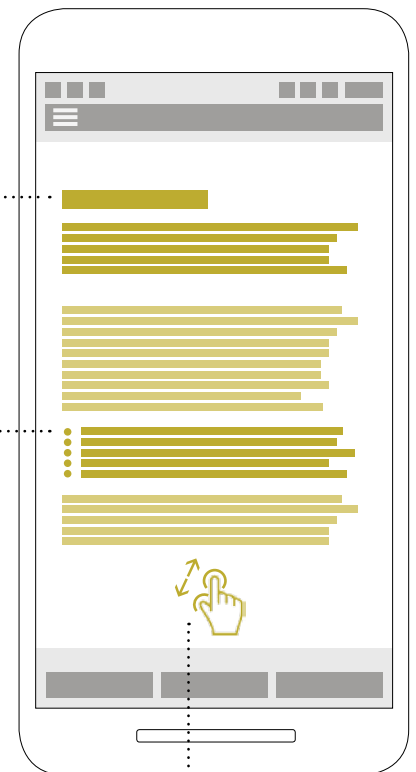
Text composition can be split into content-related components and design components. Combining both aspects in a sensible manner helps to ensure readability and understanding.

Principles

- Users must be able to follow and understand the content of texts. Over-complicated jargon must be avoided
- When it comes to text composition, it is important to ensure readability and compatibility with various mobile devices. Specific consideration must be given to the smaller screens on mobile devices
- Support functions such as text enlargement and alternative texts are welcome, but should not impair the layout and user guidance
- Complementary color combinations (opposites on the color spectrum, e.g. red/green) should be avoided. There must be sufficient contrast

Pyramid-shaped layout with title, summary, and then the full text

Bullet points can draw the user's attention to essential content



Pinch-zoom for enlarging text

Topics	Recommendations and requirements	Instructions for implementation
Content-related components	Language should be easy to understand, consistent, and concise.	<ul style="list-style-type: none"> • Use short sentences, active as opposed to passive speech, terms that are universally understood. Avoid foreign words
	Language should be adapted to the target group.	<ul style="list-style-type: none"> • Avoid foreign words and jargon outside of the explicit technical domain of the target group • If the application requires a glossary, this is a clear indication of inappropriate use of language
Design-related components	Texts should be easy to read.	<ul style="list-style-type: none"> • Preferably use the default fonts of the mobile operating system • If a different font is used specifically for the application, a font size must be used that satisfies the minimum requirements of the style guidelines of the respective operating system manufacturer (absolute minimum of 12 pt)
	Use layout in pyramid format.	<ul style="list-style-type: none"> • Present overviews or summaries right at the top, followed by the full version of the content
	Headings should be clearly identifiable as such.	<ul style="list-style-type: none"> • Headings give structure to a continuous text and thereby make it easier to read • Flat title hierarchy
	Text support functions that are provided by the operating system must be fully supported by the application.	<ul style="list-style-type: none"> • Mobile operating systems feature assistive technology such as text enlargement, screen readers, and gesture control. This technology should be supported as far as possible
	There should be a font enlargement option available for the text which works without losing elements of the content and without impairing operation or layout.	<ul style="list-style-type: none"> • If it is not possible to use the text enlargement function of the operating system, the mobile application must make it possible to enlarge content by up to 200% • A simple option for changing the font size should be provided for this purpose, using buttons or pinch-zoom, for example • Content must not impede the enlargement function
	The font must be easy to read on the screen.	<ul style="list-style-type: none"> • Usually guaranteed by adopting the operating system settings • Otherwise, use sans-serif (grotesque) fonts such as Arial or Verdana instead of serif fonts such as Times New Roman
	The layout must be easy to read.	<ul style="list-style-type: none"> • Use ragged right alignment. Avoid lengthier texts in block capitals or italics • Where necessary or appropriate, use bullet points or headers to draw the user's attention to the essential content • Avoid backward references
	There should be sufficient contrast between the text and the text background.	<ul style="list-style-type: none"> • The smaller the font, the greater the contrast needed between the text and the background • A patterned background should be avoided. The contrast between content (text and image) and background should be at a ratio of at least 4.5:1
	Complementary color combinations must be avoided.	<ul style="list-style-type: none"> • Do not use complementary colors right next to each other (e.g. red/green, blue/orange, yellow/purple)
	Colors should not be used to present crucial information.	<ul style="list-style-type: none"> • If colors are used to distinguish text from interaction elements, there must be at least one other differentiator

5.

Graphics, Animation and Multimedia

Graphics and multimedia content can provide additional information and operation options. However, they should not just be used solely out of consideration for design, but should support use of the application in a meaningful way. Animations and graphics that are distracting not only take up valuable screen space but also interfere with actual interaction. They should therefore be avoided where possible. The ratio of content-related elements to graphics and animations should be well-balanced and appropriate.

Principles

- Multimedia content should be used sensibly and should support rather than interfere with the rest of the content
- It is important to ensure a high-contrast display when it comes to graphics and animations.
- Animations and multimedia content should be easy to control and should not be executed automatically as background actions
- For mobile applications in particular, it is important to ensure that media content is presented in a robust and optimized manner and in alignment with the respective mobile devices



Topics	Recommendations and requirements	Instructions for implementation
Graphics	Images and text should be coordinated in a meaningful way.	<ul style="list-style-type: none"> • Use images and graphics that are relevant to the text • Avoid using images for purely design-related purposes
	It should be possible to scale graphics without loss of quality.	<ul style="list-style-type: none"> • Use various sizes of either vector graphics or images
	Icons and buttons must be large enough.	<ul style="list-style-type: none"> • Use recommended default sizes in accordance with relevant style guides
	There must also be sufficient contrast in graphics.	<ul style="list-style-type: none"> • There should be sufficient contrast in graphics/graphic operating elements • The same applies to text within these elements • Check using software that measures the contrast ratio
	Load graphics in a targeted way (i.e. based on the destination device).	<ul style="list-style-type: none"> • Download high-resolution graphics if this is conducive to the device and mobile usage (in terms of size, display resolution, and internet bandwidth)
Animations	Avoid purely cosmetic elements or animations that flash.	<ul style="list-style-type: none"> • Purely cosmetic animated graphics should be avoided
Multimedia	Text alternatives must be provided for graphics/images and multimedia elements.	<ul style="list-style-type: none"> • Mobile operating systems feature assistive technology such as text enlargement functions and screen readers. The application should be compatible with this technology
	Loading images must not cause sections of text to be moved.	<ul style="list-style-type: none"> • If necessary, use placeholders of the same size for images or videos that are loaded dynamically
	Background music should be avoided if it is not of explicit relevance to the core functionality of the application.	<ul style="list-style-type: none"> • Provide a clearly visible option for turning off the music
	The loading time for multimedia content should be displayed.	<ul style="list-style-type: none"> • Display progress for longer loading times • Dynamic progress indicator (e.g. spinner) for tasks that take longer than a second • Use progress bars for tasks that take longer than five seconds • If a task takes longer than ten seconds, also provide a time estimate • It must be possible to cancel the loading process at any time
	Content to be downloaded must be identifiable as such and described adequately.	<ul style="list-style-type: none"> • Use clear icons for downloads. Display information regarding format, file size in kB or MB, possibly duration in minutes
Advertising	Advertisements should never be intrusive and should be clearly identifiable as such.	<ul style="list-style-type: none"> • Where possible, avoid advertisements that are distracting • If it is not possible to avoid advertisements, use them contextually • Ensure that advertisement views are identifiable • Make it possible to switch the advertisement off and/or move to a different view

6.

Links

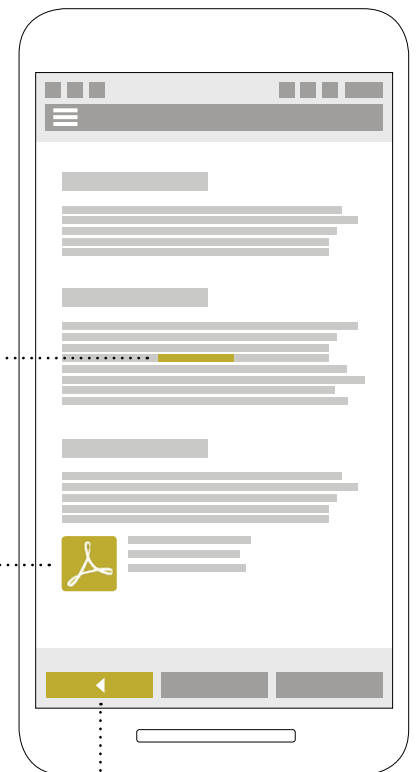
Links provide an opportunity for users to access external information. When using links, ensure that they are clearly identifiable as such, and that they are self-explanatory.

Principles

- Links in an application should clearly be identifiable as such, including for users with impairments (e.g. color blindness), and consistently identified through the entire application
- Links must be accessible to users who are reliant on support functions

Inline link

Resource link leads to further content



Back button enables the user to navigate back to the original link page with ease

Topics	Recommendations and requirements	Instructions for implementation
Links	How a link is displayed and the functionality of a link should be consistent throughout the application.	<ul style="list-style-type: none"> • For example, use a consistent color scheme and underlining. Use links that describe the action (describe what happens when the user clicks on the link). Names of links should always refer to the destination (not: "Click here!")
	References to links must feature clear descriptions, including for users with sensory impairments (e.g. color blindness).	<ul style="list-style-type: none"> • It is better to use descriptions related to objects or shapes rather than descriptions that just relate to color, for example "click on the circle" instead of "click on the purple icon." As a general rule of thumb, use several differentiators • In this respect as well, the application must be compatible with the assistive technology featured on mobile devices, such as screen readers. For this purpose, the links must be provided with appropriate metadata
	When following links, users should be able to easily return to the original location.	<ul style="list-style-type: none"> • Wherever possible, avoid external links (those that take users away from the application) • With external links, users should be able to use the back button to return to the original application • As an alternative, websites can be opened directly in the application in an integrated browser window (hybrid apps) • With links that are integral to the application, the functionality of the back button must be implemented accordingly

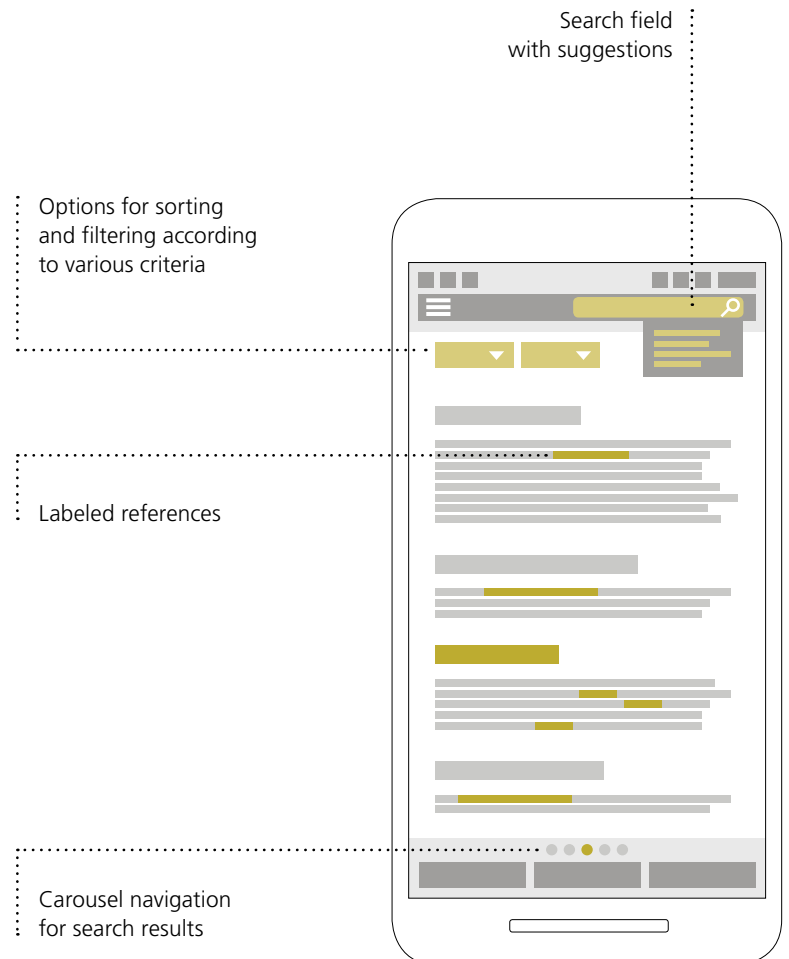
7.

Searching, Filtering and Sorting

The search function makes it easier to find content. Older people often state that it is not clear to them how to carry out a search and that the sequence in which the search results are presented to them is not very logical. It is important that they are able to adjust this sequence in a meaningful way. It must also be clear how the search results are produced. In addition, it would be good to have the option of filtering the search results according to various criteria.

Principles

- With regard to the search process, good positioning of the search fields is just as important as transparency. Users greatly appreciate the option of refining the search by applying further criteria
- When displaying the search results, the availability of sorting options (e.g. according to date, location, and other criteria) can help to improve the overview



Topics	Recommendations and requirements	Instructions for implementation
Search field	Users must be able to find the search field or the corresponding icon (magnifying glass) easily.	<ul style="list-style-type: none"> • If need be, this must be tested during development by carrying out usability tests • Common positions are the top middle or top right • If the search field is positioned in the navigation menu, it should appear right at the top
	A search field must be immediately identifiable as such.	<ul style="list-style-type: none"> • The design of the search field must be consistent on all pages. Possibly use text markers and clear icon markers such as a magnifying glass, for example
Search results	There should be a clear explanation of which criteria the search can be carried out against and how the search results are produced in terms of content.	<ul style="list-style-type: none"> • Make the search process transparent (e.g. in which area the search is being carried out)
	The search results should be clearly presented.	<ul style="list-style-type: none"> • Group search results and display logical links (e.g. related terms)
	There should be an option to sort and filter the results according to various criteria.	<ul style="list-style-type: none"> • Provide various options for sorting and filtering • The options for sorting and filtering must be as easy as possible for users to access • The criteria that can be used to sort and filter information must be clear at first glance

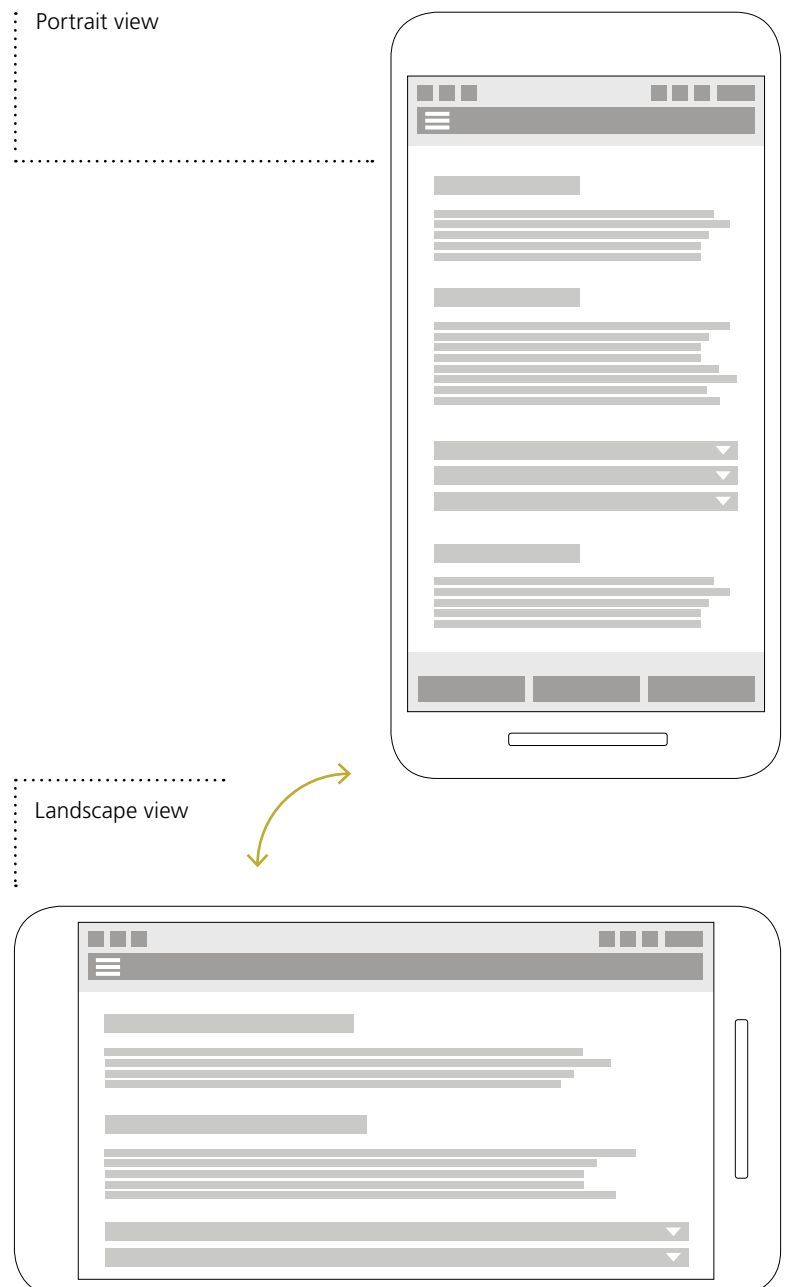
8.

Consistency and Robustness

For mobile applications in particular, older people appreciate it if the appearance of applications that they use regularly does not change at all if possible or does not change abruptly. However, they expect content to be up-to-date. Content that is kept up-to-date indicates a reliable offering. The way in which the application is structured and presented should be as stable as possible, as well as robust in terms of the various pieces of hardware and operating systems.

Principles

- A balance must be struck between being up-to-date and being consistent when it comes to layout. Naturally, this does not relate to content and functionalities, which must be kept up-to-date
- It is important that users are able to quickly find their way around the application
- Some users would like to be able to use the functionality of an application on a range of mobile devices. These applications should look similar and function in a similar way across all devices



Topics	Recommendations and requirements	Instructions for implementation
Consistency	The overall layout of the application should be consistent.	<ul style="list-style-type: none"> • Adhering to operating system-specific style guides can make the transition easier when standards are updated because all applications are updated at the same time • Avoid radically changing the layout of applications as far as possible to ensure that existing users are not lost (recognition factor) • If changes are unavoidable, ensure that the mental model of the application remains as unchanged as possible
Robustness	The application must be compatible with various devices and robust in the face of differing display sizes.	<ul style="list-style-type: none"> • Ensure the same or similar presentation and functionality on all screen sizes of the supported devices (e.g. tablets, smartphones)
	It must be possible to display the application in portrait format and landscape format.	<ul style="list-style-type: none"> • Use the same or similar presentation for different display formats (portrait, landscape) so that the application can also be used in a fixed position (e.g. if the mobile device is mounted on a wheelchair) • The content displayed should not differ considerably between portrait and landscape formats. If need be, additional details can be displayed in landscape format

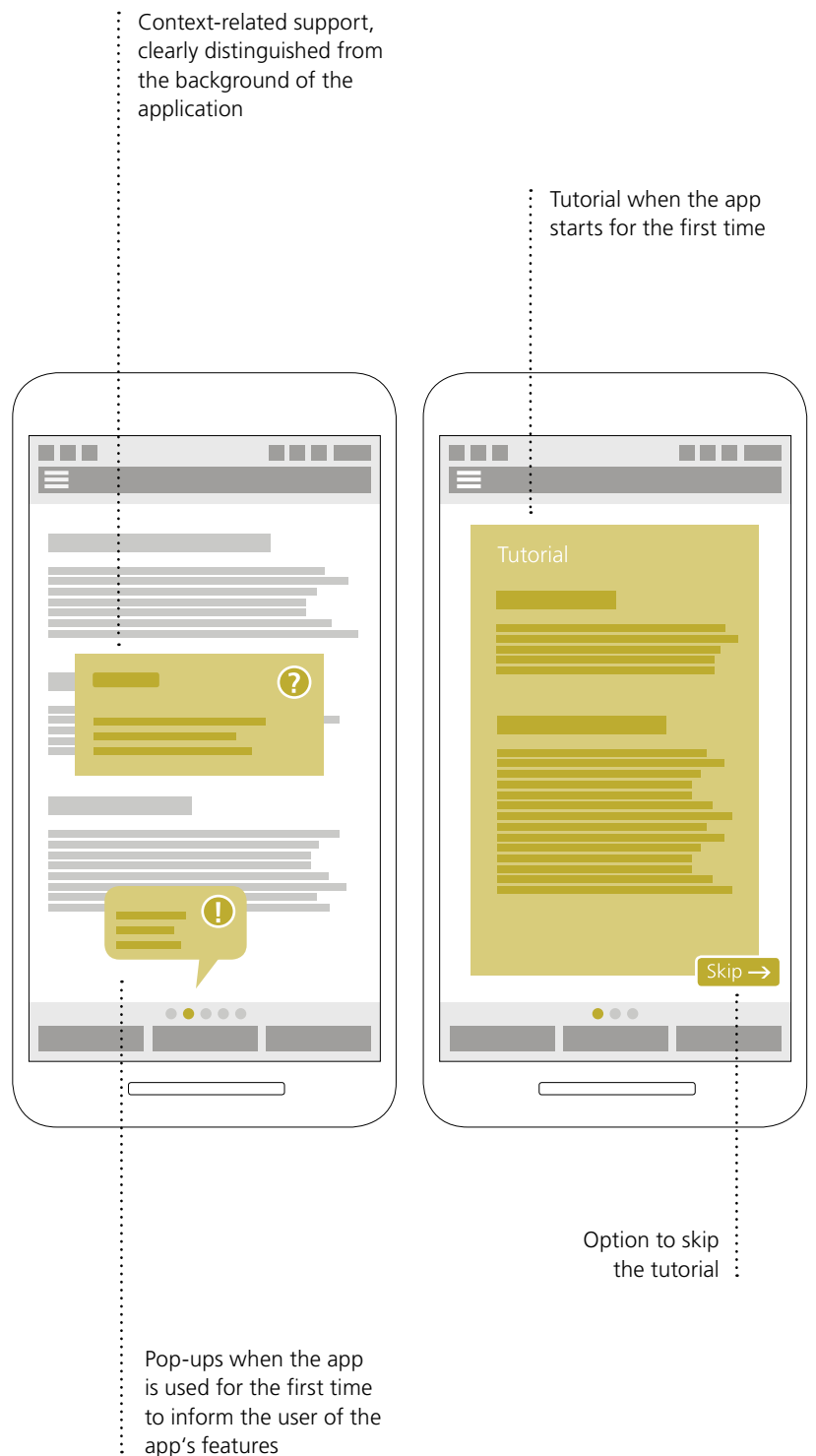
9.

Support Functions

Mobile applications are usually characterized by distinct, specific functions and should generally be able to be operated without any additional support. If support functions do need to be installed, these should not impair use of the mobile application. Furthermore, it must be obvious which elements are part of the application and which elements are part of the support function. In addition, the user must not be inundated with information (context-related support).

Principles

- Support functions should generally be avoided if they are not absolutely necessary
- Support functions should not be disruptive for the user and should not impair functionality, and the user must be able to disable the support function



Topics	Recommendations and requirements	Instructions for implementation
Help texts	The application should be self-explanatory and only provide help texts where necessary.	<ul style="list-style-type: none"> • Support functions should not be needed to use the application • If necessary, help texts enable users to better find their way around the application • They provide information about functions, icons, or gestures, for example • Tips should only be provided if they are not obvious or generally known
Support functions	The support functions provided and icons used in an application should be obvious and as self-explanatory as possible. Additional information should be provided about them where necessary.	<ul style="list-style-type: none"> • Consistent use of clear icons and terms across the whole application • Direct contact form or redirection to the email program in order to contact the manufacturer quickly
	Support functions must be clearly identifiable as such.	<ul style="list-style-type: none"> • Make the background to the layout elements of the support functions stand out from the background to the application
	Context-sensitive information can be helpful.	<ul style="list-style-type: none"> • Context-sensitive information is a good way of gradually drawing the user's attention to the functions of an application • Information should only appear if it relates to what the user is doing at that moment in time
	Support functions must not impair the function of the application or the user's operation of it.	<ul style="list-style-type: none"> • There should be an option to enable and disable support functions • If the application provides a tutorial, the user must have the option of skipping the tutorial

10.

Registration and Forms

Registration processes and entry forms must be designed in a self-explanatory and supportive way. The purpose and benefit of entering data must be immediately obvious to the users. With regard to data protection, it must be obvious and/or explained if data is to be used, archived, or accessed by a third party.

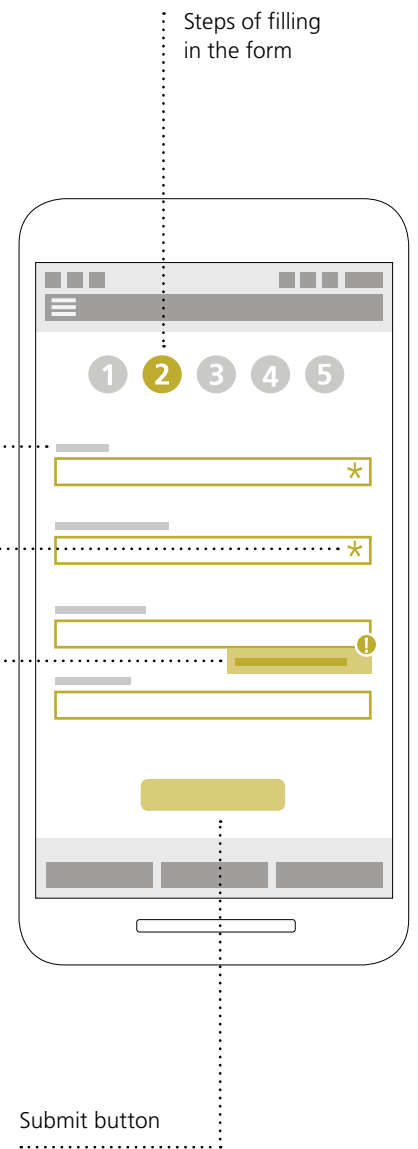
Principles

- The intent and purpose of entering personal data must be obvious
- Sensory impairments and slower reaction times must be taken into account with regard to forms
- Data input should be supported by a feedback system so that any errors can be identified straight away and so that users can be guided properly through the form

Labels for the different form elements

Marking of mandatory fields

Marking of incorrect entries and information regarding corrections



Topics	Recommendations and requirements	Instructions for implementation
Registration	The registration process should be transparent and self-explanatory for users.	<ul style="list-style-type: none"> • Unnecessary registration must be avoided • If registration is necessary, the process must be designed to be self-explanatory, clear, and user-friendly • The reason why registration is necessary should be explained in a transparent way. Only request details that are absolutely necessary
Forms	Forms must be designed to be self-explanatory and clear.	<ul style="list-style-type: none"> • The input screen must be of a sufficient size and easy to understand • Mandatory fields must be clearly marked • Optional fields must also be clearly marked • The current field must be clearly identifiable on entry forms • Password fields should be provided with an option to display the password in plain text
	Errors in forms should be handled in a manner that is easy to understand and user-friendly.	<ul style="list-style-type: none"> • Incorrect or missing entries in the forms should be clearly marked and there must be an option to easily correct data without losing any data that has been entered so far • The repetition of passwords and email addresses must be avoided. If necessary, the relevant values may be displayed once more for the user to confirm • Information about how users can correct their input must be clearly visible and permanently displayed until the error has been corrected (do not use pop-ups or toasts) so that the user does not have to remember what the error was
	The time required to enter information must be adequately assessed.	<ul style="list-style-type: none"> • The time limits set by the mobile application must be sufficient and adjustable • For forms that require a greater amount of information to be entered, there should be an option to break off from entering data without this causing data that has already been entered to be lost
	It should be possible to enter data correctly without the need for additional prior knowledge.	<ul style="list-style-type: none"> • If users need to enter data in a certain format, there must be clear information about the format in which data needs to be entered (example input) and there must be immediate feedback about errors • Where possible, the keyboard layout should match the format in which data is being requested (e.g. for a telephone number field, only display numbers on the keyboard)
	Text fields and form fields must be large enough.	<ul style="list-style-type: none"> • If the maximum length of an entry is known in advance, design the text fields so that they are large enough to avoid having to scroll vertically in the form field • Place label elements above and not next to form elements to avoid having to scroll horizontally
Data protection	Users must be clearly informed about how data that has been entered, as well as other data retrieved from the application, will be used, for what purpose, and by whom.	<ul style="list-style-type: none"> • As a general rule, as little personal data should be requested from users as possible • Information about data protection must be provided once but must interrupt activity and the user must be unable to avoid it (action is required on the part of the user before they can continue) • Clear information if the application is to access further information on the mobile device (files, sensors, location, etc.) • The option to prevent such access on an individual basis
Location	If the user is asked to enter location details, the user should have a choice.	<ul style="list-style-type: none"> • Always provide two options for information about location: one that is automatically determined by the mobile device (through GPS, mobile network, access points, etc.) and one that is determined by the user

Summary

Both today and in the future, the design of an application is an important aspect when answering the question of how to achieve age-appropriate mobile usage of applications on mobile devices. It is not just older people who benefit from easier access and design recommendations for simpler operation, but all users. We should, however, avoid a separate label of “specifically for older people” because this can also put people off.

The recommendations presented in this paper are based on the experience of various experts, desk research, and conversations with older users. This research has shown that the most important thing for older users is that applications are designed in a way that is clear and easy to understand, are easy to read, are secure, and are easy to use.

The recommendations presented here do not claim to be exhaustive because the progressive, technological development and digitalization of our everyday lives continues to pose new challenges for older people in terms of accessibility.

Specific Implementation of Recommendations

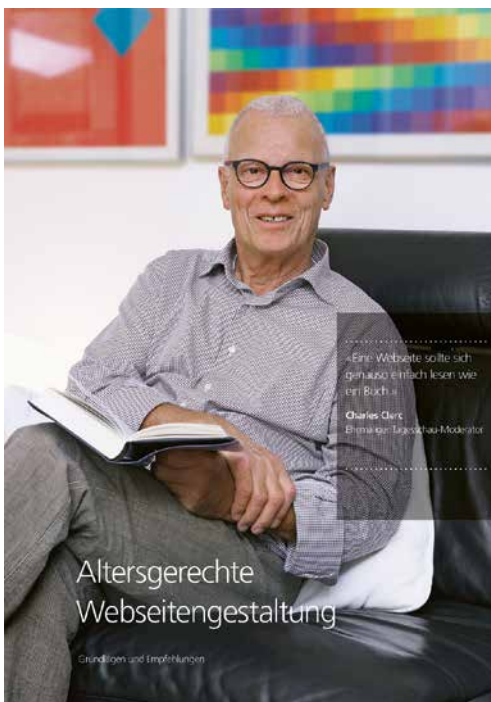
The recommendations and checklists provided in this paper can be used by those commissioning applications as well as by experts developing applications. They give guidance on how mobile applications should be designed so that older people can get the most out of applications too.

Right from the outset when developing a new application and when carrying out updates at a later stage, the design and functionality should be assessed and optimized with the aid of usability tests involving real users. The participation of older users at an early stage in the process can help to identify specific areas of the application that are problematic for older people and, where possible, allow modifications to be made or support to be provided.

Further information is available at:
<http://www.ageweb.ch>

Publication

«Age-appropriate website design»



This brochure is aimed at people who commission, design, or develop websites. Nine areas of age-appropriate web design are defined and steps for their implementation recommended. The brochure should help to ensure that not only living and outdoor spaces, but also virtual spaces on the web, become increasingly barrier-free in the everyday lives of older people.

Further information can be found on our website <http://www.ageweb.ch>

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Age-Appropriate Mobile Applications

Basic principles
and recommendations

This brochure is aimed at people who commission, design, or develop mobile applications. Ten areas of age-appropriate mobile app design are defined and steps for their implementation described. The brochure should help to ensure that more and more mobile applications become barrier-free for older people.

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