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# INTUX PROJECT

## Learning Framework

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## Table of contents

1. Introduction .....	5
1.1 Objectives .....	5
1.2 Planned Results .....	6
2. Theoretical and practical backgrounds .....	7
2.1 Best practices and challenges in user-based testing with users with disabilities identified in existing literature .....	7
2.2 Best practices in user-based testing in practice .....	7
2.3 Prerequisites of successful user-based testing with users with disabilities.....	8
2.4 Validation of identified best practices with users with disabilities and experts.....	10
2.1.1 Best practices for user-based testing with users with disabilities .....	11
2.1.2 Challenges for user-based testing with users with disabilities .....	12
3. Learning framework.....	18
3.1 Framework for describing modules.....	19
3.1.1 Prerequisites.....	19
3.1.2 Learning outcomes .....	19
3.1.3 Content.....	19
3.1.4 Exercises.....	19
3.1.5 Learning Assessment Methodology.....	20
3.1.6 Link to further resources.....	20
3.1.7 Teaching methods/examples/guidance and tools which can be used .....	20
3.1.8 Learning styles (visual, auditory, and kinesthetic learning).....	20
4. Specifications of the proposed modules .....	22
4.1 The mapping of identified best practices into the proposed modules .....	22
4.2 Module 1: Overarching: planning, flexibility and back-up/alternatives.....	26
4.2 Module 2: Test panel set-up and diversity .....	29
4.3 Module 3: Communication and etiquette.....	31
4.4 Module 4: Assistive technology, guidance and support (onsite/online) .....	34
4.5 Module 5: Conclusion of the test, feedback and compensation .....	37
5. Conclusions .....	40
6. Literature.....	41

## Tables

Table 1. The list of identified best practices in previous project activities.....	11
Table 2. List of barriers with literature references -Before user testing (1).....	12
Table 3. List of barriers with literature references - During the user testing (2).....	13
Table 4. List of barriers with literature references - After user testing (3).....	16

## Figures

Figure 1. The result of the mapping of best practices to modules .....	25
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# 1. Introduction

The learning framework is the summary of all previous activities in Work Package 2 and includes several activities. The aims of Activity 5 are the following:

- (1) Create structure for the learning framework;
- (2) Gather the main conclusions from the results of activities 1-4;
- (3) Define main knowledge gaps to be addressed;
- (4) Identify key content to be included in the course;
- (5) Identify the practicalities of how the course should be carried out; and
- (6) Develop the learning framework for the development of an online course for UX design students in higher education on inclusive and accessible user testing with people with disabilities.

## 1.1 Objectives

This work package is the backbone of the INTUX project and has the following specific objectives:

1. Specific objective 1: To identify and analyse the state-of-the-art in the field of inclusive and accessible user testing.
2. Specific objective 2: To research best practices in user testing with people with disabilities, both in Europe and on an international level and withdraw key takeaways for the INTUX project.
3. Specific objective 3: To gather information from users with disabilities on their needs in terms of accessible and ethically sound set-up of user testing.
4. Specific objective 4: To validate and further develop research findings with people with disabilities and university staff and co-create ideas for the learning framework.

These four specific objectives contribute to the General Objective 1 of the project: To establish a learning framework for the development of training courses for UX design students in higher education on inclusive and accessible user testing with people with disabilities.

The associated results to the specific objectives will each contribute to building the framework which will provide the foundation to create the training course on inclusive and accessible user testing in WP3. By using this approach, the project team considers the latest research on user testing, whilst identifying practical examples of how it has been carried out successfully by other organizations.

Key content was highlighted to be included in the course modules. The planned activities also focused on listening to people with disabilities to gather their needs on accessible and ethical user testing. Finally, the research will be validated with people with disabilities and university staff and the initial outline for the learning framework is developed through a co-creation workshop.

## 1.2 Planned Results

The main result of this work package are a learning framework to develop training modules for university students studying UX design on how to carry out inclusive and accessible usability testing (WP3). The framework serves as a guideline document for designing and implementing practice-oriented teaching of inclusive user testing based on close cooperation with disabled person organizations and other user organizations. The framework incorporates different results that were developed as part of the work package, including key content identified during the literature review, best practices on user testing from Europe and beyond, the validation of research results and further development with people with disabilities and university teaching and training staff in UX design and related courses. The framework also includes guidance on the practicalities of the course (duration, structure, elements to be considered, self-learning vs guided learning etc.).

The learning framework will be used in WP3 to create the training modules on inclusive and accessible user testing with people with disabilities. It will also be available on the project website as a key tool for any university to implement its training programme.

## 2. Theoretical and practical backgrounds

### 2.1 Best practices and challenges in user-based testing with users with disabilities identified in existing literature

The literature review aimed to gather relevant scientific information on user testing activities and experiences among researchers in the past 10 years. The research incorporated 83 papers, with the majority sourced from ACM Digital Library. The results indicated a notable increase in published studies over the last decade, with a focus on blind users and users with low vision, followed by users with intellectual disabilities, users in wheelchairs, and deaf users.

Through an analysis of the literature review results, we identified 15 good practices categorized into three distinct classes: (1) good practices before testing, (2) good practices during testing, and (3) good practices after testing. Additionally, the authors recognized various challenges associated with user testing, especially when including users with disabilities. Notably, a frequently documented challenge was related to the poor experience when conducting online testing, which was prevalent during the pandemic.

### 2.2 Best practices in user-based testing in practice

The following best practices were identified:

1. Guidance material and tips for conducting usability testing with people with disabilities from Bentley University. The general tips start with ensuring that there is a basic level of accessibility before setting up the tests. Other general points discuss for example recruitment, assistive technology, time management in between sessions, and dealing with logistics
2. Tips from the Easy Reading Project. The project has developed several sets of information material focusing on the preparation and conduction of user tests. The project website provides downloadable guides on Informed consent, A checklist for interaction with users during user tests, A checklist on data compliance, making sure the system's use of data is transparent and in line with user needs for privacy and A checklist on data treatment.
3. Tips form company practice in Funka. The case study describes different methods and tools used in the preparation and conduct of user tests at different stages of a development project. For example, user involvement can start already at the earliest stages of concept development, using wireframes or paper prototypes.
4. Guidelines from IBM. This website provides general information about disabilities and the tools that can be used to capture and structure a variety of user needs within a design process. It does not as such provide any details on how to interact with persons with disabilities before or during the user testing. The objective is instead to provide the necessary background on the nature of different disabilities in the context of user research / design processes.

5. Report on how to conduct usability studies for accessibility from Nielsen Norman Group. The report deals with the preparation and conduct of usability sessions with persons using assistive technology. The overall focus is on methodological issues. The report describes methods that the NN Group has used in their own research and provides recommendations. It also includes checklists and sample documents to facilitate the running of the sessions.
6. A Comprehensive Guide to Accessible User Research from People Nerds. The first article on planning starts by explaining the basics of accessibility work, noting that accessibility is not an isolated activity, but it needs to be fully integrated in all workflows that are part of the design and development process. This is helpful in setting the context of user research and helps the design and development team make the most of the results.
7. Guidance resource for moderating usability testing with people with disabilities from Tetralogical. The blog post has four main sections dealing with the following aspects of how to run a usability testing: Time management, Flexibility, Problem-solving, Etiquette and respect.
8. Guidelines for running research sessions with people with disabilities from UK Government. The guidance document is structured as a checklist of steps to follow in the preparation of and during the conduct of user research sessions, directly on-site. It mainly contains advice and instructions on disability etiquette, that is how to ensure that the participants in the user research are treated with respect and that accommodations are made to meet their needs.
9. Guidance resource from Just Ask, presenting Integrating Accessibility throughout Design from UI Access. The chapter on usability testing is divided into sub-sections dealing with all stages of the testing: planning, preparing, conduction and reporting. It also includes a checklist for all stages and a screener to use in the recruitment of participants.
10. Guidance resource for conducting usability testing with people with disabilities from Xperienz. The article begins by providing the case for conducting usability tests with persons with disabilities, and in general for working with accessibility in the design and development of websites.

### 2.3 Prerequisites of successful user-based testing with users with disabilities

The conducted survey resulted in the following results:

- The survey results clearly indicate that many participants do not use assistive technology. This highlights the need for UX professionals and product developers to consider a wider range of accessibility needs when designing and testing products and services. By taking into account the needs of users who may not rely on assistive technology, designers can create more inclusive and accessible products that benefit a larger group of users.
- The survey results show that the frequency of participation in user testing is an important factor in ensuring that products and services are regularly reviewed and



improved to meet the needs of users. While the majority of participants reported participating in user testing less than once per year, the fact that 36% reported participating 1-3 times per year and 11% reported participating 4-10 times per year indicates that some organisations prioritise user testing to improve accessibility and inclusivity. However, there is still room for improvement in the prioritisation of user testing in the design process, and increasing the frequency of user testing can help designers more effectively address the needs of users.

- The majority of participants in the survey reported participating in user testing less than once per year, indicating that there is a need to increase the frequency of user testing in the design process. Designers should prioritise regular user testing to more effectively address the needs of users and ensure that their products and services are accessible and inclusive.
- The fact that some organisations reported participating in user testing 1-3 times per year or even 4-10 times per year is a positive sign that some organisations prioritise user testing to improve the accessibility and inclusivity of their offerings. This demonstrates that there are successful models of user testing implementation that should be emulated by others to ensure their products and services are user-friendly and meet the needs of all users.
- The transportation arrangements for user testing and the use of personal assistive technology are critical considerations to ensure the inclusivity of user testing for individuals with disabilities. By accommodating the use of personal assistive technology and providing transportation arrangements where necessary, organisers can improve the accessibility and inclusivity of user testing for individuals with disabilities.
- Organisers should take steps to improve the emotional experience of participants during user testing, such as providing clear instructions and promoting a culture of respect and inclusivity. By creating a positive emotional experience for participants, organisers can encourage future participation and obtain more accurate feedback from a diverse range of users.
- The results of the survey emphasise the importance of compensation in user testing, as only a small percentage of participants reported receiving no compensation. Companies conducting user testing should consider a variety of compensation options, including gifts, monetary compensation, and transportation coverage, to ensure that participants feel valued and fairly compensated for their time and effort. By offering attractive compensation options, companies can attract a diverse group of participants and gather more valuable feedback during the user testing process.
- The results of the user testing survey highlight the importance of providing feedback to participants on their performance during testing. With the majority of participants reporting that they never received feedback, companies conducting user testing must prioritise feedback as an essential component of the testing process. This can lead to a better user testing experience for participants and ultimately lead to better products and services for consumers.

- To create a positive and inclusive user testing experience, companies must consider the factors that contribute to a positive testing experience, such as a friendly attitude from instructors, clear and concise instructions, and a well-prepared test setup. Additionally, companies must take into account user expectations for user testing, such as accessibility, impact, and compensation. By prioritising these factors and addressing negative experiences, companies can create a more effective user testing program that benefits both the company and the participants.
- The survey results indicate that the majority of participants had a positive experience with user testing and are likely to recommend it to others. This suggests that user testing can be an effective way for companies to gather valuable feedback and improve their products and services.
- Based on the survey results, it can be concluded that there is a significant potential for user testing to provide value to individuals across various demographics and backgrounds. With almost half of the respondents indicating that they believed user testing could be useful for them, companies and organisations can leverage this interest and engagement to gather valuable feedback and insights to improve their products and services.
- The results of the survey highlight the need for greater awareness and training on user testing with individuals with disabilities in UX design and related higher education programs. By increasing access and opportunities for individuals with disabilities to participate in user testing and improving the inclusivity and accessibility of testing environments, organisers can create a more diverse and representative testing pool. This, in turn, can lead to the creation of more accessible and inclusive products and services for all users.

## 2.4 Validation of identified best practices with users with disabilities and experts

Building upon the findings from the literature review, the identification of best practices, and the survey, a validation workshop was conducted to affirm the recognized good practices. The workshop included 51 participants from 3 countries, which actively participated with comments and suggestions. The workshop included 17 people with disabilities, 7 representatives of organisations for people with disabilities, 11 professors, 8 students and 8 experts in usability. Several participants were experts and professors or people with disabilities at the same time.

After presenting the 15 best practices, the attendants provided very useful feedback that will allow us to refine and improve the best practices and extend them by including the suggestion of 8 new best practices. In addition, a general comment stated is that some of the best practices are not always applicable so a mechanism to identify whether to use them or not should also be provided.

In relation to existing best practices, 9 of them were identified as very important during the usability tests with persons with disabilities, as attendants agreed with them obtaining a

score over 75. The other six best practices were also identified as important, with a score over 59. Finally, 23 good practices were included in the learning framework.

During the data extraction activities, several important insights emerged from workshop participants, shedding light on various challenges and difficulties faced. However, it became apparent that certain perspectives were not adequately represented, particularly in terms of older people and individuals with more general disability descriptions.

Through their valuable comments, workshop participants emphasized the significance of including a broader range of experiences and viewpoints, especially those of older individuals and people with disabilities not explicitly covered. Their feedback reinforced the realization that missing values existed within the dataset, potentially leading to incomplete or biased analyses.

Recognizing the critical importance of a comprehensive and inclusive approach, efforts were made to rectify this issue. By actively seeking out additional data and incorporating the perspectives of older individuals and individuals with broader disability descriptions, we aimed to bridge the gaps in the existing dataset. Through the integration of these missing values, an extended list of good practices was developed, fostering a richer and more comprehensive analysis of the challenges at hand.

### 2.1.1 Best practices for user-based testing with users with disabilities

Based on the classification presented in Table 1, we focused on good practices related to users involved in user testing procedures. Thus, we identified 15 good practices and divided them into three different classes: (1) good practices before testing, (2) good practices during the testing, and (3) good practices after testing, adding 8 more good practices after overview of workshop results.

Table 1. The list of identified best practices in previous project activities

BEFORE	DURING	AFTER
BP1.5 Using accessibility standards BP1.4 Clear instructions <b>to perform the tasks</b> BP1.1 Explanation of user testing goals to participants BP1.3 Training for participants BP1.2 Collecting consent from participants <b>BP1.6 Diversity of disabilities</b> <b>BP1.7 Familiarization with assistive products</b>	BP2.8 Comfortable surroundings BP2.3 Use of own personal equipment BP2.5 Enough time BP2.2 Possibility of a <b>caregiver</b> (or assistant) BP2.6 Taking breaks BP2.1 User testing from home BP2.7 Supervision by professionals BP2.4 Repeating tasks	BP3.2 Support after testing BP3.1 Compensation <b>BP3.2 providing feedback/information after testing</b>

BEFORE	DURING	AFTER
<p><b>BP1.8 Compatibility of testing product with assistive products</b></p> <p><b>BP1.9 Zero discrimination tolerance</b></p> <p><b>BP1.10 Participants have all the freedom they need</b></p> <p><b>BP1.11 Co-creation of tests</b></p> <p><b>BP1.12 Collect consent from the ethical committee</b></p> <p><b>BP1.13 Insurance for equipment/personnel</b></p>		

### 2.1.2 Challenges for user-based testing with users with disabilities

Along with best practices, the authors identified numerous challenges in user testing in particular when including users with disabilities. Among the most documented were poor experiences when performing testing online, which was often the case during the pandemic. Another documented challenge was performing user testing remotely, where the users with disabilities reported confusing and not clear enough instructions as the one source of the problem. Another problem when performing user testing from home was some users with different disabilities might not feel at ease at home due to lack of space and privacy issues. This was not attributed to a specific PwD case and it presented a general problem. The complexity of tools a difficulties in setting up the devices according to each individual's needs were particularly highlighted, especially among individuals with visual impairments, postural issues, and older adults. Consequently, these obstacles made long-sitting sessions impossible for them. The complexity of tools and difficulties in setting up the devices according to each individual's needs were particularly highlighted, especially among individuals with visual impairments, postural issues, and older adults, who sooner or later experience visual and postural issues sooner or later. Consequently, these obstacles made long-sitting sessions impossible for them. Cultural differences were also addressed in user testing cases with people with or without disabilities, and lastly, no compensation to users was noted as a more significant barrier.

Reported challenges of inclusion from the literature review are presented in Table 2, Table 3 and Table 4.

*Table 2. List of barriers with literature references -Before user testing (1)*

ID	Barrier Name	Short explanation	Title	Authors
1.1.	Participant chosen with potential bias	Participants have previous interest or knowledge, which affects user testing results.	HikePal: A mobile exergame to motivate people with intellectual disabilities to do outdoor physical activities	Torrado, Juan C. and Jaccheri, Letizia and Pelagatti, Susana and Wold, Ida

<b>ID</b>	<b>Barrier Name</b>	<b>Short explanation</b>	<b>Title</b>	<b>Authors</b>
1.2.	Cultural differences	If international user testing participants are included, disregard of cultural differences is potentially problematic.	Targeting Lifestyle Behavior to Improve Brain Health: User-Experiences of an Online Program for Individuals with Subjective Cognitive Decline	Wesselman, Linda M. P. and Schild, A. K. and Hooghiemstra, A. M. and Meiberth, D. and Drijver, A. J. and Leeuwenstijn-Koopman, M. V. and Prins, N. D. and Brennan, S. and Scheltens, P. and Jessen, F. and vander Flier, W. M. and Sikkes, S. A. M.
1.3.	Protocol differences for healthy and impaired users	Due to individual differences in capabilities between different users, results cannot be directly compared.	A Multifunctional Brain-Computer Interface Intended for Home Use: An Evaluation with Healthy Participants and Potential End Users with Dryand Gel-Based Electrodes	Kaethner, Ivo and Halder, Sebastian and Hintermueller, Christoph and Espinosa, Arnau and Guger, Christoph and Miralles, Felip and Vargiu, Eloisa and Dauwalder, Stefan and Rafael-Palou, Xavier and Sola, Marc and Daly, Jean M. and Armstrong, Elaine and Martin, Suzanne and Kuebler, Andrea
1.4.	Complex experimental design	Participants with intellectual disabilities have difficulties completing complex tasks.	SymbolChat: Picture-Based Communication Platform for Users with Intellectual Disabilities	Keskinen, Tuuli and Heimonen, Tomi and Turunen, Markku and Rajaniemi, Juha-Pekka and Kauppinen, Sami
1.5.	Understanding participants	Researchers do not understand the specific needs and mindsets of participants, both with and without disabilities.	Writing Centers and Students with Disabilities: The User-centered Approach, Participatory Design, and Empirical Research as Collaborative Methodologies	Brizee, A. and Sousa, M. and Driscoll, D.L.

*Table 3. List of barriers with literature references - During the user testing (2)*

<b>ID</b>	<b>Barrier Name</b>	<b>Short explanation</b>	<b>Title</b>	<b>Authors</b>
2.1.	Challenges with tool accustoming	The users have difficulties accustoming to the tools that they are using for the first time.	Learning features and accessibility limitations of video conferencing applications: are people with visual impairment left behind	Doush, I.A. and Al-Jarrah, A. and Alajarmeh, N. and Alnfaij, M.
2.2.	Unfamiliar and complex tools	Older adults struggle to use unfamiliar tools.	I see therefore i read: improving the reading capabilities of individuals with visual disabilities through immersive virtual reality	Weir, K. and Loizides, F. and Nahar, V. and Aggoun, A. and Pollard, A.
2.3.	Tool bugs and malfunctions	While performing user testing, there is a risk of testing environment malfunctions (freezing, failing to update, ...)	ASSIST: Evaluating the usability and performance of an indoor navigation assistant for blind and visually impaired people	Nair, Vishnu and Olmschenk, Greg and Seiple, William H. and Zhu, Zhigang

<b>ID</b>	<b>Barrier Name</b>	<b>Short explanation</b>	<b>Title</b>	<b>Authors</b>
2.4.	Tool setup challenges	Difficulties occur when setting up the device for each individual.	Myoelectrically Controlled FES to Enhance Tenodesis Grip in People with Cervical Spinal Cord Lesion: A Usability Study	Thorsen, Rune and Dalla Costa, Davide and Beghi, Ettore and Ferrarin, Maurizio
2.5.	Tools support shortcomings	Lack of a functionality for easy access to the application for people with different impairments (for example visually impaired).	A universal design approach to wayfinding and navigation	Fogli, Daniela and Arengi, Alberto and Gentilin, Fulvio
2.6.	Tools inappropriate for all users	Tools appropriate only for normal vision users.	Accessibility and Usability Problems Encountered on Websites and Applications in Mobile Devices by Blind and Normal-Vision Users	Carvalho, Michael Crystian Nepomuceno and Dias, Felipe Silva and Reis, Aline Grazielle Silva and Freire, Andr\{e} Pimenta
2.7.	Infrastructure difficulties	Technical infrastructure can be unsuitable for an evaluation with visually disabled users.	User Evaluation of the Smartphone Screen Reader VoiceOver with Visually Disabled Participants	Smaradottir, Berglind F. and Haland, Jarle A. and Martinez, Santiago G.
2.8.	Unproductiveness of assistive technology	The lack of screen reader support on smart glasses, a rapidly draining battery, and a dependency on Internet connection decrease the success of the testing process.	From the Lab to People s Home: Lessons from Accessing Blind Participants Interactions via Smart Glasses in Remote Studies	Lee, K. and Hong, J. and Jarjue, E. and Mensah, E.E. and Kacorri, H.
2.9.	Participant's obligation feelings	If the researchers are present, the participants feel obliged to make them happy, participants express opinions which are favourable to the researchers or their caregivers.	HikePal: A mobile exergame to motivate people with intellectual disabilities to do outdoor physical activities	Torrado, Juan C. and Jaccheri, Letizia and Pelagatti, Susana and Wold, Ida
2.10.	Social desirability	When individuals are being observed by others, they tend to regulate their emotions more carefully in challenging situations due to the desire to appear socially acceptable. This can result in an increase in emotional restraint, even when facing disadvantageous conditions.	Impact of accessibility barriers on the mood of users with motor and dexterity impairments	Pascual, A. and Ribera, M. and Granollers, T.
2.11.	Needed support of the caregivers	Children and young adults with special communication needs cannot participate by themselves.	Design and evaluation of ECO: an augmentative and alternative communication tool	Guasch, Daniel and Martin-Escalona, Israel and Macias, Jose A. and Francisco, Virginia and Hervas, Raquel and Moreno, Lourdes and Bautista, Susana

<b>ID</b>	<b>Barrier Name</b>	<b>Short explanation</b>	<b>Title</b>	<b>Authors</b>
2.1 2.	Online testing	Usability testing on-line due to the pandemic or other reasons often results in unreliable findings.	When Headers Are Not There: Design and User Evaluation of an Automatic Topicalisation and Labelling Tool to Aid the Exploration of Web Documents by Blind Users	Silva, Jorge Sassaki Resende and Freire, Andr\{e} Pimenta and Cardoso, Paula Christina Figueira
2.1 3.	Remote evaluations	Disadvantages and problems around conducting remote evaluations with participants with disabilities, as too little support is provided.	`Did You See That!?' Enhancing the Experience of Sports Media Broadcast for Blind People	Goncu, Cagatay and Finnegan, Daniel J.
2.1 4.	Accessibility of web courses	The lack of adequate web course accessibility hinders the successful conduct of user testing. This means that the web courses are not designed or developed in a way that allows all users to access and use them effectively, regardless of their abilities or disabilities.	Analysis of the accessibility of selected massive open online courses (MOOCs) for users with disabilities.	Królak, A. and Zajac, P.
2.1 5.	Testing from home	Poor internet and other challenges can make testing at home not always feasible.	Brain-computer interfaces on track to home: Results of the evaluation at disabled end-users' homes and lessons learnt	Miralles, F. and Vargiu, E. and Rafael-Palou, X. and Solà, M. and Dauwalder, S. and Guger, C. and Hintermüller, C. and Espinosa, A. and Lowish, H. and Martin, S. and Armstrong, E. and Daly, J.
2.1 6.	Testing on site	As some experiments require strict laboratory conditions and rigorous protocols that cannot be performed from home.	An empirical evaluation of a hands-free computer interaction for users with motor disabilities	Boštjan Šumak and Matic Špindler and Mojca Debeljak and Marjan Heričko and Maja Pušnik
2.1 7.	Journey difficulties	Long travel journeys can present a challenge to participants.	An empirical evaluation of a hands-free computer interaction for users with motor disabilities	Boštjan Šumak and Matic Špindler and Mojca Debeljak and Marjan Heričko and Maja Pušnik
2.1 8.	Danger of persuasive technologies	Integration of persuasive technologies influences behavior and attitudes.	Targeting Lifestyle Behavior to Improve Brain Health: User-Experiences of an Online Program for Individuals with Subjective Cognitive Decline	Wesselman, Linda M. P. and Schild, A. K. and Hooghiemstra, A. M. and Meiberth, D. and Drijver, A. J. and Leeuwenstijn-Koopman, M. V. and Prins, N. D. and Brennan, S. and Scheltens, P. and Jessen, F. and vander Flier, W. M. and Sikkes, S. A. M.

<b>ID</b>	<b>Barrier Name</b>	<b>Short explanation</b>	<b>Title</b>	<b>Authors</b>
2.1 9.	Shortage of time for understanding unfamiliar concepts.	Complete novelty, limited experience or unfamiliarity may impact the results.	End user evaluation of a Kneeling Wheelchair with "on the fly" adjustable seating functions	Mattie, Johanne and Wong, Angie and Leland, Danny and Borisoff, Jaimie
2.2 0.	Shortage of time	Subjects can have difficulties while performing user testing and require more time than expected.	Disability users' evaluation of the web accessibility of SNS	Lee, Sang M. and Hong, Soon-Goo and An, Dong-Han and Lee, Hyun-Mi
2.2 1.	Controlled environment over real setting	Testing in a controlled setting does not produce the same results as in a real setting, when users are performing regular daily activities.	End user evaluation of a Kneeling Wheelchair with "on the fly" adjustable seating functions	Mattie, Johanne and Wong, Angie and Leland, Danny and Borisoff, Jaimie
2.2 2.	Environment problems	Multiple wires on the floor present a fall risk, loud sounds generate stress, hard to lift and heavy devices become obstacles.	Exergaming platform for older adults residing in long-term care homes: User-centered design, development, and usability study	Chu, C.H. and Biss, R.K. and Cooper, L. and Linh Quan, A.M. and Matulis, H.
2.2 3.	Difficulties envisioning the tasks	Participants find it difficult to only visualize the problems as they need more direct experiences (they cannot judge a game only by watching but must experience playing a game).	Exergaming platform for older adults residing in long-term care homes: User-centered design, development, and usability study	Chu, C.H. and Biss, R.K. and Cooper, L. and Linh Quan, A.M. and Matulis, H.
2.2 4.	Physical barriers	Sitting straight without being able to move the head is potentially challenging.	Web page design recommendations for people with down syndrome based on users' experiences	Alonso-Virgós, L. and Baena, L.R. and Espada, J.P. and Crespo, R.G.
2.2 5.	Technical difficulties	Time-consuming and challenging activities which are not directly connected to user testing.	Co-Conception Process of an Innovative Assistive Device to Track and Find Misplaced Everyday Objects for Older Adults with Cognitive Impairment: The TROUVE Project	Lopes, P. and Pino, M. and Carletti, G. and Hamidi, S. and Legué, S. and Kerhervé, H. and Benveniste, S. and Andéol, G. and Bonsom, P. and Reingewirtz, S. and Rigaud, A.-S.
2.2 4.	Unclear instructions	Risk of instructions being unclear and confusing.	From disabilities to capabilities: Testing subtitles in immersive environments with end users	Agulló, B. and Matamala, A. and Orero, P.

*Table 4. List of barriers with literature references - After user testing (3)*



ID	Barrier Name	Short explanation	Title	Authors
	No compensation	No compensation to users creates a bad user experience.	Multimodal Gaze Interaction for Creative Design	Creed, Chris and Frutos-Pascual, Maite and Williams, Ian
	Unmet expectations or preconceptions	Expectations that are not satisfied and can be understood as deception, frustration or poor user experience.	Prejudices, memories, expectations and confidence influence experienced accessibility on the Web	Aizpurua, A. and Arrue, M. and Vigo, M.

### 3. Learning framework

The associated results to the specific objectives will each contribute to building the framework which will provide the foundation to create the training course on inclusive and accessible user testing in WP3. By using this approach, the project team considered the latest research on user testing and experiences in the consortium, whilst identifying practical examples of how it has been carried out successfully by other organisations. Key content will be highlighted to be included in the course modules. The planned activities focused on listening to people with disabilities to gather their needs on accessible and ethical user testing. Finally, the research will be validated with people with disabilities and university staff and the initial outline for the learning framework will be developed through a co-creation workshop.

A learning framework is a structured approach to organizing and delivering educational content and activities. It typically includes a set of guidelines, principles, and strategies for designing, implementing, and evaluating learning experiences. It includes various components, such as:

- learning objectives,
- content,
- assessment
- feedback
- learning styles (visual, auditory, and kinesthetic learning)

Examples of learning frameworks, which provide educators with a systematic way of designing and delivering effective learning experiences that meet the needs of their learners:

- Bloom's taxonomy
- 5E instructional model,
- ADDIE model,
- SAMR model,
- TPACK model
- Universal Design for Learning (UDL)
- Culturally Responsive Teaching (CRT)
- Inclusive Design

The best learning framework for teaching user testing would be the one that aligns with the specific objectives and goals of the course, while also catering to the learning styles and preferences of the learners. In this learning framework, the training courses on user-based testing with users with disabilities is divided into following five modules:

1. Foundational: planning, flexibility and back-up/alternatives (before + during + after)
2. Test panel set-up and diversity (before)
3. Communication and etiquette (before + during + after)
4. Assistive technology, guidance and support (onsite/online) (before + during)
5. Conclusion of the test, feedback and compensation (after)

## 3.1 Framework for describing modules

For describing modules, the following information structure will be used:

- Prerequisites (students, instructors)
- Learning outcomes for the module
- Content (short description + resources)
- Exercises
- Learning assessment methodology
- Link to further resources

and optionally:

- Teaching methods/examples/guidance and tools which can be used
- Learning styles (visual, auditory, and kinesthetic learning)

### 3.1.1 Prerequisites

Description about what a student needs to know before applying to the module or starting to learn the content provided within the module. This section specifies the requirements or prior knowledge that students and instructors should have before engaging with the module. It outlines the skills, knowledge, or experience necessary to successfully participate in the learning activities.

### 3.1.2 Learning outcomes

Learning outcomes describe the intended achievements or skills that students are expected to acquire upon completing the module. These outcomes should be specific, measurable, and observable, providing a clear indication of what students will be able to do or understand because of the learning experience.

### 3.1.3 Content

This section provides a brief description of the module's content. It outlines the key topics or concepts that will be covered during the learning process. It may also include references to external resources, such as textbooks, online tutorials, or other materials that will be used to support the learning journey.

### 3.1.4 Exercises

Examples of prepared exercises that can be adjusted to the needs of users as well as to requirements of specific trainer or student to gain practical experience and knowledge in content covered by the module. Exercises refer to the practical activities or tasks that students will engage in during the module. These exercises are designed to reinforce the learning material and allow students to apply the concepts and skills they have acquired. Exercises can range from simple problems or questions to more complex projects or assignments.

### 3.1.5 Learning Assessment Methodology

This section explains the methods or strategies that will be used to evaluate and assess students' learning progress and achievements. It describes the tools or techniques employed to measure the extent to which students have achieved the desired learning outcomes. Assessment methods can include written tests, quizzes, exams, projects, presentations, assignments and review of the results by the expert, or any other means of evaluating student performance.

### 3.1.6 Link to further resources

This section provides additional resources, such as websites, books, articles, or online platforms that students can explore to deepen their understanding of the module's subject matter. These resources serve as supplementary materials to support self-directed learning and further exploration of the topic beyond the scope of the module.

Additionally, the module's description could include the following definitions:

### 3.1.7 Teaching methods/examples/guidance and tools which can be used

This section outlines the instructional strategies, examples, guidance, and tools that instructors can utilize to facilitate the learning process and enhance student engagement. It encompasses the various approaches and techniques that will be employed to deliver the content effectively. Teaching methods can include lectures, demonstrations, hands-on activities, group discussions, case studies, or multimedia presentations among others.

Examples and guidance provide practical illustrations or step-by-step instructions to help students grasp and apply the concepts effectively. Tools refer to any technological resources, software, or platforms that can be used to support the learning experience, such as coding environments, simulation tools, or collaborative platforms. This section highlights the diverse range of methods, examples, guidance, and tools that instructors can employ to create an interactive and effective learning environment.

### 3.1.8 Learning styles (visual, auditory, and kinesthetic learning)

Inclusive learning recognizes and adapts to diverse learning styles to ensure that every individual has the opportunity to excel. In an inclusive and diverse learning environment, unique preferences of all learning types are addressed.

**Visual learners:** Visual learners thrive when presented with visual aids such as charts, diagrams, graphs, and images. By incorporating colourful notes, mind maps, and visual organizers, the learning module can enhance their understanding and memory.

**Auditory learners:** Auditory learners, on the other hand, excel through listening and verbal communication. Providing lectures, discussions, and audio recordings caters to their preferred mode of learning, and their strong listening skills enable effective absorption of information. Encouraging participation in group discussions further supports their learning journey.

**Reading/writing learners:** For reading/writing learners, a preference for written materials is paramount. By offering diverse reading materials, such as textbooks, articles, and written instructions, they can excel in tasks like note-taking, summarizing information, and writing essays or reports. Engaging them in activities like creating detailed outlines, using flashcards, and participating in written exercises nurtures their learning potential.

**Kinesthetic learners:** Addressing the needs of kinesthetic learners involves creating opportunities for hands-on experiences and physical activities. Practical tasks, experiments, and interactive exercises that involve movement and touch are integral to their learning process. Incorporating role-playing, manipulatives, props, and experiential learning activities allows them to fully engage their senses and flourish in their educational journey.

By fostering an inclusive environment that embraces diverse learning styles, we create a space where all learners can thrive, grow, and reach their full potential. By considering and incorporating various learning styles, the modules aims to provide a well-rounded learning experience that caters to the diverse needs and preferences of users, enhancing their comprehension and retention of the material. Instructors can employ a combination of visual, auditory, and kinesthetic approaches to create a balanced and inclusive learning environment.

## 4. Specifications of the proposed modules

The training courses on user testing with users with disabilities is divided into following five modules:

1. Foundational: planning, flexibility and back-up/alternatives (before + during + after)
2. Test panel set-up and diversity (before)
3. Communication and etiquette (before + during + after)
4. Assistive technology, guidance and support (onsite/online) (before + during)
5. Conclusion of the test, feedback and compensation (after)

Listed modules consist of different learning topics, which consist in good practices, identified in previous activities of the work package 2. The mapping of best practices and proposed modules is presented in the next section.

### 4.1 The mapping of identified best practices into the proposed modules

To map the identified best practices into the proposed modules, a collaborative and consensus-based mapping process that includes the expertise and opinions of multiple professors was applied. By involving four professors in the mapping process, diverse range of perspectives and insights was considered. The following good practices were included in the mapping process:

- BP1.1 Provide digitally accessible explanations of user testing goals to participants - Develop a concise document that outlines the essence of user testing and provides clear instructions for participants on what to expect and how to participate.
- BP1.2 Collect consent from participants - Ensure that you obtain the user's ethical approval and informed consent before proceeding with any study or data collection.
- BP1.3 Training for participants - Prioritize offering training opportunities to participants before commencing user testing to enhance their understanding and preparedness for the evaluation process.
- BP1.4 Clear instructions - Create a document that offers straightforward and easily understandable instructions, avoiding technical words, to ensure clarity and ease of comprehension for all participants.
- BP 1.5 Using accessibility standards - Prioritize document accessibility and adherence to standards to ensure compatibility with assistive technologies, enabling an inclusive user experience for all individuals.
- BP1.6 Diversity of disabilities – Recognize that diverse disabilities require varying adaptations during user testing, and tailor the approach accordingly to foster inclusivity and gather valuable insights from all participants.

- BP1.7 Familiarization with assistive products – Allow sufficient time and provide clear instructions to enable participants to become familiar and comfortable with the new assistive product before proceeding with the testing process.
- BP1.8 Compatibility of testing product with assistive products – Ensure that the assistive products used are compatible with the testing products, and have technical support available to address any potential issues that may arise during the user testing process.
- BP1.9 Zero discrimination tolerance – Foster a positive and respectful environment that encourages open communication and values the diverse perspectives and contributions of all participants.
- BP1.10 Participants have all the freedom they need – Empower participants to make autonomous decisions and respect their right to leave the user testing environment if they feel the need to do so.
- BP1.11 Co-creation of tests – Ensure the active involvement of users with special needs in the creation of user tests, fostering an inclusive and representative testing process that addresses diverse user requirements.
- BP1.12 Collect consent from the ethical committee - Seek ethical approval from the committee and obtain informed consent from all participants before proceeding with any research or study.
- BP1.13 Insurance for equipment/personnel – Implement insurance coverage for all participants involved in user testing activities to provide protection and support in the event of any unforeseen incidents or accidents.
- BP 2.1 User testing from home - Offer participants the option to conduct usability activities from the comfort of their homes, providing flexibility and convenience in their engagement with the testing process.
- BP2.2 The possibility of a caregiver - Encourage participants to be accompanied by their caregivers, friends, or family members during the user testing sessions, fostering a supportive and comfortable environment that acknowledges and respects their individual needs.
- BP 2.3 Use of own personal equipment - Facilitate participants in using their preferred personal equipment during user testing, recognizing the importance of accommodating individual preferences and enhancing the overall testing experience.
- BP2.4 Repeating tasks - Provide participants with the option to repeat each test during the user testing activities, ensuring a comprehensive and fair evaluation process that considers any adjustments or learning experiences along the way.
- BP2.5 Enough time - Assign sufficient amount of time for conducting user testing activities, allowing for thorough and thoughtful evaluations to gather valuable insights and feedback.

- BP2.6 Taking breaks - Incorporate scheduled breaks between user testing activities to offer participants adequate rest and rejuvenation, ensuring a conducive and productive testing environment.
- BP2.7 Supervision of professionals - Enlist expert supervision in user testing activities to ensure the process is guided by knowledgeable professionals, facilitating accurate assessments and valuable feedback collection.
- BP2.8 Comfortable surroundings - Ensure that the user testing environment offers comfortable surroundings and accessible infrastructure, promoting a welcoming and inclusive experience for all participants.
- BP 3.1 Compensation - Offer compensation to participants for their attendance in user testing, recognizing the value of their time and input, and fostering a positive and mutually beneficial engagement.
- BP3.2 Support after testing - Extend the courtesy of arranging transportation and/or accompaniment for participants to return safely to their homes when user testing activities take place outside of their usual locations.

The mapping process entailed identifying and evaluating best practices to assess their relevance and applicability to the specific target modules. Each professor independently assessed whether a particular best practice should be covered within a target module based on their professional judgment and expertise. This helped to capture a variety of viewpoints and allowed for a comprehensive evaluation.

To ensure a robust and rigorous mapping, a threshold for agreement was established. In this case, the threshold was set at three or more professors agreeing on the mapping of a specific best practice to a target module. This consensus-based approach helped to minimize individual bias and ensured that the mapping decisions are supported by a collective agreement among the professors.

The result of the mapping process is available in Figure 1.



	MODULE 1			MODULE 2	MODULE 3			MODULE 4		MODULE 5
	Overarching: planning, flexibility and back-up/alternatives (before + during + after)			Test panel set-up and diversity (before)	Communication and etiquette (before + during + after)			Assistive technology, guidance and support (onsite/online) (before + during)		Conclusion of the test, feedback and compensat
	before	during	after	before	before	during	after	before	during	after
BP1.1 Provide digitally accessible explanations of user testing goals to participants	4	3	0	0	2	2	0	3	2	0
BP1.2 Collect consent from participants	2	1	0	2	4	1	0	0	0	0
BP1.3 Training for participants	3	3	1	1	1	2	0	1	2	0
BP1.4 Clear instructions	4	2	0	3	2	3	1	1	0	2
BP 1.5 Using accessibility standards	4	4	3	4	4	4	3	4	3	3
BP 2.1 User testing from home	2	1	0	2	1	1	0	4	3	0
BP2.2 The possibility of an escort	0	4	0	1	1	2	0	0	4	2
BP 2.3 Use of own personal equipment	1	3	0	4	1	2	0	4	4	0
BP2.4 Repeating tasks	1	4	0	1	1	4	0	1	3	0
BP2.5 Enough time	1	4	0	0	0	3	0	1	3	0
BP2.6 Taking breaks	1	4	0	0	0	4	0	0	3	0
BP2.7 Supervision of professionals	2	4	1	2	2	4	1	2	3	2
BP2.8 Comfortable surroundings	2	4	0	3	2	3	0	0	1	0
BP 3.1 Compensation	0	0	4	0	0	0	1	0	0	4
BP3.2 Support after testing	0	0	4	0	0	0	1	0	0	4
BP1.6 Diversity of disabilities	3	3	1	3	2	2	2	3	3	1
BP1.7 Familiarization with assistive products	3	2	0	3	2	2	0	3	2	0
BP1.8 Compatibility of testing product with assistive products	3	3	0	2	2	1	0	3	3	0
BP1.9 Zero discrimination tolerance	3	3	3	3	3	3	3	2	2	3
BP1.10 Participants have all the freedom they need	1	2	1	3	1	3	1	0	1	1
BP1.11 Co-creation of tests	3	0	0	2	3	0	0	2	0	0
BP1.12 Collect consent from the ethical committee	3	0	0	3	2	0	0	1	0	0
BP1.13 Insurance for equipment/personnel	3	0	0	3	2	0	0	1	0	0

Figure 1. The result of the mapping of best practices to modules

Each module and its assigned good practices are comprehensively described in the following subsections, encompassing PREREQUISITES, LEARNING OUTCOME, CONTENT, EXERCISES, LEARNING ASSESSMENT METHODOLOGY, and TEACHING METHODS. While each module also includes proposed LEARNING STYLES, it is worth noting that they are general and consistent across all modules. As the learning styles for each module should be thoughtfully adapted to accommodate the diverse needs of various learning types, differences in participants must be accepted. Recognizing that individuals have different preferences and strengths in how they absorb and process information, an inclusive approach is crucial. In designing the modules, the unique characteristics of visual learners, auditory learners, reading/writing learners, and kinesthetic learners should be considered:

- Visual Learners: Use visual aids and diagrams to enhance understanding.
- Auditory Learners: Incorporate verbal explanations and discussions.
- Kinesthetic Learners: Include hands-on activities and interactive demonstrations.
- Reading/Writing Learners: Provide written materials and encourage note-taking.
- Social Learners: Facilitate group discussions and collaborative projects.
- Logical Learners: Present information in a logical and structured manner.
- Multimodal Learners: Integrate various approaches to engage participants.

For visual learners, incorporating engaging visual aids like charts, diagrams, graphs, and images helps to facilitate their comprehension and retention of information. Additionally, utilizing a mix of colourful notes, mind maps, and visual organizers further enhances their learning experience.

Auditory learners benefit from a focus on auditory communication. This can involve providing engaging lectures, stimulating discussions, and making use of audio recordings to present the course material effectively. By emphasizing verbal explanations and instructions, we can maximize their learning potential. Moreover, encouraging group discussions allows them to exchange ideas and collaborate with others, bolstering their understanding of the subject matter.

For reading/writing learners, the emphasis should be on written materials. Providing a diverse selection of textbooks, articles, and written instructions allows them to excel in absorbing and processing information. Offering opportunities for tasks such as note-taking, summarizing, and essay/report writing further supports their learning needs. Creating detailed outlines, using flashcards, and engaging in written exercises can also bolster their retention and understanding of the content.

To accommodate kinesthetic learners, hands-on experiences and physical activities play a vital role in their learning. By incorporating practical tasks, experiments, and interactive exercises, we enable them to actively engage with the subject matter. Utilizing role-playing, manipulatives, props, and experiential learning activities gives them the chance to apply their knowledge in a tangible way, fostering a deeper understanding of the concepts.

Ultimately, by adopting an inclusive approach that acknowledges and adapts to diverse learning styles, we create an environment where each learner can thrive and succeed. Embracing these different learning types in module design ensures that we support the individual needs of every student, promoting a positive and effective learning experience for all.

Common as well as distinctive characteristics of each module are presented in the following sections.

**4.2 Module 1: Overarching: planning, flexibility and back-up/alternatives**

PREREQUISITES	Basic knowledge about digital accessibility and user testing as well as experience in planning and creating adaptable/alternative scenarios to enhance the quality and reliability of user testing results while effectively addressing unexpected situations.
LEARNING OUTCOME	<p>Advanced knowledge and skills related to digital accessibility, user testing, conducting accessible testing, training participants, using accessibility standards, including assistive products, repeating tasks, accommodating breaks, supervision protocols, appropriate environments, compensation, and post-testing support.</p> <ul style="list-style-type: none"> <li>• Advanced knowledge of digital accessibility, user testing, and conducting accessible user testing.</li> <li>• Understanding the impact of training participants and how it can affect test results.</li> </ul>

	<ul style="list-style-type: none"> <li>• Ability to utilize accessibility standards in general and in user testing specifically.</li> <li>• Awareness of the benefits and drawbacks of having a caregiver during user testing, including proper behaviour and instructions.</li> <li>• Advanced understanding of assistive products and incorporating them into user testing, considering compatibility and personal equipment.</li> <li>• Recognizing user testing participants' needs, creating an environment that allows breaks without disrupting activities.</li> <li>• Familiarity with supervisory protocols, suitable testing environments, and appropriate compensation and support for testers post-testing.</li> </ul>
CONTENT	<p>BEFORE</p> <ul style="list-style-type: none"> <li>• BP1.1 Provide digitally accessible explanations of user testing goals to participants</li> <li>• BP1.3 Training for participants</li> <li>• BP1.4 Clear instructions</li> <li>• BP 1.5 Using accessibility standards</li> </ul> <p>DURING</p> <ul style="list-style-type: none"> <li>• BP1.1 Provide digitally accessible explanations of user testing goals to participants</li> <li>• BP1.3 Training for participants</li> <li>• BP 1.5 Using accessibility standards</li> <li>• BP2.2 The possibility of an caregiver</li> <li>• BP 2.3 Use of own personal equipment</li> <li>• BP2.4 Repeating tasks</li> <li>• BP2.5 Enough time</li> <li>• BP2.6 Taking breaks</li> <li>• BP2.7 Supervision of professionals</li> <li>• BP2.8 Comfortable surroundings</li> </ul> <p>AFTER</p> <ul style="list-style-type: none"> <li>• BP 1.5 Using accessibility standards</li> <li>• BP 3.1 Compensation</li> <li>• BP3.2 Support after testing</li> </ul>
EXERCISES	<p>Exercise: Impact of Participant Training on Test Results</p> <ul style="list-style-type: none"> <li>• Conduct a user testing session with two groups of participants: one group receiving thorough training before the testing session and the other group receiving minimal or no training.</li> </ul>

- Compare and analyse the results and feedback from both groups to understand the impact of participant training on test outcomes.
- Discuss the importance of providing appropriate training to participants and its potential effects on the validity and reliability of user testing results.

Exercise: Utilizing Accessibility Standards in User Testing

- Select a digital product or website and create a user testing plan that aligns with established accessibility standards, such as WCAG (Web Content Accessibility Guidelines).
- Conduct a user testing session based on the plan, ensuring that the testing activities adhere to the identified accessibility standards.
- Evaluate the effectiveness of incorporating accessibility standards into the user testing process and identify any challenges or improvements.

Exercise: Exploring the Role of a caregiver in User Testing

- Conduct a discussion on the benefits and drawbacks of having a caregiver present during user testing activities.
- Develop guidelines for proper behaviour and instructions to provide to caregivers, emphasizing the importance of neutrality, non-influence, and facilitation of the testing process.
- Role-play a user testing scenario where caregivers are present, allowing participants to practice interacting with caregivers while maintaining the integrity of the testing session.

Exercise: Incorporating Assistive Products and Personal Equipment

- Familiarization with a range of assistive products commonly used in user testing, such as screen readers, magnifiers, or alternative input devices.
- Design a user testing scenario that requires the use of specific assistive products or personal equipment.
- Conduct the user testing session, considering compatibility issues, advantages, and potential limitations of the assistive products and personal equipment used.

Exercise: Creating an Inclusive Testing Environment

- Develop guidelines for recognizing and accommodating the needs of user testing participants, including provisions for breaks without disrupting the testing activities.

	<ul style="list-style-type: none"> <li>• Role-play various scenarios where participants require breaks or accommodations, and practice adjusting the testing environment to meet their needs while maintaining the integrity of the testing process.</li> </ul> <p>Exercise: Supervisory Protocols and Post-Testing Support</p> <ul style="list-style-type: none"> <li>• Develop a protocol for supervising user testing activities, outlining responsibilities, communication channels, and data handling procedures.</li> <li>• Create guidelines for providing appropriate compensation and support to testers post-testing, addressing factors such as feedback, debriefing, and potential follow-up assistance.</li> </ul>
LEARNING ASSESSMENT METHODOLOGY	<ul style="list-style-type: none"> <li>• Pre and post-test assessments to measure knowledge gained.</li> <li>• Performance evaluation during exercises to assess application of concepts and skills.</li> <li>• Group discussions to reflect on experiences and analyse outcomes.</li> <li>• Role-playing and simulations to gauge practical application.</li> <li>• Written reports or presentations summarizing findings and reflections.</li> <li>• Peer and instructor feedback to provide guidance and identify areas for improvement.</li> </ul>
TEACHING METHODS	<ul style="list-style-type: none"> <li>• Lectures to deliver foundational knowledge.</li> <li>• Interactive discussions for active engagement and critical thinking.</li> <li>• Hands-on practice through role-playing and mock sessions.</li> <li>• Case studies to analyse real-life examples.</li> <li>• Multimedia materials for visual and auditory learning.</li> <li>• Collaborative projects for teamwork and comprehensive solutions.</li> <li>• Feedback and reflection to guide personal growth.</li> </ul>
LEARNING STYLES	Suggested learning styles for the exercises including visual, auditory, kinesthetic, reading/writing, social, logical, and multimodal approaches.

## 4.2 Module 2: Test panel set-up and diversity

PREREQUISITES	Basic knowledge about digital accessibility, user testing and understanding the importance of correct recruitment, sample size, recruitment channels as well as diversity including demographics,
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	abilities and disabilities, experience levels and cultural backgrounds.
LEARNING OUTCOME	<p>Advanced knowledge in digital accessibility, user testing, incorporating accessibility standards, utilizing assistive products, and ensuring an appropriate environment for user testing activities.</p> <ul style="list-style-type: none"> <li>• Advanced knowledge of digital accessibility and user testing, including conducting user testing with clear and understandable language.</li> <li>• Proficiency in utilizing accessibility standards in general and in user testing specifically.</li> <li>• Advanced understanding of incorporating assistive products into user testing, considering advantages, disadvantages, and compatibility.</li> <li>• Knowledge of creating an appropriate environment for user testing activities.</li> </ul>
CONTENT	<p>BEFORE</p> <ul style="list-style-type: none"> <li>• BP1.4 Clear instructions</li> <li>• BP 1.5 Using accessibility standards</li> <li>• BP 2.3 Use of own personal equipment</li> <li>• BP2.8 Comfortable surroundings</li> </ul>
EXERCISES	<p>Exercise: Clear and Understandable Language in User Testing</p> <ul style="list-style-type: none"> <li>• Develop a set of user testing tasks and instructions.</li> <li>• Rewrite the instructions using clear and understandable language, avoiding technical language or ambiguous terms.</li> <li>• Conduct a pilot test with participants and assess their comprehension of the revised instructions.</li> </ul> <p>Exercise: Applying Accessibility Standards in User Testing</p> <ul style="list-style-type: none"> <li>• Select a digital product or website and identify specific accessibility standards relevant to its design and functionality.</li> <li>• Develop a checklist or evaluation criteria based on the identified accessibility standards.</li> <li>• Perform a simulated user testing session, evaluating the product or website against the checklist to assess its adherence to accessibility standards.</li> </ul> <p>Exercise: Incorporating Assistive Products in User Testing</p>

	<ul style="list-style-type: none"> <li>• Familiarize yourself with different types of assistive products commonly used by individuals with disabilities, such as screen readers, magnifiers, or alternative input devices.</li> <li>• Design a user testing scenario and include specific assistive products that align with the targeted disabilities or impairments.</li> <li>• Conduct a user testing session, considering the advantages, disadvantages, and compatibility of the assistive products used.</li> </ul> <p>Exercise: Creating an Appropriate Testing Environment</p> <ul style="list-style-type: none"> <li>• Identify the essential elements for creating an inclusive and conducive testing environment, including physical accessibility, lighting, noise control, and ergonomic considerations.</li> <li>• Design a user testing space that meets these requirements, ensuring participants' comfort, safety, and privacy.</li> <li>• Conduct a usability test in the designed environment and gather feedback from participants on their experience.</li> </ul>
LEARNING ASSESSMENT METHODOLOGY	<ul style="list-style-type: none"> <li>• Pre and post-test assessments to evaluate participants' understanding.</li> <li>• Task performance evaluation to assess the application of concepts and skills.</li> <li>• Participant feedback and comprehension assessment through pilot tests and user testing sessions.</li> <li>• Usability test feedback to evaluate the effectiveness of the designed testing environment.</li> </ul>
TEACHING METHODS	<ul style="list-style-type: none"> <li>• Lectures to deliver foundational knowledge.</li> <li>• Interactive discussions for engagement and critical thinking.</li> <li>• Hands-on practice through role-playing and simulations.</li> <li>• Case studies to analyse real-life examples.</li> <li>• Multimedia materials for visual and auditory learning.</li> <li>• Collaborative projects for teamwork and comprehensive solutions.</li> <li>• Feedback and reflection to guide personal growth</li> </ul>
LEARNING STYLES	Suggested learning styles for the exercises including visual, auditory, kinesthetic, reading/writing, social, logical, and multimodal approaches.

### 4.3 Module 3: Communication and etiquette

PREREQUISITES	Basic knowledge about standards, digital accessibility and user testing including basic skills in clear communication, clear and
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	<p>concise language, active listening, non-biased language and adaptability. Basic awareness about respecting participant’s privacy, empathy and patience, objectivity, appreciation and feedback.</p>
<p>LEARNING OUTCOME</p>	<p>Advanced knowledge about the importance of consent, the consequences of its absence, knowledge in digital accessibility, user testing, accessibility standards, clear communication, repeating tasks, participant needs, supervision protocol, and appropriate testing environments.</p> <ul style="list-style-type: none"> <li>• Knowledge of the importance of obtaining consent, consequences of not providing it, and providing clear outlines for participants.</li> <li>• Advanced understanding of accessibility standards in general and in user testing.</li> <li>• Expertise in conducting user testing according to accessibility standards.</li> <li>• Comprehensive knowledge of digital accessibility and user testing.</li> <li>• Proficiency in conducting user testing with clear and understandable language.</li> <li>• Understanding the benefits and consequences of repeating tasks during user testing.</li> <li>• Soft skills to recognize participant needs and create an environment that allows breaks without disrupting testing activities.</li> <li>• Familiarity with the protocol of supervising user testing activities and ensuring an appropriate testing environment.</li> </ul>
<p>CONTENT</p>	<p>BEFORE</p> <ul style="list-style-type: none"> <li>• BP1.2 Collect consent from participants</li> <li>• BP 1.5 Using accessibility standards</li> </ul> <p>4.3.2 DURING</p> <ul style="list-style-type: none"> <li>• BP1.4 Clear instructions</li> <li>• BP 1.5 Using accessibility standards</li> <li>• BP2.4 Repeating tasks</li> <li>• BP2.5 Enough time</li> <li>• BP2.6 Taking breaks</li> <li>• BP2.7 Supervision of professionals</li> <li>• BP2.8 Comfortable surroundings</li> </ul> <p>4.3.3 AFTER</p>



	<ul style="list-style-type: none"> <li>BP 1.5 Using accessibility standards</li> </ul>
EXERCISES	<p>Exercise: Consent and Clear Outlines</p> <ul style="list-style-type: none"> <li>Develop a sample consent form for user testing activities, ensuring it covers necessary information and outlines participants' rights and responsibilities.</li> <li>Create a scenario where participants are given unclear instructions and task outlines. Evaluate the consequences of inadequate communication and discuss the importance of providing clear and understandable information.</li> </ul> <p>Exercise: Accessibility Standards Application</p> <ul style="list-style-type: none"> <li>Select a digital product or website and conduct an accessibility audit based on established accessibility standards.</li> <li>Identify potential accessibility barriers and propose modifications to address them, considering both general accessibility standards and those specific to user testing.</li> </ul> <p>Exercise: Conducting User Testing with Accessibility Standards</p> <ul style="list-style-type: none"> <li>Design a user testing plan that integrates accessibility standards throughout the process, from participant recruitment to task design and data analysis.</li> <li>Conduct a mock user testing session, ensuring adherence to accessibility standards and evaluating the effectiveness of the approach.</li> </ul> <p>Exercise: Evaluating Benefits and Consequences of Task Repetition</p> <ul style="list-style-type: none"> <li>Assign participants tasks to perform on a digital product or website, with some tasks repeated and others not.</li> <li>Analyse the impact of task repetition on participant performance, feedback, and overall user experience, considering both the benefits and potential drawbacks.</li> </ul> <p>Exercise: Creating an Inclusive Testing Environment</p> <ul style="list-style-type: none"> <li>Role-play scenarios where participants have specific needs or limitations, such as requiring breaks or accommodations.</li> <li>Practice adapting the testing environment to cater to participant needs while ensuring the integrity and continuity of the testing process.</li> </ul> <p>Exercise: Supervision Protocol and Appropriate Testing Environment</p>

	<ul style="list-style-type: none"> <li>• Develop guidelines for supervising user testing activities, including communication protocols, monitoring techniques, and maintaining a comfortable and accessible testing environment.</li> <li>• Conduct a discussion on the importance of adhering to supervision protocols and creating an appropriate environment that respects participant privacy and ensures their comfort and safety.</li> </ul>
LEARNING ASSESSMENT METHODOLOGY	<p>Performance Evaluation:</p> <ul style="list-style-type: none"> <li>• Assess ability to develop a consent form, apply accessibility standards,</li> <li>• evaluate the benefits and drawbacks of task repetition,</li> <li>• create an inclusive testing environment,</li> <li>• develop supervision protocols.</li> </ul>
TEACHING METHODS	<ul style="list-style-type: none"> <li>• lectures,</li> <li>• interactive discussions,</li> <li>• hands-on practice,</li> <li>• case studies,</li> <li>• multimedia materials,</li> <li>• collaborative projects</li> <li>• feedback and reflection.</li> </ul>
LEARNING STYLES	Suggested learning styles for the exercises including visual, auditory, kinesthetic, reading/writing, social, logical, and multimodal approaches.

#### 4.4 Module 4: Assistive technology, guidance and support (onsite/online)

PREREQUISITES	Basic knowledge about digital accessibility, standards in digital accessibility and diversity of assistive products. The basics of user testing activities
LEARNING OUTCOME	<ul style="list-style-type: none"> <li>• Advanced knowledge about digital accessibility</li> <li>• Advanced knowledge about user testing</li> <li>• Advanced knowledge about conducting user testing in an accessible way</li> <li>• Knowledge about positive and negative sides to user testing from home</li> <li>• Advanced knowledge about the assistive products that are available and how to include them in user testing activities. Understanding the advantages and disadvantages of user</li> </ul>

	<p>testers own personal equipment and solving compatibility issues</p> <ul style="list-style-type: none"> <li>• Knowledge about positive and negative sides of having a guide while performing user testing activities.</li> <li>• Knowledge how to behave toward the caregiver and what instructions to give them</li> <li>• Knowledge about the useful outcome of repeating the tasks by participants, and also consequences how repeating the tasks can affect the results.</li> <li>• Soft skills to recognize the needs of user testing participants and creating an environment, where taking breaks is allowed without interfering with user testing activities.</li> </ul>
CONTENT	<p>BEFORE</p> <ul style="list-style-type: none"> <li>• BP1.1 Provide digitally accessible explanations of user testing goals to participants</li> <li>• BP 1.5 Using accessibility standards</li> <li>• BP 2.1 User testing from home</li> <li>• BP 2.3 Use of own personal equipment</li> </ul> <p>4.4.2 DURING</p> <ul style="list-style-type: none"> <li>• BP 1.5 Using accessibility standards</li> <li>• BP 2.1 User testing from home</li> <li>• BP2.2 The possibility of a caregiver</li> <li>• BP 2.3 Use of own personal equipment</li> <li>• BP2.4 Repeating tasks</li> <li>• BP2.5 Enough time</li> <li>• BP2.6 Taking breaks</li> <li>• BP2.7 Supervision of professionals</li> </ul>
EXERCISES	<p>Exercise: Digital Accessibility Analysis</p> <ul style="list-style-type: none"> <li>• Select a website or digital platform and conduct a comprehensive accessibility evaluation using WCAG (Web Content Accessibility Guidelines) standards.</li> <li>• Identify accessibility barriers and propose modifications or improvements to enhance the overall accessibility of the platform.</li> <li>• Present your findings and recommendations in a detailed report.</li> </ul> <p>Exercise: User Testing Best Practices</p>

	<ul style="list-style-type: none"> <li>• Research and compile a list of user testing best practices, considering factors such as participant recruitment, task design, data collection, and analysis.</li> <li>• Create a user testing plan for a specific digital product or website, ensuring it aligns with the best practices identified.</li> <li>• Conduct a mock user testing session and evaluate the effectiveness of the plan and adherence to accessibility principles.</li> </ul> <p>Exercise: User Testing with Assistive Products</p> <ul style="list-style-type: none"> <li>• Familiarize yourself with a range of assistive products used by individuals with disabilities, such as screen readers, magnifiers, or alternative input devices.</li> <li>• Develop a user testing scenario and incorporate specific assistive products to evaluate the accessibility of a digital product or website.</li> <li>• Identify any compatibility issues or challenges that arise and propose solutions to address them.</li> </ul> <p>Exercise: Exploring the Impact of Task Repetition</p> <ul style="list-style-type: none"> <li>• Conduct a study where participants perform a set of tasks on a digital product or website.</li> <li>• Analyse the outcomes and compare the results of tasks performed once versus those repeated by the participants.</li> <li>• Evaluate the usefulness of task repetition in uncovering usability issues, identifying learning effects, and understanding its impact on user feedback.</li> </ul> <p>Exercise: Understanding the Role of Guides in User Testing</p> <ul style="list-style-type: none"> <li>• Research and discuss the advantages and disadvantages of having a guide or a caregiver present during user testing activities.</li> <li>• Develop guidelines for the behaviour and instructions to provide to guides to ensure a productive and unbiased testing environment.</li> <li>• Conduct a role-play exercise where participants take on the roles of user testers and guides, simulating a user testing session while addressing potential challenges.</li> </ul>
LEARNING ASSESSMENT METHODOLOGY	<p>The learning assessment methodology for the exercises includes</p> <ul style="list-style-type: none"> <li>• evaluating participants' performance in conducting accessibility analysis,</li> <li>• implementing user testing best practices,</li> </ul>

	<ul style="list-style-type: none"> <li>• incorporating assistive products,</li> <li>• analysing the impact of task repetition,</li> <li>• understanding the role of guides in user testing.</li> </ul>
TEACHING METHODS	<ul style="list-style-type: none"> <li>• lectures,</li> <li>• discussions,</li> <li>• hands-on practice,</li> <li>• case studies,</li> <li>• role-playing exercises.</li> </ul>
LEARNING STYLES	Suggested learning styles for the exercises including visual, auditory, kinesthetic, reading/writing, social, logical, and multimodal approaches.

#### 4.5 Module 5: Conclusion of the test, feedback and compensation

PREREQUISITES	Basic knowledge about digital accessibility user testing.
LEARNING OUTCOME	<p>Advanced knowledge and understanding of accessibility standards in general and in user testing, conducting user testing according to accessibility standards, as well as knowledge of appropriate compensation and support for user testing activities.</p> <ul style="list-style-type: none"> <li>• Advanced knowledge of accessibility standards in general.</li> <li>• Advanced knowledge of accessibility standards in user testing.</li> <li>• Advanced knowledge of conducting user testing according to accessibility standards.</li> <li>• Advanced knowledge of providing feedback in a structured manner after user testing activities.</li> <li>• Understanding of appropriate compensation for user testing activities.</li> <li>• Knowledge of providing appropriate support after testing activities.</li> </ul>
CONTENT	<p>AFTER</p> <ul style="list-style-type: none"> <li>• BP 1.5 Using accessibility standards</li> <li>• BP 3.1 Compensation</li> <li>• BP3.2 Support after testing</li> </ul>
EXERCISES	<p>Examples of good practices in Applying Accessibility Standards and Supporting User Testing Participants include:</p> <ul style="list-style-type: none"> <li>• Task Preparation: Create tasks and materials based on accessibility standards, ensuring compatibility with assistive technologies.</li> </ul>

	<ul style="list-style-type: none"><li>• Accessible Documentation: Prepare documents in an accessible format, considering headings, alternative text, and colour contrast.</li><li>• Participant Compensation: Provide compensation promptly, including monetary rewards and reimbursement for travel expenses.</li><li>• Transportation Arrangements: If needed, arrange transportation to ensure accessibility and equal participation.</li></ul> <p>Exercise: Accessibility Standards Analysis</p> <ul style="list-style-type: none"><li>• Research and identify key accessibility standards in general.</li><li>• Create a comprehensive list of accessibility guidelines and principles.</li><li>• Analyse and evaluate how these standards can be applied to different digital platforms or websites.</li></ul> <p>Exercise: User Testing with Accessibility Standards</p> <ul style="list-style-type: none"><li>• Develop a user testing plan that incorporates accessibility standards.</li><li>• Design user testing scenarios that specifically address accessibility considerations.</li><li>• Conduct user testing sessions with participants and assess the effectiveness of incorporating accessibility standards.</li></ul> <p>Exercise: Conducting User Testing According to Accessibility Standards</p> <ul style="list-style-type: none"><li>• Create a step-by-step guide on how to conduct user testing in accordance with accessibility standards.</li><li>• Identify potential challenges or barriers that may arise during user testing and develop strategies to overcome them.</li><li>• Role-play a user testing session, ensuring adherence to accessibility standards throughout the process.</li></ul> <p>Exercise: Compensation and Support for User Testing</p> <ul style="list-style-type: none"><li>• Explore different models and approaches for compensating user testing participants.</li><li>• Develop a framework for determining appropriate compensation based on factors such as time commitment and participant contribution.</li><li>• Design a support system for participants after testing activities, including providing resources or follow-up assistance if needed.</li></ul>
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<p>LEARNING ASSESSMENT METHODOLOGY</p>	<ul style="list-style-type: none"> <li>• Verify whether the material is written and the user testing activities are prepared in compliance with accessibility standards.</li> <li>• Assess participants' comprehension of the significance of adhering to accessibility standards.</li> <li>• Evaluate the application of good practices using practical examples.</li> <li>• Analyse the provided material and compare it against accessibility standards.</li> <li>• Determine participants' ability to create new material and plan user testing activities while considering accessibility standards.</li> </ul>
<p>TEACHING METHODS</p>	<ul style="list-style-type: none"> <li>• Lecture (based on slides and/or handbook)</li> <li>• Discussion/forums</li> <li>• Problem-based learning</li> </ul>
<p>LEARNING STYLES</p>	<p>Suggested learning styles for the exercises including visual, auditory, kinesthetic, reading/writing, social, logical, and multimodal approaches.</p>

## 5. Conclusions

Activities in Work Package 2 in Activity 5 aimed to create a structure for the learning framework and gather conclusions from all activities 1 (literature review), 2 (best practices identification), 3 (surveys) and 4 (workshops for validation of best practices in user testing). Learning framework also defines knowledge gaps, identifies key content, determines practical course delivery, and develops the learning outline for an online course on inclusive and accessible user testing with people with disabilities. The learning framework contains five modules, each addressing different aspects of inclusive and accessible user testing:

**Module 1: Overarching:** This module focuses on planning, flexibility, and back-up/alternatives in user testing. It emphasizes the importance of thorough planning, adapting to unforeseen circumstances, and having contingency plans.

**Module 2: Test panel set-up and diversity:** This module covers the process of creating a diverse test panel, emphasizing inclusivity, diverse participant recruitment, and an inclusive testing environment.

**Module 3: Communication and etiquette:** This module highlights the significance of clear and effective communication during user testing. It provides best practices for communicating with participants, giving clear instructions, and maintaining professional etiquette.

**Module 4: Assistive technology, guidance, and support:** This module explores the use of assistive technology in user testing and provides guidance and support. It addresses understanding assistive products, solving compatibility issues, and providing appropriate guidance and support to participants.

**Module 5: Conclusion of the test, feedback, and compensation:** This module focuses on the final stages of user testing, including providing feedback to participants, ensuring compensation, and concluding the testing process respectfully. It highlights the importance of acknowledging participant contributions.

These modules, integrated with best practices, identified in previous activities, collectively form a comprehensive framework for conducting inclusive and accessible user testing, covering planning, diversity, communication, assistive technology, guidance, support, and test conclusion aspects.



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