

January 2025

Accessible digital services

Manual for UX researchers and
designers

Research Team,
Department of Research and New Technologies,
Centre for Information Technology



Instructions for use



We have **numbered the chapters** in the report to help screen reader users navigate more easily through the document. We have strived to use plain language and have avoided elaborate words.

Some graphic elements have also been included in the publication. We have used them as adornments in order to offer a more pleasant visual experience for sighted people, and for functional purposes to provide a clear-cut and predictable page layout, split into figures and text.

In order to make the reading more fluent, we have skipped alternative captions under graphic elements. Illustrations are used as frills, are decorative only and therefore do not overload the content.

The graphics style is **minimalist**. It is made up by geometric, soft shapes, a gritty texture and a harmonious color palette. Warm tones are predominant: yellow, orange and red. For contrast, cool colors have been added: navy blue, purple and blue.

We have depicted characters and objects in a simplified way, with highlights of silhouettes and symbols. Each figure contains a technology element (e.g. an on/off symbol on the device screen), which suggests the relation between humans and the digital world.



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About us

The Centre for Information Technology (COI) devises digital services for citizens, businesses and public entities. We've been striving to make them progressively more accessible to persons with various disabilities, recognizing that such services may also be helpful to a number of other users.





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Chapter 1

About the project

Magda Kołba-Górna



About the project

Public e-services give the citizens, both women and men, the opportunity to manage their administrative formalities in an expedite and autonomous way. It is hard to miss the potential triggered by the fact that more and more services are being moved into the digital space; it frees many people from the need to turn up for official appointments at specific, often inconvenient hours. Those who live far from the office are spared inconvenient travel, while those who are professionally active do not need to take days off. This also ensures the inclusion of persons with disabilities who are now able to perform any necessary tasks on their own thanks to accessible technology solutions.



Magda Kołba-Górna

About the project

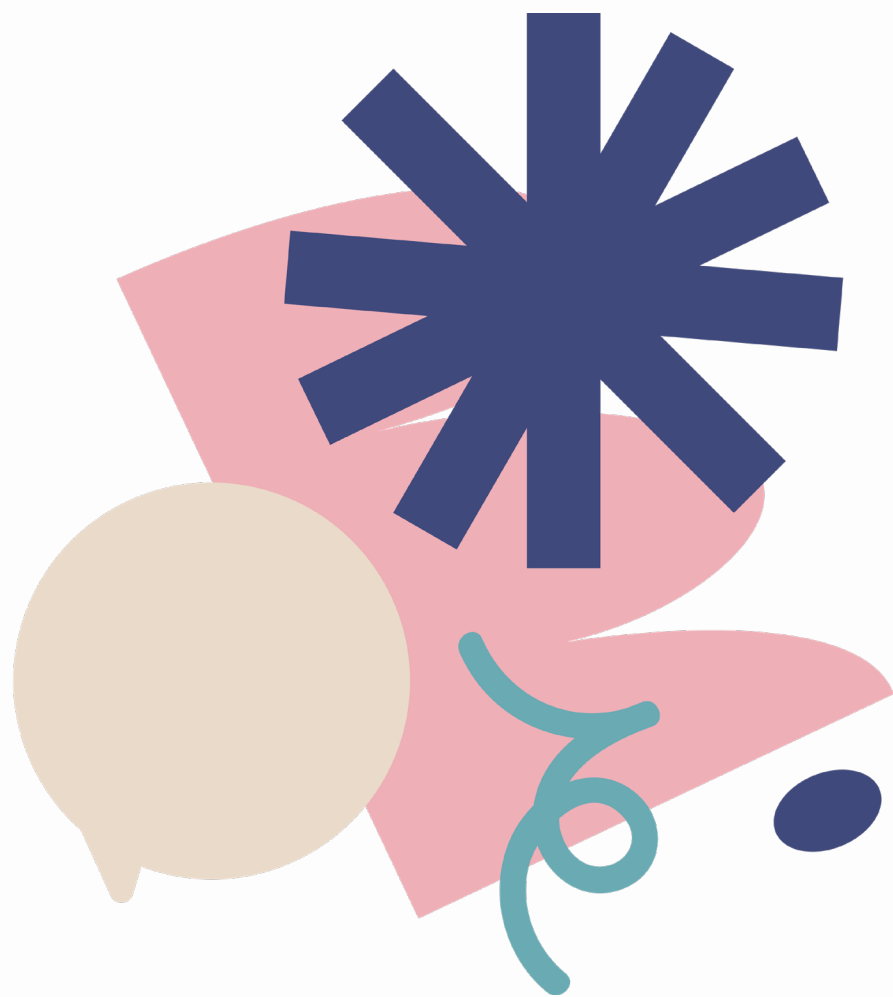


Until now, we have analyzed the needs of persons with disabilities (PWD) against WCAG requirements. The COL's team of experts tested and refined our products, conducted audits and provided training to other teams. However, we felt that this was not enough – and that we wanted to take a wider approach in order to probe into the actual use of digital products. We were wondering when citizens with disabilities would rely on our solutions, what they think of them and how they assess their usefulness in their daily lives.

We conducted a series of qualitative studies split into 4 stages. They were run between 2023 and 2024. We enrolled subjects who are blind, visually impaired, the Deaf and persons with mobility impairments (in their hands and arms).

As part of the project, we also made efforts to prepare for the study: we followed trainings, fast-tracked savoir-vivre workshops and communication courses, and we analyzed the space where interviews were held.





Chapter 1.3

About the project

We would like to share the lessons we learnt throughout the project. We wish to encourage those involved in designing digital solutions not only to think about WCAG audits and compliance with legislative requirements for digital accessibility, but also to take a step further and get into conversation with representatives of different user groups about their experiences and digital services.

We are extremely grateful to all those who accepted our invitation to the study and shared their experiences. This publication is the fruit of our joint effort.

Read on to find out more!

Chapter 2

About accessibility

Kamila Pierunek



About accessibility

Research with users with disabilities poses several challenges.

The first challenge is the disability itself. The user may rely on assistive technologies or have some phone use habits which they have developed over the years but unknown to the researcher. This leads to cognitive load and redirects attention to technical aspects. Please remember that methods used by PWD are just tools and the subject is first and foremost a user who would use their phone to perform a specific task. In this respect, a respondent with disability is no different from a person without any identified disability.



Kamila Pierunek

About accessibility



The second challenge arises because PWD represent an extremely diverse group. The mere breakdown into visual, hearing or movement impairment is but an initial step. Any health-related problems can still vary in terms of their severity, which may fluctuate over time. Disabilities can overlap.

Each subject may take a different approach to their health issues. Some would define themselves through the prism of their disability, while others would consider it as a more or less secondary feature.

Some people hide their disability, do not want to talk about it, and sometimes do not even identify themselves as a person with a disability and would never describe themselves as such.

Add to that the varying level of familiarity with assistive technologies and solutions which support various PWD groups. Just because someone is blind does not mean that they are an expert in screen readers; the fact that someone has limited hand dexterity will not make them able to identify the interface that would work best. A person with disability does not necessarily have expert knowledge about digital accessibility, and most often does not have one.



Things to bear in mind



- **The study usually takes more time than a session with a user without disability.** Because assistive technologies are used, it takes more time to complete the relevant task, technical problems and application errors are more likely to occur, and the user may simply work at a slower pace.
- **Getting to the study site can be a major challenge.** It will certainly be helpful if the subject is picked from an agreed location and is provided with mobility options. Subjects often arrive for the study with an accompanying person. Their comfort should also be ensured.
- The study which involves mapping the natural use of the mobile app (e.g. when in street traffic) requires an additional observer to be present to focus solely on the subject's safety.
- **It would be a waste of time and money to have the subject test something that should be tested first by digital accessibility experts.** Many problems, both technical and UX and UI-related, e.g. faulty interface elements, can be spotted much earlier.
- **Let's open up! Research sessions with persons with disabilities can turn out to be extremely inspiring.** Different perceptions of the world, varying life experiences – all these often lead to truly fascinating discoveries.



Chapter 3

Experiencing inaccessibility

Piotr Bartkowski



Experiencing inaccessibility

Piotr Bartkowski, COI Digital Accessibility Specialist provides answers to four questions.

1.

Which issues related to the digital accessibility of products are right now the most problematic for blind and visually impaired persons?

The use of Website and mobile application interfaces which have not been adapted to screen readers is the most commonly reported problem. In addition, low display contrast, multi-column layouts and zoomed-in GUI elements may also pose problems, especially in mobile applications.



Piotr Bartkowski

Experiencing inaccessibility

2.

What is the most important hurdle to an effective use of devices, apps, Websites or to perform tasks on-line?

For me, as a visually impaired person, what is most troublesome are mobile apps which are not compatible with the VoiceOver screen reader. This can be really frustrating when you are on the move (travel) and causes stress. I have learnt how to deal with this, i.e. I stop and try to manage the application while standing rather than walking. I have less trouble handling products and services on my PC because I use an external screen. So, I can use the Apple macOS built-in magnifier.

3.

What are the key needs of persons with disabilities in terms of improving their experience in digital product use?

This is primarily the question to visually impaired persons concerning their needs and solutions to be tested. Visually impaired persons represent a very diverse user group. In some cases an enlarged font is helpful, in others a small text will work too, but used together with reversed colors. Some of these needs are met by operating systems and their built-in accessibility features. But mobile app and website developers should bear in mind that certain features will work better when they are built based on native solutions.



Chapter 3.3

Experiencing inaccessibility

4.

Which best practices or solutions in digital accessibility that are available on the market are noteworthy? What works well or is moving in the right direction?

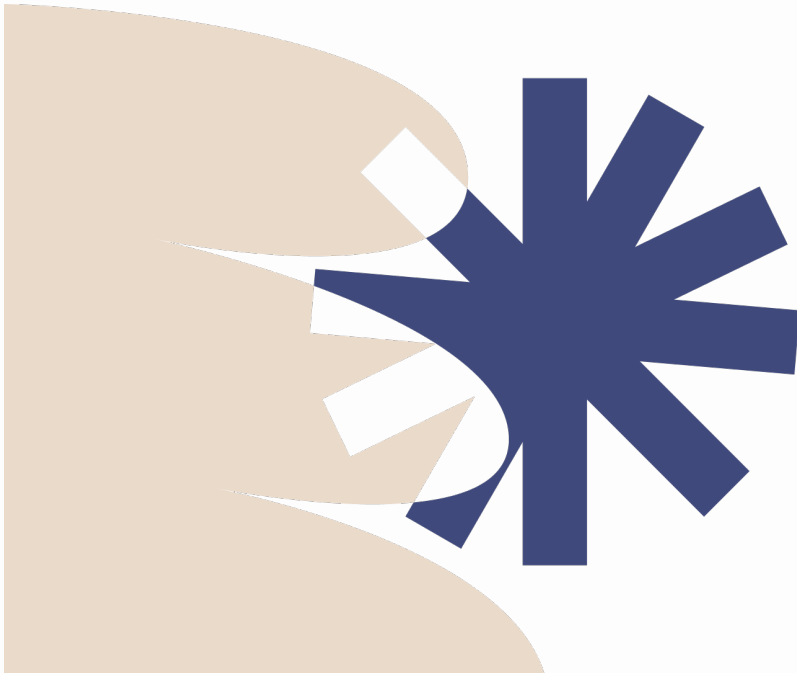
It is good to follow solutions introduced by technology giants, e.g. Apple, Google, Microsoft. Their services are very often accessible to different recipient groups. It is advisable to test solutions before their implementation, and build component libraries with their accessibility in mind. I'm glad to see that the market is more and more attentive to this issue and that the staff is trained in digital accessibility.

Chapter 4

Why to invest in accessibility



Why to invest in accessibility



While digital accessibility is commonly associated with the work for the benefit of people with disabilities, measures which foster accessibility serve also the interest of other social groups. Examples include the elderly and persons with lower digital literacy, i.e. the recipients who need digital solutions which are simple and understandable.

Each of us, at some point in our lives, may face some kind of impairment: break an arm, have a vision or hearing issue or suffer some other limitations. From this vantage point, accessibility may therefore be considered as a human right. Research-supported design is now shifting to universal design.

Therefore, it is sensible to devise and adapt existing services to digital accessibility requirements right now.

Ensuring accessibility

Ensuring accessibility means:

- acknowledging that services are created with care, and the needs of multiple recipients are taken on board,
- recognizing that there are 5.5 million Poles with disabilities¹ who are citizens and consumers,
- compliance with national and EU laws – public entities are required to comply with digital accessibility requirements established in 2019, and starting from 28 June 2025 these requirements will also apply to the private sector in some specific areas,
- cost containment, e.g. reduction in expenditure on user help desks, subsequent improvements at the design or software development stage,
- providing a response to ongoing demographic change and the ageing population: in 2021, every second person with disability in Poland will be over 65 (2.8 million people)².

¹ Data from the 2021 National Census. (2021 National Census), Central Statistical Office (GUS) / Censuses / 2021 National Census / 2021 National Census - final results / Families in Poland in the light of the results of the 2021 National Census. [14.12.2024].

² Ibid.





Tomasz Bednarczyk,

UX designer at the COI

I started to look at designing from a new perspective.

I realized how much the comfort of use is affected by such factors as the complexity of interactions, environmental conditions or the diversity of needs. With this, I am able to design more intuitive and accessible solutions, aligned with WCAG standards, which enhances the experience for all the users. In addition, accessibility is becoming increasingly important because of legal requirements and market expectations; therefore, it was a great value for me and our team to beef up these skills.



Michał Mruk,

UX designer at the COI

Thanks to my participation in mCitizen studies with people with disabilities, I have gained better understanding of their needs and barriers, and now I am able to develop more accessible and intuitive interfaces. I also learned how important it is to test solutions with diverse recipient groups at different designing stages.

Chapter 5

General conclusions and recommendations



About disability

Disability is not always an important aspect of PWDs' identity. Our users include citizens, partners, parents, students, employees or athletes.

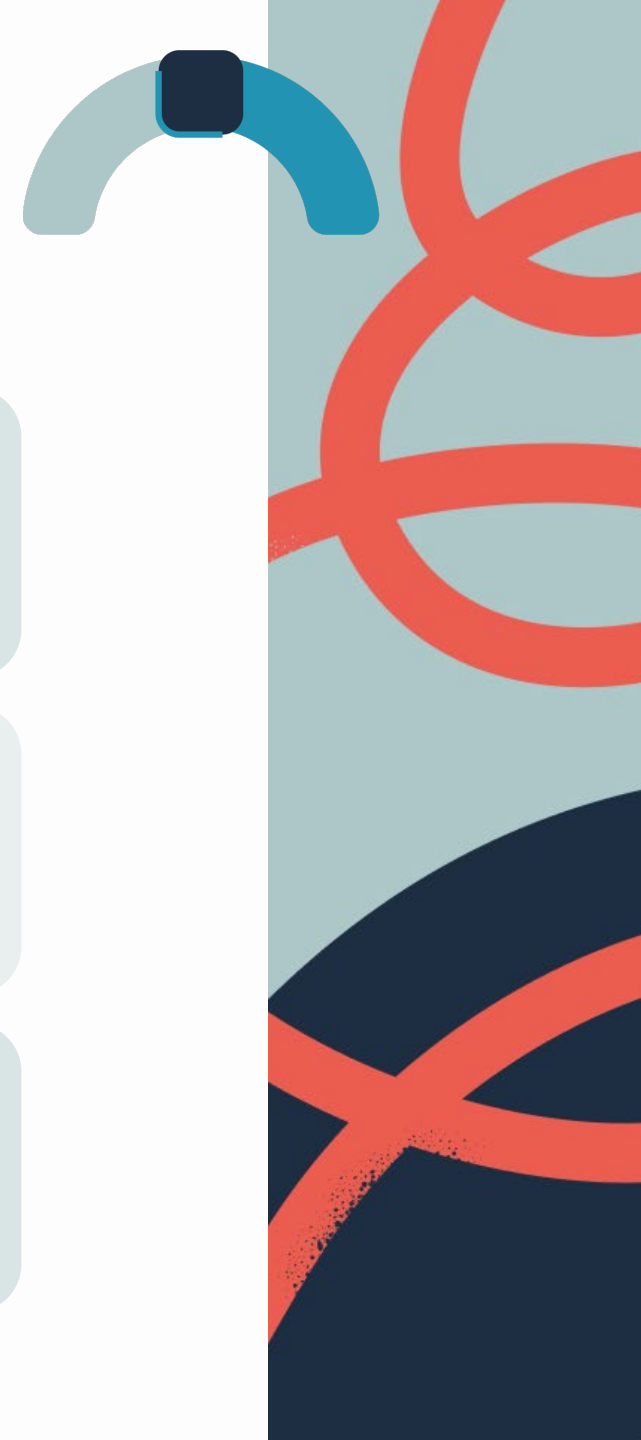
The Deaf use **Polish Sign Language (PSL)**. Phonic Polish is like a foreign language to them. For this reason, the Deaf have more troubles with reading and written communications.

The experience of disability **corresponds to a wide and very diverse range of variants**, depending on the degree of disability, its overlapping symptoms and the dynamics of change (intensification or weakening).

Persons with hand disabilities may experience difficulty holding devices and operating touchscreens with precision.

Progressive or sudden loss of functions causes severe stress and psychological pain. This is also a physical and intellectual challenge, involving **learning to use technology in novel ways.**

PWD tend to use digital solutions on mobile devices. Visually impaired persons (as the only ones among our subjects) defined their preferred model and manufacturer (iPhone from Apple).



About disability

Persons with disabilities want to be autonomous and independent. They expect to get there thanks to accessible solutions.

Limitations of accessibility, communication channels and lack of tutorials discourage them from using digital solutions in full (higher entry threshold).

Visually impaired persons need devices which magnify screen content and provide an option to adjust display contrast and interface colors.

Social media groups and associations are the most important platforms to share and learn about digital technologies and their use.



About digital services

Interface customization

Conclusions

- Accessibility is reduced by the lack of flexibility and customization options

Recommendations

- Introduce customizable color patterns, layout, size of elements.
- Introduce adjustment features with caution. An imposed set of solutions may support accessibility in some situations and impede in others, e.g. large buttons will help people with mobility impairments but may cause confusion for the visually impaired.

About digital services

User Interface

Conclusions

- Small interface elements are a hindrance (persons with mobility vision impairments).
- Buttons away from the dominant hand are non-functional (persons with motor impairments).
- Excessive interface complexity may be a barrier (the Deaf and the visually impaired).
- Missing alternative descriptions for graphics and apps not adapted to screen readers are problematic (the blind)
- The lack of display contrast change option and the dark mode is quoted as a major inconvenience (visually impaired persons).
- Visual signage or acronyms (e.g. PSL) make it easier to find a path dedicated to a specific user group (the Deaf).

Recommendations

- Enlarge buttons and interactive elements, and bring them within reach.
- Reduce the complexity of screens and discard any non-functional frills.
- Test solutions for their digital accessibility compliance.
- Introduce the dark mode and display contrast change option.
- Add visual direction signs and acronyms for each group.

About digital services

Accessibility of functions and navigation

Conclusions

- There is no electronic document for PWD similar to the digital identity card (*mDowód*).
- Registration processes may be complex at times, have pre-set time limits to confirm operations, and require switching from mobile to Web-based applications (often not adapted to mobile devices).
- Creating a traditional password and logging is too complicated.
- Forms can sometimes be too long and complex.

Recommendations

- Add an PWD ID card in mCitizen app.
- Explain registration and login processes on mobile devices, e.g. develop videos with transcription and translation in the PSL.
- Explain password requirements before it is created, quote examples or types of errors, e.g. *Special character means !,.,@, #.*
- Create a simplified logging option and encourage to use biometrics.
- Facilitate data input through automatic feed and confirmation options, and set more time for acceptance.

4.

About digital services

Language and content

Conclusions

- Screen reader users prefer clear-cut titles and headers. Information of relevance and keywords used at the beginning of a sentence and short selection lists arranged alphabetically are helpful in finding a specific piece of text.
- Elaborate verbiage is a barrier for the Deaf; they need plain language and preferably translation into the PSL.

Recommendations

- Titles and headers should clearly indicate the stage of the process or the relevant screen content. Then, the user is able to decide whether to skip it or not.
- Use short selection lists or alphabetically sorted lists.
- Place key words at the beginning of sentences to help understand what the text is about.
- Use plain language and translations into the PSL.

About digital services

User support

Conclusions

- The fear of error is a hurdle to the free use of technology.
- There is a shortage of educational materials adapted to the needs of people with disabilities.
- Difficulties in reporting problems (lack of clear pathways for the visually impaired, communication barrier for the Deaf).
- The non-involvement of persons with disabilities at the testing stage reduces the accessibility of services.

Recommendations

- Improve process transparency and provide technical support.
- Develop instruction materials for different target groups.
- Instead of describing a challenge, provide a list of issues for users to pick one which they find relevant,
- Add support for reporting in the PSL or the option to report issues in the form of recording.
- Regularly involve users with various disabilities in the testing process.

Chapter 6

Detailed conclusions and recommendations

Scan the QR code from the graphic
on the right side in order to read
the reports





Chapter 7

Blind and visually impaired persons

Blind and visually impaired persons

Conclusions



- **Visual impairment covers a broad spectrum of symptoms.** Persons who are blind and visually impaired can have the same or varying needs in relation to technology. This depends on several factors, including the degree of disability, the life situation and the context of use. For example, visually impaired persons do not need to use screen readers, but often do so when lighting conditions are poor.
- **Failure to meet accessibility standards** under the WCAG guidelines causes time losses and leads to a lower quality of user experience. E.g. misaligned headers on Websites or advertisements impede the search for relevant information.
- **Users need customization,** they want to adapt applications to suit their individual needs, for example to change the menu layout or enable the dark mode.

Blind and visually impaired persons

Conclusions



- **Support tools are essential** in the daily life of visually impaired persons. The most basic include VoiceOver screen readers (iOS), TalkBack (Android) and magnifiers. Braille keyboards, tools for changing the display contrast or switch between light and dark modes are also in common use.
- **There is a fine line between the need for autonomy and the need for support.** With excessive assistance from outside, PWD may feel that their autonomy is not fully recognized. On the other hand, very limited technological support can reduce independence, e.g. because of the missing biometric log-in functionality users need to enter their password when they stay in public places.
- **Searching for information on social networks** is the preferred way to learn about available solutions, pick up novelties and find motivation to learn new things, e.g. “Available Apple” group on Facebook.

Blind and visually impaired persons

Conclusions



- **Technologies should be aligned with the context of daily tasks.** This means adaptation to real-life usage scenarios, which are not idealized situations, e.g. a blind mum needs to be able to use an app efficiently with one hand while walking with her child or travelling by bus.
- **Large-scale and unexpected changes in interfaces are frustrating** as PWD need to check the new layout with a screen reader and learn new navigation paths.
- **Impairment affects mental health** and can significantly hinder adaptation to technology tools which foster autonomy. For instance, someone who loses their sight will experience tough emotions because of reduced independence and will postpone the moment when they'll learn new ways of handling their smartphone.
- **Withdrawal from reporting issues.** Most users assume that their opinions will not be taken on board.



Blind and visually impaired persons

Recommendations



- **Compatibility with supporting devices.** Streamline applications to make them compatible with VoiceOver, TalkBack and magnifiers.
- **Accelerating navigation.** Apply a hierarchical logic in the screen layout with more relevant information located earlier (more to the top, closer to the left). Arrange lists alphabetically and shorten them.
- **Increased access time to messages.** Reduce the number of fast disappearing notifications, enable their re-reading.
- **Simplicity and ease of operation.** Reduce to the minimum hassles at the login and confirmation stages, e.g. password masking, CAPTCHA codes. Provide alternatives, e.g. audio equivalents.
- **Interface customization.** Allow users to customize the layout of the application, e.g. by arranging menus according to their needs and priorities.
- **Visual adaptation.** Introduce the dark mode and options to change display fonts and contrasts for an easier use by the visually impaired.
- **Preparation for a change.** Inform about planned updates, provide instructions to support learning the navigation in the new interface.
- **User participation in testing.** Involve visually impaired persons in the testing of mobile and web-based applications to recognize their actual needs.

Chapter 8

The Deaf





Chapter 8.1

The Deaf

Conclusions

- **Polish Sign Language (PSL) is the primary** vehicle of communication for deaf persons, and phonic Polish is a foreign language for them. As a result, the Deaf of Polish nationality have different proficiency levels in Polish language. This can affect the understanding of content in applications and Web-based services, as well as the ability and speed of writing.
- **Communication with deaf persons** requires an interpreter or the use of simplified written language. This is a challenge in official and public situations, but also when health or life are at stake. Communication barrier can be overcome thanks to the assistance of interpreters, relatives and the use of communication cards (pictograph task cards).

The Deaf

Conclusions



- **Avoiding technical phrases and using plain language is the first step towards better accessibility for Deaf persons.** The key barriers include strenuous registration process, intricate words, unfamiliar phrases and jargon in the application language (e.g. the subjects did not understand the word “biometrics”).
- **Integrating textual and visual layers.** Visuals and graphics make digital content easier to understand. For example, respondents were unable to create the password because it was not clear to them what a “special character” meant and no examples were provided.



The Deaf

Conclusions



- **Write “the Deaf”, “d/Deaf” or “deaf person”. Avoid the word “deaf-mute”** as it suggests the lack of language – this approach is wrong and unacceptable to the Deaf. The Deaf represent a culture with their own language, and “deafness” is a physical characteristic. Not every person who has lost their hearing belongs to the Deaf.
- **Deaf persons have greater fear of error and lower confidence in technology. This is due to their limited communication capabilities** which impair correct content understanding, prevent them from making corrections or clarify any misunderstanding through unmediated communication. For this reason, the Deaf avoid using digital services, out of fear of serious consequences, e.g. losing money in banking operations.



Chapter 8.4

The Deaf

Conclusions

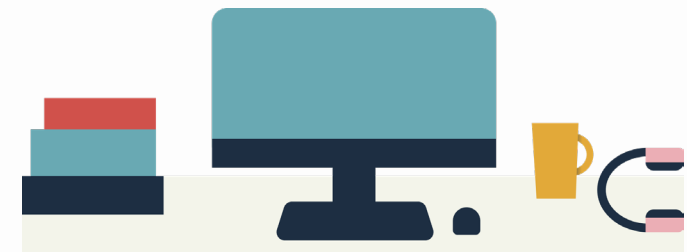
- **The community remains a vital source of knowledge** – this is where the Deaf will learn about new technologies or share interesting facts. Organizations such as the Polish Association of the Deaf play an important socializing role.
- **Assistive communication technologies are applications for video calls, and enable to send short video messages similar to a text or voice messaging.** Some persons would set a different vibration mode on their phone to tell the difference between functions or people, e.g. different vibrations for the alarm clock, a call and a text message.

The Deaf

Recommendations



- **Translation into the PSL.** Key application functionalities should be translated into videos in PSL. These may include instructions about registration, logging and service use. It would be advisable to have a real-time video call with an interpreter or to organize asynchronous communication.
- **Plain language.** Use the principles of plain language, avoid long sentences, abstract concepts and jargon.
- **Textual content with visual supports.** Create symbols and graphics aligned with the text for them all to facilitate correct understanding of the text.
- **Signs dedicated to the Deaf.** Make applications easier to navigate, mark deaf-friendly functions with icons or acronyms, e.g. the PSL.
- **More time for actions.** Extend the time allocated to perform key actions, e.g. confirming identity or filling in forms, to give a chance to those who are slower readers or writers.
- **Education and manuals.** Create simple tutorials or educational materials in the PSL to lower the entry threshold for new users and help them overcome the fear of technology.
- **Easier problem reporting.** Introduce the option to report issues by selecting them from a pre-defined list and allow to send a screencast or a conversation in the PSL.



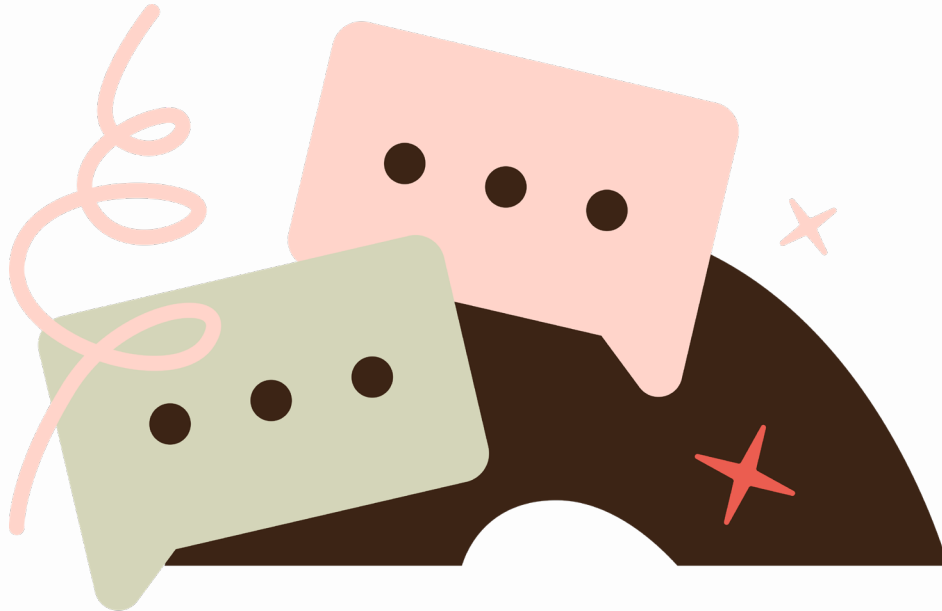
Chapter 9

Persons with motor impairments



Persons with motor impairments

Conclusions



- **The experience of disability is dynamic** as it may deteriorate or improve. It often requires physical, mental and social adaptation, which may take time, be challenging and costly.
- **Dependence on the help from others.** In a number of situations, persons with motor impairments need to ask relatives or carers for help in managing life tasks or using apps, which reduces their autonomy.
- **Technology and digitization are enablers in return to agency.** Mobile devices represent the most accessible option to connect with the world and a way to unconsciously exercise your hand. Digital solutions may sometimes support the process of regaining autonomy by providing opportunities to manage formalities remotely.

Persons with motor impairments

Conclusions

- **The right size of smartphone matters.** As standard phones are getting bigger and bigger, it is more and more difficult to hold them and navigate with fingers across the surface at the same time. Small ones are handier, but generate more mistakes when precision is required.
- **The location of the buttons and the distances between them are important.** Many mobile apps are not aligned with the needs of people with hand impairment: it is assumed they are right-handed or can easily reach the top of the screen, e.g. it is challenging to hold the phone and touch the back button in the top left-hand corner of the screen with a disabled hand.
- **Lack of interface flexibility and need for customization.** Application interfaces should allow for the adaptation of their layout or element size to the needs of their users, e.g. arranging important functions within the reach of the thumb of an able-bodied hand.



Persons with motor impairments

Conclusions



- **The role of support devices.** User appreciate devices which support voice control, but also specialized mice, keyboards or simple phone grippers.
- **Low confidence in technology.** Because of the fear of losing data or not being able to complete the process online persons with mobility impairments give up the digital option and opt to manage their formalities in person.
- **Problematic forms and non-adapted digital services.** The completion of lengthy online forms, especially on mobile devices, is difficult, time consuming and often cannot be performed on one's own. As a result, formalities need to be completed in person, which is also very time-consuming.



Persons with motor impairments

Recommendations



- **Interface customization.** Ensure the customization in mobile apps for everyone to be able to adapt them to their very individual needs and limitations, e.g. customization of menu layouts.
- **Friendly navigation.** Make the mobile app easier to navigate – place important action buttons at fingertips, e.g. lower on the screen and with access on both sides, simplify the login and confirmation process, e.g. with biometrics.
- **Larger interface elements.** Enable users to enlarge buttons, text boxes and interactive elements in applications to make their use easier for those with limited precision of movement.
- **Data input and navigation options.** Allow the use of autocomplete function or a voice assistant.
- **Independence through digitization.** Lower the application entry threshold to enable anyone who is temporarily hospitalized or has a permanent disability to manage their affairs. This will give them the autonomy and more control over their life.
- **Education in crisis.** Develop a manual for people who have become disabled and for their relatives to show them how to manage their new situation.

Chapter 10

Way forward



Way forward

People with disabilities represent a diverse group of citizens, with individual needs and limitations. The group includes persons with mobility impairments, the blind, visually impaired persons or the Deaf. Add to that groups of persons with neurodiversity and with intellectual disabilities who have not yet been covered by our research – this will change! This complexity boils down to one general recommendation: there should be a growing customization of digital solutions.

A lot has been done to adapt pavements, buildings or public transport to the needs of PWD. They have gained more autonomy, but these changes turned out to be beneficial to parents with young children or the elderly as well. A similar challenge is now posed by the rapid advances in technology where more and more activities can be transferred to the virtual space.

Digital accessibility removes the obstacles which may stand in the way to meet such needs.

It would be sensible to look at accessibility from a broader perspective. All areas of life, including daily chores, work, health, recreation or close relationships, are becoming increasingly hybrid. We meet needs in real and virtual worlds, and accessibility creates equal opportunities for everyone.

Digital solutions represent an opportunity – they can expand the options for action and the scope of freedom for users, including PWD. If accessibility is not ensured they become a threat – they can exclude, discriminate and aggravate inequalities. Much remains to be examined. And even more to be done.



Thank you!



Ministry of Digital Affairs
Republic of Poland

We Make the Future

COI Centre for
Information
Technology