USERS
AS
EXPERTS

Intellectual Output 3:

Typology of web accessibility user expertise among persons with disabilities

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1 Introduction

This document summarizes the findings of Intellectual Output (IO) 3: Typology of Web Accessibility User Expertise among Persons with Disabilities. It is the third IO of the Users as Experts project.

IO3 aims to define competences and competence levels in the field of web accessibility and relate them to practical application areas. The typology links this level with existing and acquired knowledge that people with disabilities who want to develop into user experts should bring with them or learn. A special feature of the typology is that, in addition to the classic web accessibility expertise and helpful inherent skills, it specifically considers and lists the experiential knowledge of people with disabilities that is valuable for web accessibility user expertise and that should be taken up and built upon.

Competencies or practical application areas are additionally mapped to vocational training and certifications that already exist in the area of web accessibility. However, so far these are not specifically based on the user expertise of people with disabilities.

The typology deliberately tries to reduce complexity in order to structure and relate "competencies and practical application areas" and "existing and acquired knowledge" (as well as "training and certifications"). The typology is intended as a conceptual model and will not be able to reflect in all details the actual existing diversity of user expertise of people with disabilities as well as their potential possible application in different work contexts in the field of web accessibility consulting.

In the following, we briefly introduce the research project "Users as Experts". In the chapters that follow, we focus on the description of the methodological and content-related design of IO3 and the typology of web accessibility user expertise among persons with disabilities (terminology, methods, typology in graphical and textual form).

1.2 About the project "Users as Experts"

People with disabilities who use websites and web services often have to deal with inaccessibility. Their experiential knowledge can be the starting point for developing expertise on web accessibility.

Based on this basic assumption, the Users as Experts project develops an innovative concept for training and building user expertise in the field of web accessibility and makes the results available on the project website https://www.funka.com/en/user-as-experts.

The goal of the research project is to promote inclusion and career opportunities for people with disabilities by providing an innovative educational program that builds on personal experiences and skills, specifically aimed at developing user expertise of people with disabilities in the area of web accessibility.

The project consists of the four Intellectual Outputs (IOs):

- IO1: Repository of user expertise best practices,
- IO2: Methodological toolkit for the identification, professionalisation and certification of user expertise,
- IO3: Typology of web accessibility user expertise among persons with disabilities and
- IO4: Model curriculum for a user expertise course in web accessibility.

The project "Users as Experts" is a strategic partnership funded by the EU education program Erasmus+. The project will run from 11/2020 to 11/2022.

Strategic partners are

- Funka Nu AB (project coordinator), Sweden,
- SYNTHESIS Center for Research and Education, Cyprus,
- DIAS GmbH, Germany and
- Föreningen Furuboda, Sweden.

2 Terminology

The typology works with the terms "competencies and practical areas of application", "existing and acquired knowledge", and "vocational training and certifications". These are briefly explained below.

2.1 Competencies and practical areas of application

Competencies are closely related to the practical application domains of user expertise in the field of web accessibility. The term "competence" focuses on the subject, i.e. the user expert, while the term "practical application area" focuses on the object, i.e. the organization in which the competence might be needed. In the typology, the two domains merge.

Competence develops fluidly, reaching different levels in different domains. This implies different levels of competence can coexist within the same person. In our conceptual model, user experts begin their development on a foundation of experiential knowledge that they bring with them. Often, some basic levels of competence can already be assumed when users are engaged in practices within some area of application.

Drawing on the "repertoire of experience" of people with disabilities distinguishes the conceptual model from classic approaches in the field of vocational education, such as the certifications of IAAP which are designed to certify any expert, independent of the experience of using web content with a disability. User experts continue to develop by combining the perspective of their own actual user experience and factual domain knowledge. Over time and through practice, they progress at their own pace to more advanced levels of competence. As their experience and knowledge develops, a wider range of practical application areas becomes available (for example, in roles such as inhouse accessibility auditing or quality assurance within large organisations, or as expert in organizations that provide web accessibility consulting services).

2.2 Existing and acquired knowledge

Under *existing knowledge*, we subsume experiential knowledge and personal traits that people with disabilities can bring with them:

- "Experiential knowledge" is composed of knowledge that has built up in everyday practices and experiences when interacting with a digital environment in its social

context, and skills that develop through individual ways of using web content (e. g., the skill of using an assistive technology).

- By "personal traits" we mean characteristics that make us feel comfortable about a task. A personal trait, such as analytical thinking or the enjoyment of communication, is inherent in a person, but can be further developed and expanded over the course of a lifetime.

2.3 Training and certifications

Existing training courses and certifications were researched that specifically address the field of web accessibility. We investigated both offers on level of the national Member states involved as well as offers at the European or international level. The training schemes and certifications identified usually address everyone (with or without disabilities) and usually focus mainly on learning (training) or the testing and certification of factual knowledge.

3 Methods

Methodologically, the development of the Typology of web accessibility user expertise among persons with disabilities took place as an iterative co-creation process. This meant that different actors could all contribute in the development and validation of the content:

- the project partners with their respective different expert knowledge;
- the potential target groups of the project, e.g.
    - people with disabilities and disabled people's organizations (DPOs);
    - vocational education and training providers (VET providers);
    - public sector bodies;
    - private sector companies.

The development took place in several steps.

At the beginning, areas of competence for web accessibility (in general and specifically related to people with disabilities) were identified, structured, and compared with existing certifications (national, European, international). This first, project-internal part of the methodological development of the typology was done jointly and in regular exchange with all project partners. The overview of vocational training and certifications was also developed in a joint data collection with all partners.

Subsequently, the draft typology was discussed and validated in four workshops and three individual interviews with a total of 27 members of the target groups.

- Workshop I (online focus group, 9 participants: user experts with disabilities, representatives of DPOs, public sector bodies and private sector companies)
- Workshop II (online focus group, 5 participants: user experts with disabilities, representatives of public sector bodies)
- Workshop III (online focus group, 7 participants: representatives of DPOs, public sector bodies and private sector companies)
- Workshop IV (online focus group, 3 participants: representatives of DPO)
- Interview (2 telephone interviews, 1 in-person interview) with 3 advanced Web Accessibility User Experts with disabilities

The completion of the typology was based on the results of the workshops and interviews and in final consultation with the partners.

4 Typology

The typology schematically relates "competences or practical application areas" of web accessibility user expertise to the "acquired knowledge" that user experts with disabilities bring with them or can acquire (see table).

The bottom row of the table lists "Existing resources", i.e., existing vocational training and certifications in the field of web accessibility that match the respective competences.

"Competences or practical application areas" are divided into a theoretical area where user experts provide training support in terms of awareness raising, information, and consulting, and a practical part where user experts provide support in terms of practical activities, for example, by demonstration, basic testing or advanced testing and consulting. Competences build on each other. There are basic and advanced levels.

<table>
<tr><th></th><th>Awareness</th><th>Information & consulting</th><th>Demonstration</th><th>Basic testing</th><th>Advanced testing & consulting</th></tr>
<tr><td>Experiential knowledge</td><td colspan="2">✓ Experience of exclusion
✓ Knowledge of one’s specific, individual user needs (web)</td><td colspan="3">✓ Good level of assistive technology competence (if applicable)</td></tr>
<tr><td rowspan="2">Personal traits</td><td colspan="2" rowspan="2">✓ Ability to explain and convince (ambassador skills)</td><td colspan="3">✓ Digital affinity (technical interest)</td></tr>
<tr><td></td><td colspan="2">✓ Enjoys working with assistants & quality assurance (teamwork skills)
✓ Likes to work in detail (analysis skills)</td></tr>
<tr><td rowspan="3">Acquired knowledge</td><td rowspan="3"></td><td rowspan="3">▪ Rights of people with disabilities
▪ Web Accessibility Directive & European Accessibility Act & related national laws
▪ Web Accessibility Standards (WCAG, EN 301 549)
▪ Knowledge how people with different disabilities, user needs and assistive technologies / adaptive strategies use digital products
▪ Know strategies for the implementation of sustainable accessibility in organizations</td><td colspan="3">▪ Increasing knowledge of how to conduct accessibility testing</td></tr>
<tr><td></td><td colspan="2">▪ Technical know-how: familiarity with HTML, WAI-ARIA, CSS
▪ Basic understanding of web development processes
▪ Basic knowledge of the underlying technologies (operating system, application, assistive technology)
▪ Knowledge of standardised test procedures, accessibility specifications and techniques
▪ Knowledge of evaluation tools for web accessibility
▪ Ability to read/understand English
▪ Ability to report test results in a comprehensive way</td></tr>
<tr><td colspan="3">▪ Knowledge of limitations of user demonstration, task-based testing and partial audits</td></tr>
<tr><td>Existing Resources</td><td colspan="2">IAAP CPACC, Introductions on web accessibility (e. g. W3C, MOOCAP), MOOC Integrating Web Accessibility in Curricula in higher education (IWAC), Curriculum of the Swedish project Users as Experts</td><td colspan="3">IAAP WAS, Web A11y by Google, MOOCAP further courses</td></tr>
</table>

Visual structure of the table

- Top column headers: orange with dot pattern (Awareness / Information & consulting) and green with diagonal line pattern (Demonstration / Basic testing / Advanced testing & consulting).
- Row headers left: blue (Experiential knowledge / Personal traits/ Acquired knowledge /Existing resources).
- Content area: grey.

In the following, the typology is described in textual form.

5 Support and manage accessibility: Awareness raising, Information & Consulting

Here, user experts provide support by raising awareness and by contributing information and consulting. They offer face-to-face or remote training sessions or workshops where they inform about aspects such as user needs, relevant standards, or common obstacles, and provide examples, also drawing on their own user experience, rather than offering hands-on consulting or testing.

5.1 User experts' experiential knowledge of exclusion

Web content that is not designed to be accessible excludes people with disabilities or makes it at the very least difficult to use. Digital barriers lead to experiences of exclusion for people with disabilities. A blind person or a person with severe motor impairments relies on keyboard operation, and will often discover that not all interface elements can be operated with the keyboard since they only support mouse interactions. For example, the result may be that a form cannot be sent because the "Send" button is not keyboard-operable.

Against this background, we assume that people with disabilities have: *Experience of exclusion.*

People with different disabilities use web content individually, and therefore also encounter specific barriers related to their respective disability. For example, if information is only presented visually, blind users or users with severe visual impairments will not perceive it. For these users, it is vital that images or graphics have alternative texts that are available for their assistive technologies, such as screen readers. For a user with impaired hearing, on the other hand, the lack of alternative texts for images is no barrier. If an online video is missing captions, this would be irrelevant for a blind user, but for a hearing-impaired person, captions are crucial for the perception and understanding of such a video.

Through the daily use of web content, people with different disabilities (e. g. blindness, low vision, auditory disabilities, motor disabilities, cognitive disabilities) know which barriers make participation difficult or impossible for them. They also know where their particular user needs lie.

Another aspect of the experiential knowledge of people with disabilities is therefore: *Knowledge of one's specific, individual user needs (web).*

5.2 Useful personal traits

User experts who want to promote awareness, or inform and advise, should have an interest in communication and sharing. We refer to this existing personality trait as: *Ability to explain and convince ("ambassador skills").*

5.3 Acquired knowledge for two levels of user expertise

"Awareness" is considered the basic level of this field of user expertise. Within the framework of vocational training, user experts can gradually reach the more advanced level "Information & consulting".

5.3.1 Basic level: Awareness

In order to create awareness for individual experiences of exclusion and personally experienced digital barriers, acquired knowledge is not necessarily required.

Sharing one's own experiences and thus raising awareness is a first, important practical application of user expertise. As the saying goes: knowledge is the first step to change.

Users with disabilities can speak authentically and convincingly about their own experiences. Target groups, such as public sector bodies or private sector companies, thus realise that and how they exclude individual persons with disabilities and receive an incentive to act.

However, it is important to stress that users at this basic level can only report from their individual perspective and on the basis of their personal experience. At this level, they cannot speak for the entirety of people with disabilities or transfer their individual needs to generally accepted requirements for web accessibility.

Awareness raising is therefore a first step, but additional web accessibility expertise is needed for comprehensive and sustainable web accessibility guidance.

5.3.2 Expertise for the advanced level: Information & consulting

In order to be able to support target groups with information and counselling, expertise should be developed on the following topics:

- Rights of people with disabilities, e. g. Convention on the Rights of Persons with Disabilities (CRPD), Charter of Fundamental Rights of the European Union, as well as national instruments on disability rights

- Web Accessibility Directive (WAD) and European Accessibility Act (EAA), as well as related national laws and their practical significance for obligated stakeholders (e. g. scope, minimum requirements, implementation deadlines, disproportionate burden clause, accessibility statement, feedback mechanism, complaints mechanism, monitoring)
- Web Accessibility Standards (Web Content Accessibility Guidelines - WCAG, EN 301 549 - Accessibility requirements for ICT products and services / for requirements on web content: see EN 301 549 Annex A, Table A.1)
- Knowledge how people with different disabilities / user needs (without the ability to see, with limited vision, with limited ability to perceive colours, with auditory disabilities, with limited motor skills, with limited ability to speak, with cognitive disabilities, with a sensitivity to light flicker that can trigger seizures) and with different assistive technologies / adaptive strategies use digital products and how user needs were translated into the success criteria of the Web Accessibility Standards (and further best practices)
- Knowledge of strategies for the implementation of sustainable accessibility in organizations

The main focus here is on the repertoire of knowledge relating to the standards, laws, and implementation strategies that every web accessibility consultant needs. With this expertise, user experts can explain to public sector bodies or private sector companies, for example, what the requirements of laws like the Web Accessibility Directive mean in practice. What kind of web content must be optimised for accessibility? What additional measures, such as the publication of an accessibility statement or the provision of a feedback mechanism, is required? Beyond that, user experts can also advise regarding long-term, organisational strategies.

User experts are uniquely able to draw on their own experiences of exclusion and their user needs and to relate them to the experiences and needs of other user groups with disabilities. The aim is to broaden the user expertise beyond one's own horizon and thus to become able to speak for the diversity of people with disabilities. An advanced user expert is also able to match the digital participation needs of people with different disabilities with the requirements defined by the recognised web accessibility standards.

5.4 Existing resources: Vocational training and certifications

This field of user expertise, especially the more technical information on web accessibility (disabilities and disability groups, disability rights, web accessibility standards and laws, remediation techniques, management strategies) has an intersection with the following training and certification:

- International Association of Accessibility Professionals (IAAP): Certified Professional in Accessibility Core Competencies: https://www.accessibilityassociation.org/s/certified-professional
- Introductions on web accessibility, e.g.
    - World Wide Web Consortium (W3C): An Introduction to Web Accessibility (5 modules: What is Web Accessibility, People and Digital Technology, Business Case and Benefits, Principles, Standards, and Checks, Getting Started with Accessibility): https://www.edx.org/course/web-accessibility-introduction
    - MOOCs for Accessibility Partnership (MOOCAP): Introductory Course - Digital Accessibility: Enabling Participation in the Information Society https://www.futurelearn.com/courses/digital-accessibility
- MOOC Integrating Web Accessibility in Curricula in higher education (IWAC): http://www.iaapnordic.org/projekt/iwac/, Handbook: http://www.iaapnordic.org/contentassets/f4a8a77de778400c857166d23090cf2b/iwac-handbook_final-.pdf
- Curriculum of the Swedish Users-as-Experts-project (Användare som experter): https://www.furuboda.org/malmo/projekt-och-kurser/anvandare-som-experter-kursen

6 Evaluate the accessibility of web content and advise on solutions: Demonstration, Basic testing and Advanced testing & consulting

Here, user experts provide practical support for the implementation of accessibility by demonstrating the results of using their specific assistive technology in practice, or by using it to operate or test web content. The accessibility and usability of a website can be assessed at a basic level, e. g. by a user with a disability performing a specific task on a website in his or her individual mode of use, or, at an advanced level, by evaluating websites or web-based applications against published technical standards and guidelines for web accessibility. We consider "demonstration" as basic level, "basic testing" as intermediate level and "advanced testing & consulting" as the highest level of this area of user expertise.

6.1 Experiential knowledge that user experts bring to the table

Whether in education, at work or in leisure - there is more and more web-based information, activities and processes in everyday life. Accordingly, people with disabilities regularly use the Internet. In doing so, they often use assistive technologies and/or adaptive strategies, depending on their disability:

- *Assistive technologies* are hardware or software products that support digital access. For example, blind people use screen readers and/or Braille displays, visually impaired people use magnification software or screen magnifiers, people with motor disabilities of arms and hands use speech recognition software, special keyboards, or mouse alternatives.
- *Adaptive strategies* are ways of acting that support the use of digital content, e. g. when visually impaired people set individual colours or font sizes in their browser, when people who cannot use a mouse operate web content with the help of the keyboard, or when people with cognitive impairments turn off distracting moving content.

Beyond the basic competence required for using desktop computers and smartphones, people with disabilities also have additional skills of using assistive technologies and/or adaptive strategies. Their experiential knowledge can thus be summed up as: *Good level of assistive technology competence (if applicable).*

6.2 Useful personal traits

User experts who conduct demonstrations or audits basically benefit at all levels from: *Digital affinity (technical interest).*

For the more advanced levels, where detailed testing becomes central, the following personal traits have been found to be worthy of attention:

- *Enjoys working with assistants and quality assurance (teamwork skills)*
- *Likes to work in detail (analysis skills)*

6.3 Acquired knowledge for three levels of user expertise

"Demonstration" is considered the basic level of this field of user expertise. Within the framework of vocational training, user experts gradually reach the intermediate level "Basic testing", followed, as the case may be, by the highest level "Advanced testing & consulting".

In this practical area, user experts work primarily with those responsible in development departments (concept developers, designers, developers, web editors): it is here where the requirements of web accessibility are actually turned into accessible designs and technical implementations.

6.3.1 Increasing testing expertise - across all levels

In the course of the training and through the subsequent practical work, user experts develop an: *Increasing knowledge of how to conduct accessibility testing*.

The evaluation of web content can be challenging, especially when it comes to assessing whether a particular implementation technique actually meets the Success Criteria of the Web Accessibility. The accessibility standards do not prescribe implementations. This means that requirements can be technically implemented in different ways; and as the technical standard like HTML and CSS develop, new accessibility-supported techniques are constantly added to the technical repertoire. Testing expertise, while based on detailed knowledge of the success criteria, therefore needs constant practice and an awareness of technological changes.

6.3.2 Basic level: Demonstration

Under the rubric of "Demonstration", a user with a disability shows how he or she uses a web offer with his or her assistive technologies, explains his or her individual way of use and strategies to orientate himself or herself on websites. In this way, people in design and

development learn how to take into account accessibility requirements in their design of web content, often arriving at solutions that are easier to use for all. Another possibility is to train people in development in the use of assistive technologies. A good example is learning to use screen readers, the assistive technology employed by blind users. The basic operation is very simple and can quickly reveal critical errors and oversights. Screen readers are regularly used in iterative testing during the development of accessible web content. At the "demonstration" level, users with disabilities can also support development through task-based user testing. That activity does not necessarily require the identification of barriers to access to specific requirements of accessibility standards that have not been met. Task-based testing is often instrumental in revealing usability issues beyond technical accessibility.

For the basic level "demonstration", acquired knowledge is not a necessarily precondition. In practice, however, it has become clear that clients should be made aware about the necessary limitations of such tests. User testing is no substitute for a comprehensive accessibility test. Even when a user can cope with a task on the site, this does not mean that the web offer complies with accessibility standards (see below: Knowledge of limitations of user demonstration, task-based testing and partial audits).

6.3.3 Acquired knowledge for intermediate and advanced levels: Basic testing and Advanced testing & consulting

Here, user experts identify concrete accessibility issues in a structured way based on the criteria of the Web Accessibility Standards (WCAG or EN 301 549 (Web Content)), document them and give advice on how to remediate them.

For web accessibility audits, manual expert web accessibility test procedures and, to a limited extent, automated test tools are suitable. Testers should be aware of the advantages and limitations of automated test tools: These can only test a limited part of the accessibility requirements and often need to be complemented by expert assessments. An automated test cannot establish whether some web content conforms to the standard. However, it can provide a quick initial indication of existing issues that impact accessibility and inform in-depth follow up manual tests.

Testing can be carried out in different variants and depths, such as

- partial audits (spot checks), with assistance or independently
- full audits, with assistance or independently

When testing the requirements of the Web Accessibility Standards (especially in full audits), it may be necessary to test with assistance due to a disability. This varies depending on the disability and the assistive technology used. For example, a blind test expert cannot carry fully evaluate contrast requirements or determine the quality of a caption or of an alternative text for an image; this is usually done by his or her sighted assistant. Other test steps are carried out jointly. In the evaluation of headings both semantic aspects available to the blind user as well as visual aspects available to the assistant are taken into account. Without joint operation, issues can easily be overlooked, especially on non-accessible websites where the lack of semantics may escape a blind tester. A test expert using speech recognition software due to severe motor impairments needs an assistant at least for those test steps that require the interaction with touch gestures on a mobile phone. Other users with disabilities, on the other hand, can test independently and without assistance.

In manual expert testing, testers work with various tools, such as browser add-ons like the Web Developer Toolbar (e. g. in Firefox or Chrome), bookmarklets and desktop applications like the Colour Contrast Analyser, and screen readers like NVDA, TalkBack or VoiceOver. The use of these tools should be learned.

The audits may also include recommendations on strategies and/or remediation techniques to fix problems. It may point best practices. It can often support the assessment of the feasibility of remediation vs. the option of a complete redesign.

The following expertise is therefore important for all web accessibility testers:

- Technical know-how: familiarity with HTML, WAI-ARIA, CSS
- Basic understanding of web development processes
- Basic knowledge of the underlying technologies (operating system, application, assistive technology)
- Knowledge of standardised test procedures, e. g. WCAG-2.1-Checklist (https://www.w3.org/WAI/WCAG21/quickref/) and accessibility specifications and techniques, e. g. Understanding WCAG 2.1 (https://www.w3.org/WAI/WCAG21/Understanding/)
- Knowledge of evaluation tools for web accessibility, e. g. Browser-Add-ons, Bookmarklets etc.
- Ability to read / understand English (most documents are written in English)

- Ability to report test results in a comprehensive way

6.3.4 Awareness of limitations – across all levels

When user experts carry out partial audits or demonstrations or conduct task-based usability tests, they need to inform target groups (or customers) that this kind of test does in no way ensure that they are meeting the full requirements of the Web Accessibility Standards and other requirements prescribed in the legislation (such as accessibility statement, feedback mechanism, accessible documents, etc.). We refer to it as: *Knowledge of limitations of user demonstration, task-based testing and partial audits.*

6.4 Existing resources: Vocational training and certification

The development of expertise for the practical-technical area of standards-based testing is the focus of the following vocational training courses and certifications:

- International Association of Accessibility Professionals (IAAP): Web Accessibility Specialist (WAS): https://www.accessibilityassociation.org/s/wascertification
- Google: Web Accessibility by Google: https://www.udacity.com/course/web-accessibility--ud891
- MOOCs for Accessibility Partnership (MOOCAP): 10 further courses (Gamification, Documents, Apps etc.): https://moocap.gpii.eu/?page_id=839

7 Conclusion

The “Typology of Web Accessibility User Expertise among Persons with Disabilities” has the aim to give a structured overview of different competences and practical fields of application of web accessibility user expertise.

It was important for us not to focus exclusively on technical knowledge, but to show what experiential knowledge people with disabilities can bring to the table, and how this can be used and built upon.

This approach is in line with the experiences of other projects involving user expertise, described in IO1. The good practices collected in the field of user expertise show that an important part of the value that a user expert can bring, lies in their ability to relay their experience in a particular topic to others, rather than simply use the experience to fast-track professional training.

In a similar manner, the Typology complements the Methodological Framework & Toolkit created in IO2, that included working definitions, user expertise areas of interest, the identification of user experts, testing conducted by user experts and collection and processing of user experiences. In addition, it discussed methods for converting lived experiences into actionable skills, the formalization process and the efforts of shifting the narrative and celebrating the contributions of user experts.

In this Typology we have highlighted the basic levels with the aim of showing that practical areas of application already exist based on the given experiential knowledge of users with disabilities. Such practical knowledge and lived experience is the perfect basis on which vocational training can develop a deeper understanding and more professional skills that go beyond users' own experience. User experts can thus extend their knowledge to other types of disabilities and user needs. For those comfortable with the more technical aspects of web accessibility, this path can lead to developing the skill set needed for the testing of content against accessibility standards. Describing the component on this path is the objective of IO4: Model curriculum for a user expertise course in web accessibility.