

## User Interface Design Guidelines for Mobile Applications for Senior Citizens

\* means the guideline can be automated

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
<b>Heuristic: Visibility of system status</b>						
1	Ensure that several search results are visible on the search engine results page without having to scroll.	-	1	Ensure that several search results are visible on the search engine results page without having to scroll. [1]	-	-
2*	Expose required fields by default. Provide visual cues to indicate hidden content.	Merge	2	Expose required fields by default. [1]	1	Supplement UI with visual cues to help the elderly to be aware of hidden content. [3]
3	Focus on one task at a time instead of requiring the user to actively monitor two or more tasks, and clearly indicate the name and status of the task at all times.	Add	-	-	2	Focus on one task at a time instead of requiring the user to actively monitor two or more tasks, and clearly indicate the name and status of the task at all times. [2]

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
4*	Avoid the use of interaction timeouts and provide ample time to read information.	Add	-	-	3	Avoid the use of interaction timeouts and provide ample time to read information. [2]
5	Provide immediate feedback not only visual feedback (effective prompting) but also tactile and auditory feedback.	Add	-	-	4	Provide not only visual feedback, but also tactile and auditory. [2]
					5	Provide a mixed mode of feedback: visual feedback (compulsory) accompanied by audio feedback. [3]
					6	Make it obvious for the elderly when an action has been taken by providing immediate feedback. [3]
					7	Provide effective prompting and feedback during and after task completion. [4]

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
<b>Heuristic: Match between System and the Real World</b>						
6	Apply designs that take advantage of previous elderly experience in daily life, specifically; in using computers and feature phones.	Add	-	-	8	Apply designs that take advantage of previous elderly experience in daily life, specifically; in using computers and feature phones. [3]
7	Make sure that the "Back" button behaves predictably.	Add	-	-	9	Make sure that the "Back" button behaves predictably. [2]
<b>Heuristic: User Control and Freedom</b>						
8	Offer a button to increase text size directly from the screen.	Enhance	3	Offer a button to increase text size. [1]	10	Make it easy for people to change the text size directly from the screen. [2]
9	Offer users the ability to control and opt out of personalized sections of content.	-	4	Offer users the ability to control and opt out of personalized sections of content. [1]	-	-

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
10*	Allow users to pause, play, mute and control the volume for video content or video advertisements. Display controls clearly and prominently.	Merge	5	Allow users to pause, play, and control the volume for all video content. Display controls clearly and prominently. [1]	-	-
			6	If video advertisements are used, offer controls to pause the video and mute the sound. [1]		
11	Let users opt out of any playlists, previews or any type of video content intended to extend a viewing session.	-	7	Let users opt out of any playlists, previews or any type of video content intended to extend a viewing session. [1]	-	-
12	Use understandable, visible, large click targets for the Close action in advertisements.	-	8	Use understandable, visible, large click targets for the Close action in advertisements. [1]	-	-

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
13*	When showing pictures of items, ensure that they are clear and large enough to be legible and zoomable.	-	9	When showing pictures of items, ensure that they are clear and large enough to be legible and zoomable. [1]	-	-
14	Support user control and freedom, choice in methods allowing for alternative and flexible flows of interaction.	Add	-	-	11	Support user control and freedom, allowing for alternative and flexible flows of interaction. [2]
					12	Provide choice in methods of use to allow users to feel they are in control. [4]

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
<b>Heuristic: Consistency and Standards</b>						
15	Arrange content by topic and consistent with its importance, not by ages or demographic characteristics.	Enhance	10	Arrange content by topic, not by ages or demographic characteristics. [1]	13	Arrange information consistent with its importance. [4]
16	Separate information that is directed at a particular professional audience from information directed at a more general audience and label the professional information as such.	-	11	Separate information that is directed at a particular professional audience from information directed at a more general audience and label the professional information as such. [1]	-	-

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
17	Use a clear navigational structure, consistent and explicit step-by-step navigation. Avoid using branded language and jargon in menus.	Enhance	12	Use a clear navigational structure with mutually exclusive categories. [1]	14	Use consistent and explicit step-by-step navigation. [2]
			13	Create clear and descriptive categories and links for all items in a navigation interface. Avoid using branded language and jargon in menus. [1]		

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
18	Write in a simple language, clear and adequate that suit the elderly. Avoid ambiguous terms. Employ familiar vocabulary for the elderly to clearly indicate UI element's function.	Add	-	-	15	Write in a language that is simple, clear and adequate to the audience. [2]
					16	Use simple wordings that suit the elderly's semantic field [3]
					17	Avoid ambiguous terms. Employ familiar vocabulary for the elderly to clearly indicate UI element's function. [3]
19	Use simple and meaningful icons. Supplement text with icons, when applicable and keep icon distinguishable.	Add	-	-	18	Use simple and meaningful icons. [2]
					19	Supplement text with icons, when applicable. [3]
20	Provide same system response to the same user action and expectations consistently.	Add	-	-	20	Provide same system response to same user action consistently. [3]
					21	Be consistent with user expectations and intuition. [4]



P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
21*	Use user interface elements, term and icon consistently and distinguishably across smartphone UI screens. Adhere to standards and conventions if those exist.	Add	-	-	22	Use user interface elements consistently and adhere to standards and conventions if those exist. [2]
					23	Use term consistently across smartphone UI screens. [3]
					24	Keep icon distinguishable and consistent across smartphone UI screen. [3]
<b>Heuristic: Error Prevention</b>						
22	Set a consistent style for constructive actions compared to destructive actions.	-	14	Set a consistent style for constructive actions compared to destructive actions. [1]	-	-

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
23	Provide a descriptive confirmation message for each destructive action indicating the action consequence.	Add	-	-	25	Provide a descriptive confirmation message for each destructive action indicating the action consequence. [3]
24	Arrange elements and provide warning to minimize hazards and errors.	Add	-	-	26	Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded. [4]
					27	Provide warnings of hazards and errors. [4]
<b>Heuristic: Recognition Rather Than Recall</b>						
25	Clearly repeat the user's query.	-	15	Clearly repeat the user's query. [1]	-	-
26	Provide easy-to-find contact information.	-	16	Provide easy-to-find contact information. [1]	-	-

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
<b>Heuristic: Flexibility and Efficiency of Use</b>						
27*	Design for flexibility of display for different screen sizes.	-	17	Design for flexibility of display with responsive layouts. [1]	-	-
28*	Support a variety of user inputs. Prioritize accepting voice input for simple tasks.	-	18	Support a variety of user inputs. Prioritize accepting voice input for simple tasks. [1]	-	-
29	Use descriptive terms, not marketing terms, for products, descriptions, and links. If using technology-related terms, consider defining them in place. Avoid using them if they are not necessary.	Merge	19	If using technology related terms, consider defining them in place. Avoid using them if they are not necessary. [1]	-	-
			20	Use descriptive terms, not marketing terms, for products, descriptions, and links. [1]		

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
30	Provide a clear explanation of why personalized content is being presented and Present personalized content when users are likely to expect it.	Merge	21	Present personalized content when users are likely to expect it. [1]	-	-
			22	Provide a clear explanation of why personalized content is being presented. [1]		
31	Thoroughly test the timing of opening menus and other UI elements on hover, tap, or activation.	-	23	Thoroughly test the timing of opening menus and other UI elements on hover, tap, or activation. [1]	-	-
32	When graphical elements appear close to a text link, make those elements part of the working link.	-	24	When graphical elements appear close to a text link, make those elements part of the working link. [1]	-	-
33	Provide a search box that allows at least 18 characters to be visible at any given time.	-	25	Provide a search box that allows at least 18 characters to be visible at any given time. [1]	-	-

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
34*	Be forgiving of typos. Provide query search suggestions and return relevant appropriate results	Merge	26	Consider using search suggestions for popular search queries. [1]	-	-
			27	Create a thorough index and cross-reference terms an average person might search for. [1]		
			28	Return relevant and appropriate results for search queries. [1]		
			29	Be forgiving of typos and provide query suggestions on search results pages. [1]		
35	Make registration or sign-in optional.	-	30	Make registration or sign-in optional. [1]	-	-
36	If senior citizen discounts are offered, they should be advertised, thoroughly described, and easy to take advantage of.	-	31	If senior citizen discounts are offered, they should be advertised, thoroughly described, and easy to take advantage of. [1]	-	-

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
37	Explicitly describe the benefits of signing in (or creating an account) versus checking out at as guest.	-	32	Explicitly describe the benefits of signing in (or creating an account) versus checking out at as guest. [1]	-	-
38	Accept dashes, hyphens, and spaces as part of the string of credit card numbers.	-	33	Accept dashes, hyphens, and spaces as part of the string of credit card numbers. [1]	-	-
39	If online chat is offered, ensure that any preliminary information provided by the user (name, reason for chatting) is carried over to the live chat.	-	34	If online chat is offered, ensure that any preliminary information provided by the user (name, reason for chatting) is carried over to the live chat. [1]	-	-
40	Provide a search box that allows at least 18 characters to be visible at any given time.	Add	-	-	28	Make information accessible through different modalities. [2]

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
41	Place UI elements, specifically sensitive elements, in a visible area and preferably reachable by the user's thumb.	Add	-	-	29	Place UI elements, specifically sensitive elements, in a visible area and preferably reachable by the user's thumb. [3]
<b>Heuristic: Aesthetic and Minimalist Design</b>						
42	Prioritize accessibility and readability. Present information in an easy-to-scan format. Divide information into chunks of content labeled with clear headings and descriptions. Focus on common tasks and answering frequently asked questions.	Merge	35	Prioritize accessibility and readability. [1]	-	-
			36	Present information in an easy-to-scan format. Divide information into chunks of content labeled with clear headings and descriptions. [1]		
			37	Prioritize information on the page. Focus on common tasks and answering frequently asked questions. [1]		

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
43*	Use information-layering techniques to present long or complex content. Avoid the use of scrolling.	Merge	38	Use information-layering techniques to present long or complex content. [1]	-	-
			39	Make it easy for users to compare offerings or information without excessive scrolling. [1]		
			40	When possible, limit the use of pull-down menus and scrolling lists. [1]		
44	Design layouts that invite scrolling by avoiding the "illusion of completeness."	-	41	Design layouts that invite scrolling by avoiding the "illusion of completeness." [1]	-	-



P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
45*	Ensure font size is at least 16 points on mobile. Use large-sized fonts, sans serif, non-condensed typefaces, non-italic, and left justified.	Enhance	42	Ensure font size is at least 12 points by default on desktop and at least 16 points on mobile. [1]	30	Make sure text uses types, styles and sizes appropriate to older adults, that is, for instance, but not exclusively: large-sized fonts, sans serif, non-condensed typefaces, non-italic, and left justified. [2]
46*	Ensure that there is strong contrast between the text and/or graphics color and the background color. Do not use pure white or rapidly changing contrast backgrounds. Avoid using blue, green and yellow in close proximity.	Enhance	43	Ensure that there is strong contrast between the text color and the background color. [1]	31	Do not use pure white or rapidly changing contrast backgrounds. [2]
					32	Use high-contrast color combinations of font and/or graphics and background to ensure readability and perceptibility; avoid using blue, green and yellow in close proximity. [2]

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
47	Display words horizontally.	-	44	Display words horizontally. [1]	-	-
48	When error messages are triggered by interactive elements, place error messages in close proximity to the element.	-	45	When error messages are triggered by interactive elements, place error messages in close proximity to the element. [1]	-	-
49	Use graphics or images that add value, contain informative content and are easy to see. Supplement text with visual elements but do not replace text entirely. Avoid extraneous details.	Enhance	46	Use graphics to aid comprehension. Supplement text with visual elements but do not replace text entirely. [1]	33	Aim at creating an aesthetical user interface, by using pictures and/or graphics purposefully and adequately to minimize user interface clutter and avoid extraneous details. [2]
			47	Use images that add value and contain informative content. [1]		
			48	Ensure images are easy to see. [1]		

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
50	Provide text labels to distinguish following and sharing actions on social media.	-	49	Provide text labels to distinguish following and sharing actions on social media. [1]	-	-
51	Visually differentiate interactive elements from static elements.	-	50	Visually differentiate interactive elements from static elements. [1]	-	-
52*	Create large interactive targets with adequate spacing around the target.	-	51	Create large interactive targets with adequate spacing around the target. [1]	-	-
53	Clearly differentiate paid results or listings from organic results. Paid advertisements for outside organizations should be designed to look like advertisements, not site content	Merge	52	Clearly differentiate paid results or listings from organic results [1]	-	-
			53	Promotions created by the organization itself should match the site's style. Paid advertisements for outside organizations should be designed to look like advertisements, not site content [1]		

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
			54	Separate company-created posts from sponsored social media content. [1]		
54	Provide closed captioning and a transcript for videos.	-	55	Provide closed captioning and a transcript for videos. [1]	-	-
55	Avoid overly distracting advertisements.	-	56	Avoid overly distracting advertisements. [1]	-	-
56	Be mindful of major navigational redesigns. Adhere to common navigation design conventions that are appropriate to the device being used.	Merge	57	Be mindful of major navigational redesigns. [1]	-	-
			58	Adhere to common navigation design conventions that are appropriate to the device being used. [1]		
57*	Follow design conventions when presenting a search field. Place the search function in an easily recognizable location appropriate to the device being used.	-	59	Follow design conventions when presenting a search field. Place the search function in an easily recognizable location appropriate to the device being used. [1]	-	-

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
58*	Display search query text in a large font and ensure proper contrast between text color and background color.	-	60	Display search query text in a large font and ensure proper contrast between text color and background color. [1]	-	-
59*	Avoid using a Reset button in most forms.	-	61	Avoid using a Reset button in most forms. [1]	-	-
60	Clearly differentiate the actions and controls for creating a new account, signing in with an existing account, and continuing as a guest.	-	62	Clearly differentiate the actions and controls for creating a new account, signing in with an existing account, and continuing as a guest. [1]	-	-
61	If you must ask for the users' occupation, be sure to offer a choice for retired and deal with the entry intelligently on the backend. Do not ask users to fill in a salutation in the order form. If you must collect this information, offer a dropdown list of choices.	Merge	63	If you must ask for the users' occupation, be sure to offer a choice for retired and deal with the entry intelligently on the backend. [1]	-	-
			64	Do not ask users to fill in a salutation in the order form. If you must collect this information, offer a dropdown list of choices. [1]		

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
62*	Avoid the use of animation and fast-moving objects.	Add	-	-	34	Avoid the use of animation and fast-moving objects. [2]
63	Do not rely on color alone to convey information. Be aware of color blindness.	Add	-	-	35	Do not rely on color alone to convey information. Be aware of color blindness. [2]
64*	Use color conservatively, limiting the maximum number of colors in use to four.	Add	-	-	36	Use color conservatively, limiting the maximum number of colors in use to four. [2]
65	Allow sufficient white space to ensure a balanced user interface design.	Add	-	-	37	Allow sufficient white space to ensure a balanced user interface design. [2]
66	Make links and buttons clearly visible and distinguishable from other user interface elements.	Add	-	-	38	Make links and buttons clearly visible and distinguishable from other user interface elements. [2]

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
67	Adopt "tap" as the main gesture to interact with the UI. Avoid or minimize the use of tricky gestures: "drag and drop" , and "tap and hold".	Add	-	-	39	Adopt "tap" as the main gesture to interact with the UI. [3]
					40	Avoid, or minimize the use of tricky gestures: "drag and drop", and "tap and hold". If used then provide an alternative way for the elderly to perform the task corresponding with these gestures. [3]
68	Group information visually, place most important information in front, and avoid unnecessary information on the screen.	Add	-	-	41	Group information visually (make good use of color, text, topics, etc.). [2]
					42	Place most important information in front. [3]
					43	Avoid unwanted information on the screen. [3]

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
<b>Heuristic: Recognize, Diagnose, and Recover from Errors</b>						
69	Present error messages in direct, clear, descriptive, non-threatening language and describe the actions that users can take to correct the error.	Merge	65	Present error messages in direct, clear, descriptive, non-threatening language and describe the actions that users can take to correct the error. [1]	-	-
			66	Describe the actions that users can take to correct the error. [1]		
70*	Correct common misspellings, offer autocomplete when relevant and direct users on how to correct errors.	-	67	Correct common misspellings, offer autocomplete when relevant and direct users on how to correct errors. [1]	-	-
<b>Heuristic: Help and Documentation</b>						
71	Consider providing online chat options. If offering online chat, do not automatically pop up the feature. Instead, make the chat feature easy to notice and easy to dismiss.	-	68	Consider providing online chat options. If offering online chat, do not automatically pop up the feature. Instead, make the chat feature easy to notice and easy to dismiss. [1]	-	-



P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
72*	Supplement UI with tooltips, e.g. when a specific gesture is required to perform a certain task.	Add	-	-	44	Supplement UI with tooltips, e.g. when a specific gesture is required to perform a certain task. [3]
<b>Heuristic: Pleasurable and Respectful Interaction</b>						
73	Avoid patronizing language when planning content to include on your site.	-	69	Avoid patronizing language when planning content to include on your site. [1]	-	-
74	Create content for a broad range of interests. Do not assume that all seniors are interested in the same or limited topics.	-	70	Create content for a broad range of interests. Do not assume that all seniors are interested in the same or limited topics. [1]	-	-
75	When creating content, write in a style that is direct and emphasizes facts.	-	71	When creating content, write in a style that is direct and emphasizes facts. [1]	-	-

P#	Proposed Guidelines	Actions	B#	Baseline's Guidelines	A#	Additional Guidelines
76	Suggest likely options and use predictive text with common responses.	-	72	Suggest likely options and use predictive text with common responses. [1]	-	-
<b>Heuristic: Privacy</b>						
77	Allow users to view, understand and control the data that they share.	-	73	Allow users to view, understand and control the data that they share. [1]	-	-
78	Ask for only necessary information.	-	74	Ask for only necessary information. [1]	-	-

[1] L. Kane and K. Pernice, UX Design for Senior Citizens (Ages 65 and Older), 3rd edition, Fremont, CA: Nielsen Norman Group, 2019.

[2] P. A. Silva, K. Holden, and P. Jordan, "Towards a list of heuristics to evaluate smartphone apps targeted at older adults: a study with apps that aim at promoting health and well-being," in Proc. 48th Hawaii Int. Conf. Syst. Sci., 2015, pp. 3237-3246.

[3] H. M. Salman, W. F. W. Ahmad, and S. Sulaiman, "Usability evaluation of the smartphone user interface in supporting elderly users from experts' perspective," IEEE Access, vol. 6, pp. 22578-22591, 2018.

[4] L. R. Kascak, C. B. Rébola, and J. A. Sanford, "Integrating universal design (UD) principles and mobile design guidelines to improve design of mobile health applications for older adults," in Proc. IEEE Int. Conf. Healthcare Inform., 2014, pp. 343-348