AHFE International

Developing an AI User Interface for People With Special Needs – User Needs in the Context of Municipality Information

Marie Sjölinder[1], Jonas Ek[1], Pär Hansson[1], Carina Norman[2], Berit Norén[2], and Johan Twedberg[3]

[1]RISE, Box 1263, 162 29 Kista, Sweden
[2]Skellefteå Municipality, Trädgårdsgatan 6, 931 31 Skellefteå, Sweden
[3]Gothenburg Municipality, Göteborgs Stad, 404 82 Göteborg, Sweden

ABSTRACT

AI-tools can provide support in meeting communication needs for users with difficulties in understanding information. In an ongoing project a prototype based on generative AI for individuals with intellectual disabilities are being developed. The aim with project is to develop a solution that builds upon generative AI and that facilitates access to relevant public authority information on websites for users with intellectual disabilities. This paper will present the first phase of the project that has been focused on gathering user needs within the target group. Participants from the target group from three Swedish municipalities have participated at two occasions to provide information from their perspective. In the first session the focus was on challenges in searching for information, and at the second occasion the focus was on how to improve access to information provided by the municipalities. The outcome from the workshops have been summarized into a list of important aspects to consider when developing an AI-tool addressing needs related to information search for users with intellectual disabilities.

Keywords: AI for municipalities, Special needs, Technology usage, Interaction design

INTRODUCTION

People with intellectual disabilities could have difficulties in understanding spoken or written language, which can make it difficult to receive information or follow instructions. They also may face larger challenges in using various digital media to gain access to information. Finding information and conducting searches can be a challenge due to complex communication needs and speech or language disabilities. Studies have shown that people with intellectual disabilities feel less included digitally than the rest of the population, and that they face larger difficulties related to language comprehension in using internet than other groups (Johansson et al., 2021). One important goal for the municipalities in Sweden, and in other countries, is to provide support to young adults with intellectual disabilities so that they

have equal access to digital information from various authorities and live, as far as possible, an independent life.

There are laws that require public actors to provide digital information in a way that enables people with disabilities to access the information. However, the municipalities face several challenges in terms of meeting the requirements and provide information in a way that is needed. For example, there is a lack of expertise on accessibility within many authorities and municipalities, and in some cases, the municipalities lack a sufficiently basic digital infrastructure. From a municipal perspective, it is important, both to support independence and to use resources as efficiently as possible. Individuals that feel that they have control over their own situation and can handle things themselves will be more self-secure and need less support. However, there are challenges since there are large variations both regarding disabilities and regarding possible context of usage (Newman et al., 2016), and therefore the municipalities must cover a wide scope of issues to address.

Much has been done related to accessibility and solutions that facilitate communication for people with disabilities. W3C/WAI is an initiative within the World Wide Web Consortium (2024) that works on accessibility issues and guidelines to increase accessibility. AI-tools and machine learning algorithms can provide support in meeting communication needs (Sennott et al., 2019). For example, personalized AI-tools can provide support in better speech-recognition (Murero et al., 2020) or provide support regarding structure and presentation of information. Although there are many existing solutions, there is still a need for "smarter" services and aids. Aids that can to a greater extent combine the functions of several independent services in a dynamic and tailored way.

In an ongoing project a prototype based on generative AI for individuals with intellectual disabilities are being developed. The project described in this paper is carried out in Sweden as a cooperation between the Municipality of Skellefteå, the Municipality of Gothenburg, the Municipality of Jönköping and the research institute RISE. The aim with project is to develop a solution that builds upon generative AI and that facilitates access to relevant public authority information on websites for users with disabilities. This paper will present the first phase of the project that has been focused on gathering user needs within the target group. The domains addressed have been information from the municipalities regarding taking the first steps from school to entering an adult life with work or daily activities. A further domain is finding information related to other aspects of the adult life such as finding a place to live or change work or daily activity. Participants from the target group from the three municipalities have participated at two occasions to provide information from their perspective. In the first session the focus was on challenges in searching for information, and at the second occasion the focus was on how to improve access to information provided by the municipalities. The outcome from the workshops have been summarized into a list of important aspects to consider when developing an AI-tool addressing the needs of this target group.

THE AI SOLUTION BEING DEVELOPED

The solution developed will be based on the RISE-GPT platform. The solution is web-based and can be used via mobile, tablet or computer - individual use or together with relatives or with employees in an assisted living or within a school context.

The information from the authority's websites is simplified and made available in a simple, tailored format for the target group. The information is presented based on the user groups' needs and abilities. It can, for example, be with simplified text, text to image/pictogram or text to speech. All technical components of the solution are integrated into a shell application with a common, easy to use user interface. The project intends to produce prompt models to be able to make the information available in a more tailored way, especially aimed at the target group's challenges. By entering contextual information in the form of a prompt/agent, the language model's response can be adapted. The more detailed and specific the prompt used, the more accurate the model's response. The need for adapted communication depending on the type of disability one has fits well with generative AI's possibilities of being able to explain, simplify, summarize, explain in several alternative ways, translate, structure information, or describe in images. This can be used with a static pre-trained language model but can also be linked to specific current information (e.g. so-called RAG).

THE TARGET GROUPS' USAGE AND CHALLENGES IN SEARCHING FOR INFORMATION

In the first phase of gathering user needs from the target group the three municipalities either conducted one or several workshops. During the different workshops the participants were asked about their usage of digital services, what challenges they had when they were searching for information and what kind of support they wanted to have. Skellefteå Municipality held one workshop at a high school for students with special needs. In this workshop five students between 16 and 19 years of age participated. In Gothenburg Municipality, four workshops were held at different centers for daily activities. In these workshops there were 18 participants between 20 and 63 years of age. In Jönköping, four workshops were held at different centers for daily activities. In these workshops there were 11 participants between 22 and 53 years of age.

Usage among the participants in the target group: Regarding usage of digital services, the participants said that they used Google to seek information about leisure activities and interests. They also used various social media and streaming services for film and music. Gaming and shopping were also common usage areas. In their everyday lives, they said that they handled their finances with Swish, found their way using Google maps and used information from the authorities for finding work or to get support from social services.

Challenges when searching for information: A problem when searching for information that several in the user groups highlighted was that it is difficult to find relevant search terms and issues related to spelling. Challenges in

interpretating the information was related to the usage of difficult words and that important information was mixed with irrelevant information. Regarding usage of the municipalities web pages, the participants thought it was difficult to find information and difficult to know what to act upon. They also found it challenging to compare different options, for example when searching for jobs or daily activities. Finally, the participants brought up general issues related to trust and credibility.

Need for support and suggested solutions: Regarding possible solutions, the user group wanted voice control, auditory support, and suggestions for relevant search terms. Text sections could be shorter, clearer and supplemented with images and films. Further, the information structure could be made easier to navigate by simple structure and less tabs. The content could also be better categorised to make it easier to find the wanted information. Finally, AI was mentioned as support when searching for information in complex contexts.

IMPROVEMENTS TO FACILITATE INFORMATION SEARCH AT THE MUNICIPALITIES' WEB SITES

In the second phase of gathering user needs, the focus was on how to improve information search and presentation of information at the municipalities' web sites. The participants were asked questions about how understanding of the information could be supported. The municipalities conducted either a workshop or used a questionnaire. To make the discussions and/or the questions more concrete, information provided on the municipality's web pages was used as examples. In one of the workshops, the participants also tried to use different chatbots and AI-solutions. Skellefteå Municipality conducted a workshop with 10 participants from a high school for students with special needs, they were all in the age range between 16 and 18 years of age. In Gothenburg, a workshop was held with participants from different centers for daily activities. In total, there were 16 participants between 20 and 63 years of age. Finally, In Jönköping Municipality a questionnaire was used to gather the information. The questionnaire was filled in by 16 respondents from different centers for daily activities. In this group, 13 respondents were in the age range between 20 and 35 years of age, and 3 of the respondents were 40 years or older.

How Municipality information could be made more accessible: The participants pointed out that the search process should be tailored to individual needs and preferences. They also thought that it is important to be able to conduct the search in different ways. Some participants expressed a preference for searching information in a conversational style rather than relying on specific keywords. They wanted to use this dialogue approach and wanted responses to be tailored to their language.

Regarding the search results, the participants suggested support in filter out irrelevant content. For example by providing immediate suggestions when writing. Additionally, a refined search function, possibly organized into categories, would make it easier to find specific information. A second search field to be able to add further search words would also be helpful,

and support with translating complex search terms. Finally, the participants pointed out that it would be easier if the answers were concise, ideally with key information provided in the first sentence.

The participants thought that AI could assist by suggesting relevant search queries. They thought that an AI chatbot located at the bottom right of the page could be useful, with the option to switch to a real person for queries. Finally, they also expressed a desire for a voice input feature in ChatGPT, allowing them to speak their questions instead of typing them.

How to make the information easier to understand: The participants requested simpler and shorter sentences to make the information easier to understand, and also a simple language without complex words. Explanatory text for difficult terms was also mentioned as something that could be helpful, and also bullets when there is much text. Regarding comprehension of the content, for some users it could be easier to absorb information by listening, therefor a text-to-speech feature was suggested. For some users, it may also be important to have the option to listen and read simultaneously to enhance understanding. Finally, it was pointed out that it is important to be able to individualize the support, for example in terms of a slider that allows users to adjust the level of simplification for the information presented.

Regarding the chatbot/AI, participants felt it would be helpful to interact with the service through speech and support from a voice assistant in understanding the content. If the AI could read the texts, they could be made easier to comprehend. Further, AI-generated videos that explain texts would also be beneficial, at least if they are provided by the possibility to adjust the video speed. While participants found AI practical, they reported issues when results were not saved. Additionally, some participants felt that certain responses from AI models were too long or contained difficult words, making them harder to understand. The information sometimes appeared stiff and lacked personality, which made it less engaging. Finally, the accent of the voice could also be distracting.

How to present the information in a better way: In general, the participants said it would be easier to find information with improved information structure, clear headings and buttons. They thought that the text should be concise, balancing details with the broader overview. An AI bot could help adjust the level of detail. A mouseover function could explain complex words and at the same time provide learning. However, a functionality like that should be possible to switch off. Information should be simple and without irrelevant material. There is a need for larger font sizes and clear icons to read or simplify the text. Explanatory text should be brief and to the point, with answers in bullet points for better clarity. Simple Swedish, clear structure, step-by-step instructions, and explanatory terms would also make it easier to understand the content. Better translation tools was also needed, that to provide more accurate information and reduce misunderstandings, ideally with language settings and an icon to indicate the language.

Individualization was discussed as something that is important, and the tool should offer different text presentation options based on individual preferences, such as buttons to switch between text, images, and audio. A function to control the reading speed might be useful. If there is a speaker icon

on the page, it would also be helpful to have a volume control next to it. Sign language support was also requested alongside images for those with visual impairments. AI could be used for both read aloud from the municipalities websites and simplified texts, and AI-generated videos could provide support in explaining the texts.

INSIGHTS FROM WORKSHOPS, INTERVIEWS AND QUESTIONNAIRES

The outcome from the work with gathering user needs was summarized into a list of important aspects to include or take into consideration when designing an AI-tool for users with intellectual disabilities.

Handling of spelling mistakes and support in finding the relevant search terms: Searching for information could be made easier by providing support in choosing relevant search terms and support with correcting spelling errors. If the tool requires perfect spelling or exact keywords it can become frustrating for the users. AI's ability to handle spelling mistakes, abbreviations, and simple questions without requiring rephrasing is important for a smooth user experience. This might also require some form of autocorrect or spelling support.

Shorter and more direct responses: Short and direct answers that appear early in the text, ideally in the form of bullet points to enhance clarity. Challenges in interpretating the information was related to the usage of difficult words and that important information was mixed with irrelevant information. Long texts and complex details can cause users to lose focus and interest. Short, direct answers - preferably summarized in bullet points - make it easier to comprehend information.

Simple and everyday language: It is important to use simple language with everyday words, since complex or abstract terms can be difficult for users with intellectual disabilities to understand. Using advanced and abstract words can quickly confuse users and reduce their understanding. Everyday language and simple sentences are essential to make the tool accessible to the target audience.

Clear visual structure: A clear visual structure, icons that are easy to understand and large fonts and picture supports like pictograms facilitate understanding. A tool with too many options or a confusing layout can be overwhelming. A clear and simple design, with user-friendly icons and clear choices, is important for the target audience to easily navigate and use the tool.

Auditory support: Auditory support will provide a further way to access information and enhance the understanding. Many users in this target group need information to be read aloud, but if this is missing or the icons for reading are unclear, it can limit their possibilities to use the tool. The auditory support should also provide enough support in understanding the content.

Dialogue-based interaction: A dialogue format where AI can ask follow-up questions and adjust its tone according to the user's phrasing as appreciated among the participants. A "friendly" AI encourages continued interaction and reduces the need to jump between different questions.

Consistent tone and style: If AI switches between formal and informal tones, it can create confusion. Users in this group prefer a dialogue-based interaction where AI responds in the same tone as the question. A friendly and consistent tone makes the tool more accessible and inviting.

Customization options without overcomplicating: It was considered important that the user can make simple settings, such as choosing language, text size, and image support without too many options that could feel overwhelming. If users cannot customize the tool to suit their needs (e.g., text size, auditory support, image support), the tool risks becoming difficult to use. Customization options are important, but too many choices and settings can be overwhelming. The balance between flexibility and simplicity is crucial.

Security through clear source information: If the AI pulls information from external sources (outside of the municipalities sources), this should be clearly marked to ensure security and transparency.

It must be fun: The tool must be able to handle all types of questions to create interest among the users. If it only answers municipal-related questions, it is less likely to be used.

DISCUSSION AND CONCLUSION

As expected, and in line with previous research (Johansson et al., 2021), the participants in the work described above had challenges related to language comprehension when using internet or when searching for information. This included both finding relevant search terms and regarding spelling. Presentation of information was also crucial with respect to comprehension. The information must be short and clear and exclude irrelevant information. By providing auditory support a further possibility to enhance comprehension could be added. For users with severe challenges in understanding text, images and videos could be further ways of conveying the information. Beside presenting the information in different ways, additional ways of providing access to the information could also contribute to addressing large variations regarding disabilities (Newman et al., 2016). The need for individualization was discussed in the workshops that were held; however, it was also pointed out that this functionality must be able to manage in an easy way.

ACKNOWLEDGMENT

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