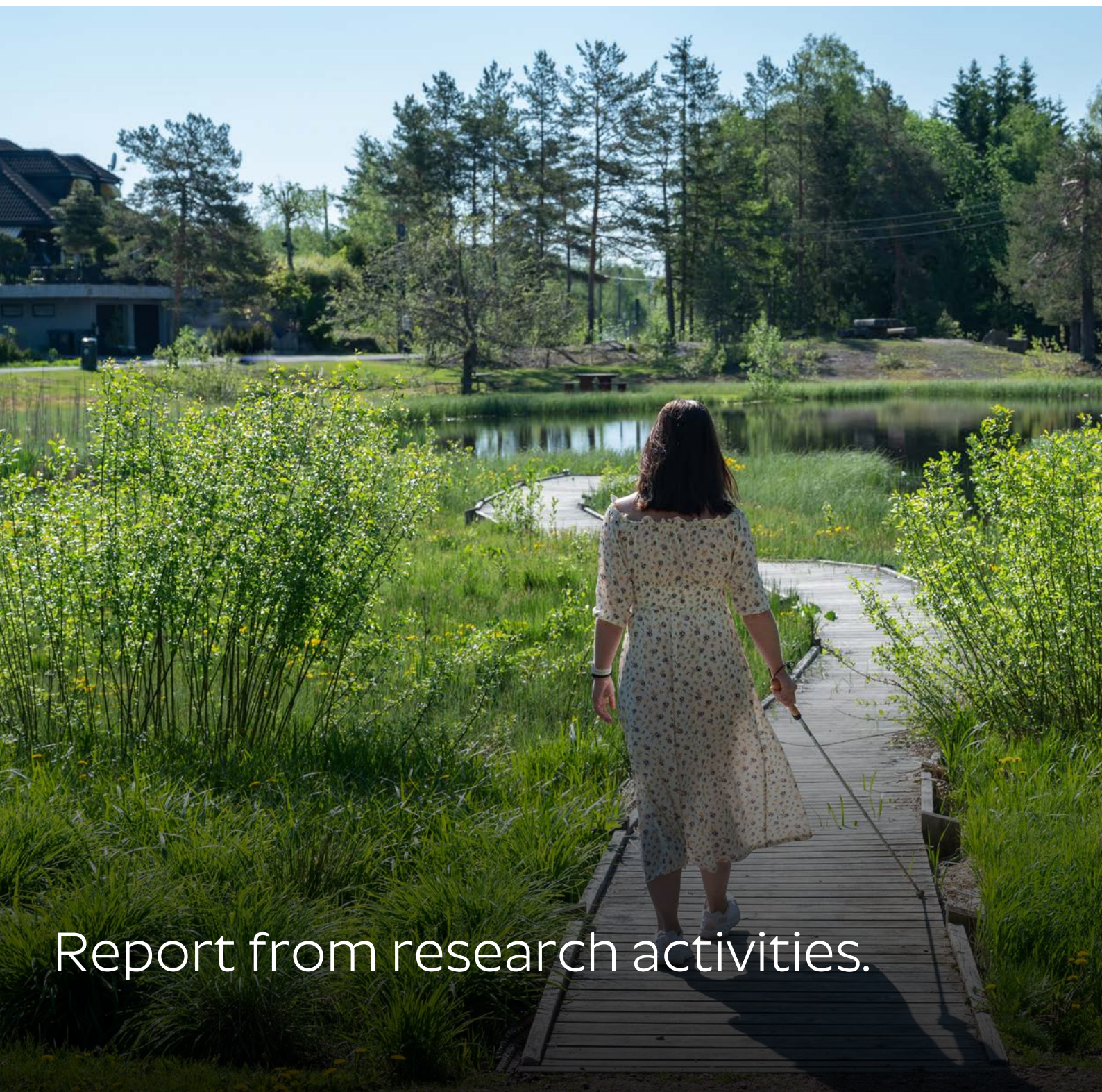


2021 | 02

FAGUTVIKLING

# RAPPORT



Report from research activities.

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Report from research activities at

**Eikholt**

National Center on  
Combined Vision and  
Hearing Impairment/Deafblindness

**NORWAY**



# CONTENT

About EIKHOLT	5
DISSEMINATION: EIKHOLT REPORTS	6
FRAMEWORK CONDITIONS: A Living Lab	6
INNOVATION: Co-researcher	6
INNOVATION: EIKHOLT-MODELLEN a person-centered rehabilitation model	8
INNOVATION: Audio-visual test of speech perception	9
RESEARCH: A study about the experiences of living with deaf blindness.	11
RESEARCH: Development of services for optimalization of dual sensory loss (SEVERAL PROJECTS)	12
RESEARCH: Time for hearing	13
RESEARCH: At Work with Dual Sensory Loss	14
RESEARCH: Sports Enjoyment Unlimited	15
RESEARCH: Optimization of visual functions for people with retinitis pigmentosa	16
EIKHOLT REPORTS	17
RESEARCH: ENVISAGE	18
INNOVATION: Testing a universally adapted hybrid solution for remote teaching	19
RESEARCH: Selective filter glasses	20
INNOVATION: RETIPLUS	22
RESEARCH: Persons with Deafblindness living with Charles Bonnet Syndrome	23
INNOVATION: OrCam	24
RESEARCH: How I became me	26
DISSEMINATION: A book about tactile language	26
RESEARCH: SUITCEYES	28
DISSEMINATION: Impressive Documentary about the Life of Deafblind Persons	30



# EIKHOLT

NATIONAL RESOURCE CENTER FOR PEOPLE WITH DUAL SENSORY LOSS/DEAFBLINDNESS

Eikholt is a national center of excellence in inter-disciplinary and broad-based knowledge and training in the fields of combined vision and hearing impairment and deafblindness. The Centre is situated in beautiful surroundings near the city of Drammen, 30 km west of Oslo.

Target Groups:

- persons with combined vision and auditory impairment/deafblindness
- professionals
- family and close people

We offer:

- rehabilitation to professional life, studies, and everyday life
- training for alternative communication
- optimization of vision and hearing
- research
- training and adaptation to information technology
- seminars and services tailored for individual needs
- a meeting place for individuals, families and professionals

Eikholt is tailored to the needs of people with combined visual and hearing impairment by its lighting, contrast- and color conscious design, telecoil for the hearing impaired, and ice-free and guided nature paths. Eikholt is a resource center that will communicate expertise to universities and important parts of the official support system. Eikholt is a non-profit institution owned by the Eikholt Foundation and funded by the Government of Norway.

# *DISSEMINATION*

## EIKHOLT REPORTS

Every year Eikholt publishes two or three professional reports on various topics concerning the activities at the center. These can be project reports or reports from rehabilitation courses. We call this “EIKHOLT REPORTS”.

They are available as printed matter or via Eikholt's website [www.eikholt.no](http://www.eikholt.no)

# *FRAMEWORK CONDITIONS*

## A LIVING LAB

Eikholt is tailored to the needs of people with combined visual and hearing impairment. The persons can stay at the center while they get systematic and functional training in the use of technical aids and learn how to use compensatory techniques. An important element in the center is the clinic for vision and hearing assessment and optimizing the senses for activities. Another important department is the Center for ICT Training. This means that we have good opportunities to test new technology in collaboration with those who will use the technology. The trial can be done in real-life scenarios. Eikholt is staffed with professionals with pedagogical, medical, and technological expertise. Together with the individuals, the professionals can evaluate the usefulness of prototypes and provide input on changes during the project.

# *INNOVATION*

## CO-RESEARCHER

Development of competence in people with dual sensory loss to become co-researchers.

User involvement can occur at different levels. The individuals are often the subject of our research, i.e., they are our important informants. Individuals can in our context be both the user himself and the user's close persons. These stories can often be strong and poignant and put color and emotion on what one wants to study. User involvement can also be more than this. Often it is relevant to engage individuals in the actual organization of the project. This can take place in the form of participation in a reference group and as ambassadors for the project. However, there are also several varieties of user involvement. In a few projects, individuals participate in the entire research process, as co-researchers the individuals participate on an equal footing with the professionals. This requires some expertise and insight in order for the role of co-researcher to become real. The project will train people with dual sensory loss to become competent co-researchers. This will be a valuable resource in future projects.





# INNOVATION

## EIKHOLT-MODELLEN A PERSON-CENTERED REHABILITATION MODEL

Lund, R. & Johansson, A-B. (2020). Eikholt-modellen. Vårt teoretiske og ideologiske ståsted. Eikholt Rapport nr 1/20 Eikholt nasjonalt ressurscenter for døvblinde, ISBN 978-82-93653-12-7 (print), ISBN 978-82-93653-13-4 (PDF)

Eikholt-modellen is a documentation of Eikholt's theoretical and ideological point of view.

From a theoretical point of view, we mean a description of our professional point of view, current concepts, and the connection between them. Eikholt's ideological point of view is a description of our idea system, basic views and societal views. An ideology is largely governed by which interests dominate. For Eikholt, this is largely characterized by how we came to be, as a response to individuals' needs and that the development up to today has been largely user driven. We have called this person-centered rehabilitation.

In our model, rehabilitation is a targeted process in which the user is the central person and becomes actively involved in all decisions. Habilitation and rehabilitation shall be based on the individual patient's and user's life situation and goals. It is about seeing the individuals as an expert in their own life, a resource person, with abilities and needs. The qualities and abilities that characterize a person can be noticed, but also neglected, they can be strengthened or inhibited by the person himself and/or other people. Involvement and partnership require mutual trust between the individuals and the professionals. Professional knowledge is often associated with power and thus more responsibility. This must be balanced against the user's right to be heard and seen, the right to autonomy and integrity. Person-centered rehabilitation is a term we use in this model.







## *INNOVATION*

### AUDIO-VISUAL TEST OF SPEECH PERCEPTION

Our speech perception is an audiovisual process. What this means is that our brains utilize visual information to supplement and enhance the auditory information from our ears, combining the two streams of information into something more than the sum of its parts. When observing a person talking, the visual information will greatly affect how much and what you hear.

In Norway we've had the ability to measure and quantify the visual contribution to speech perception with the IOWA test. This test was developed in the eighties at the University of Iowa, and adapted to Norwegian by the cochlear implant team at Rikshospitalet university hospital, in the nineties. While the IOWA test is now very old and technically outdated, it has been a valuable tool that has allowed us to better serve people with dual sensory loss, in part by enabling us to describe a person's functional communication ability in a way that synthetic tests can't.

Eikholt has committed to developing a new test of audio-visual speech perception. This will be a modern test that meets the highest criteria in terms of sound and picture quality and will be administered through a computer interface that can be expanded upon. The test will have 600+ unique sentences and several different types of noise stimuli. Four individuals; two men and two women take turns presenting short sentences which are to be repeated by the test subject. The sentences can be presented with several conditions such as visual only, audio only, audio-visual, and with or without noise. Several different visual impairments such as AMD and RP can be overlaid on the video to create a simulation of what different visual impairments may look like, and in a future version it may also include a hearing impairment simulation. The project manager is audiologist Rolf Mjønes. The development is well underway, and the test is set for release by December 2022.







# RESEARCH

## A STUDY ABOUT THE EXPERIENCES OF LIVING WITH DEAF BLINDNESS

Johansson, A-B. (2017). *Se och hör mig. Personer med förvärvad dövblindhets erfarenheter av delaktighet, rehabilitering och medborgerligt liv.* [Doctorial thesis, Sahlgrenska akademien, Inst för neurovetenskap och fysiologi]. Göteborg: University of Gothenburg. Retrieved from <http://hdl.handle.net/2077/48663>

There are very few research studies about the experiences of living with deaf blindness. The objective of this dissertation is to capture the experiences of people with acquired deafblindness regarding their participation, rehabilitation and civic life in order to develop a deeper knowledge and understand how it is to live with deafblindness. The research questions relevant to this study are based on a life-world phenomenological research approach and build on an openness towards phenomena to be studied: What does the concept of “participation” mean for people with acquired deafblindness? What are the conditions required for people with acquired deafblindness to experience participation in their lives? How do people with acquired deafblindness experience their own living conditions? How do they live with an acquired visual and hearing impairment, deafblindness? How do people with acquired deafblindness experience their rehabilitation? What ideas do they have about their experiences? What conditions are necessary for people with acquired deafblindness to exercise their citizenship and their civil privileges?

Method: Eight people with acquired deafblindness have participated in this qualitative study, which has a life world phenomenological approach. The participants have been interviewed a number of times and were observed in a participant observation. The interviews have been transcribed, analyzed, and interpreted with a hermeneutic method.

Results: The study identifies three major areas of life that are strongly connected to participation. These are work, family and social life and efforts from society. All the participants have experiences in their rehabilitation that relate to the theory of “the Lived body” and the concept of horizon and the intentional arc. The whole person in his lifeworld is not often the focus of interaction. The impairment tends to be the focus. To be able to live in society as full citizen requires special services to enable people with deafblindness to participate and take advantage of their civil rights and citizenship. Conclusion: The study provides evidence that special services from society to people with acquired deafblindness enable them to participate more fully in daily life. These services are not always available, and this can lead to frustration and social isolation. The participants also emphasized a lack of response towards people with deafblindness, which also exists among professionals. This lack of response and bias towards emphasizing disability is often found in society. The study also uncovered a lack of knowledge about the importance of addressing the special needs of people with acquired deafblindness, and the need for changing attitudes towards people with deafblindness.



# *RESEARCH*

## DEVELOPMENT OF SERVICES FOR OPTIMALIZATION OF DUAL SENSORY LOSS (SEVERAL PROJECTS)

Vision has an influence on hearing, and our research in several projects shows that when both vision and hearing impairment occur together, they amplify each other, and vision indirectly affects hearing seriously.

Combined visually and hearing-impaired people feel frustration and uncertainty about not being met with such an overall understanding. They find that professionals in the field of vision and the field of hearing work separately. A lack of overall understanding increases the risk that many combined visually and hearing-impaired persons do not receive satisfactory rehabilitation, optimization of visual aids and hearing aids or access to information.

Our studies have shown that vision loss is a factor that has a significant influence on hearing. The vision is used in communication as a support function for perception of speech and shows that speech perception decreases in percentage score when this support is lost. Based on these studies, Eikholt has developed an Audio- Vision clinic where the professionals work in teams, vision and hearing – to optimize these functions as a start to the rest of the rehabilitation. An important point in this context is that both vision and hearing are optimized at the same time and that this work is aimed at the activities to be carried out. For example, in the field of communication or mobility activities.





## *RESEARCH*

### TIME FOR HEARING

It requires time to adapt hearing aids as well as other audiological aids until the person achieves the best possible ability to function and mastery, independence and the opportunity to participate socially and in society.

This project addresses the need for time and optimization of both the residual vision and hearing, as well as close follow-up in the hearing aids for people with combined vision and hearing impairment.

By looking at speech comprehension as an audiovisual phenomenon and taking the consequence of it by optimizing both vision and hearing, we see that many individuals are able to take part in life to a far more active extent again. Having regained safety and self-esteem in many of life's noisy situations leads to better quality of life for themselves and their relatives. Spending enough time making sure that the person understands and acquires knowledge about his vision and hearing loss, thereby learning how to use different strategies such as compensation has proven to be a constructive way to take control in life.

# RESEARCH

## AT WORK WITH DUAL SENSORY LOSS

Johansson, A-B., Lund, R., & Olson, N. (2021). At Work with Dual Sensory Loss. DBI Review, #65, 41-44

Lund, R. & Johansson, A-B. (2019). Yrkesaktiv med nedsatt syn og hørsel. Erfaringer fra kampen om å beholde jobben etter et ervervet dobbelt sansetap. Eikholt Rapport nr 1/20 Eikholt nasjonalt ressurscenter for døvblinde, ISBN 978-82-93653-08-0 (print), ISBN 978-82-93653-06-6 (PDF)

At Eikholt, we have had a project to gather knowledge about experiences from working life. The project was presented in the DBI Review (Johansson et al, 2021). One of the results showed that there is a need to develop a new offer within work rehabilitation for people with combined sensory loss. Such an offer is aimed at all those who already have a job and who are fighting to keep it. It must also be aimed at young people who are in education and must find their way into working life. The project pointed out several aspects that should be included in such a course.

We envisage that the course will be a combination of useful information and exchange of experience between the course participants. The goal is for the participants to gain insight into their own situation and their own needs in the labor market. Furthermore, one should gain knowledge about the development of the labor market and what rights one has. The course will contain information about various support schemes in connection with work. It will offer to map the need for measures in the workplace, if desired. The knowledge of the use of technical aids and its support is crucial in work situation. An important item on the program is also ideas on how to facilitate being able to stay in physically and mentally good shape.





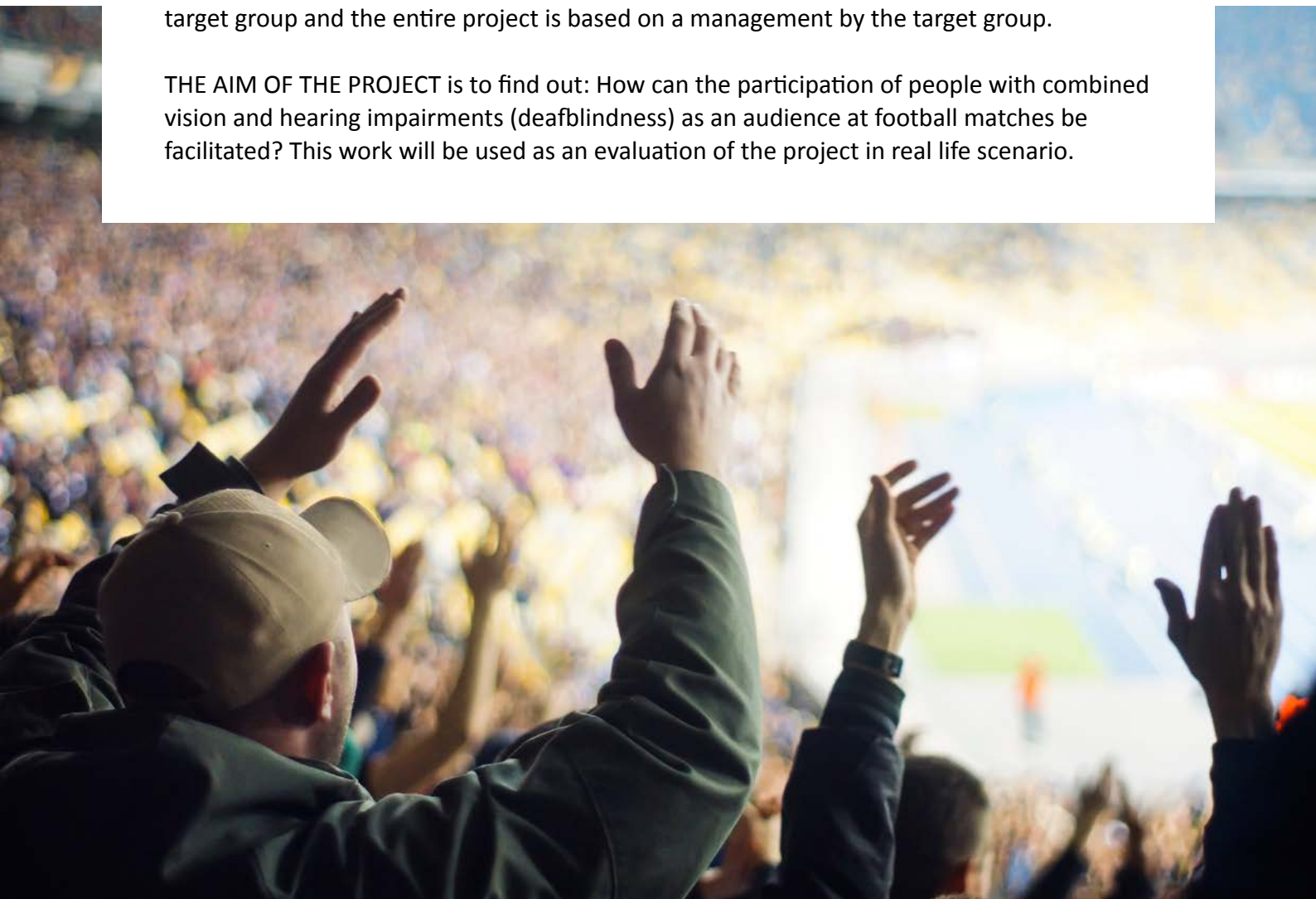
## SPORTS ENJOYMENT UNLIMITED

Broad participation in all parts of civil life is important for democracy and for individuals. People with disabilities face major barriers in many parts of the society, and as a result they are prevented from full participation on an equal footing with others. Barriers can be poor physical accessibility, transport, lack of information and lack of social inclusion.

Through the UN Convention, Norway is obliged to work actively for a more inclusive society where everyone can participate on an equal basis. Article 30 of the Convention stipulates that person with disabilities shall be guaranteed the right to have an active life through participation in culture, leisure, and sport. For most people, this is the key to a rich social life and prevents unfortunate isolation. Participation in culture and sports also means the opportunity to take part in experiences by being in the audience at events.

This project will give people with deafblindness this opportunity. We have chosen to focus on participation in an audience in football matches. We expect the experiences and learning from the project to be useful for assessment of other cultural and sporting events. We expect the social participation as an audience at football matches will be a relatively demanding task that will provide us with a lot of learning and has great transfer value to other arenas. The project is initiated by representatives of the target group, people with combined visual and hearing impairment. One of the two project managers belongs to the target group and the entire project is based on a management by the target group.

THE AIM OF THE PROJECT is to find out: How can the participation of people with combined vision and hearing impairments (deafblindness) as an audience at football matches be facilitated? This work will be used as an evaluation of the project in real life scenario.



# RESEARCH

## OPTIMIZATION OF VISUAL FUNCTIONS FOR PEOPLE WITH RETINITIS PIGMENTOSA

RP is one of the most common causes of severe visual impairment. In Norway, we estimate that the target group is around 1,500 people without there being any register of this.

A large proportion of individuals of services from Eikholt (National Resource Center for the Deafblind) are in the target group. This is partly since the group diagnosis Usher represents more than 60% of the individuals. Of individuals under the age of 70, people with RP are a large and important user group of the services from Hurdal Vision and Coping Center (Norwegian Association of the Blind).

The project will map what are the relevant measures that can optimize the visual function for people with RP. During the project period, to build knowledge, we will test these measures on a selection of project participants who are at different stages in RP. The measures will address some typical problems because of RP. This is:

- Measures in area 1: Narrowed field of view (tunnel vision)
- Measures in area 2: Impaired vision in low light (night blindness)
- Measures in area 3: Glare and light sensitivity

It is a point that the project should be carried out methodically so that the project participants learn and gain insight into their own visual impairment and disability. We believe that the participants' own insight will strengthen the project so that we get more knowledge out of the experiments with the various measures.

The project is supported with grants from the research foundation of the Norwegian Association of the Blind and the research foundation of the Norwegian Association for people with Retinitis Pigmentosa.





# EIKHOLT REPORTS





# RESEARCH

## ENVISAGE

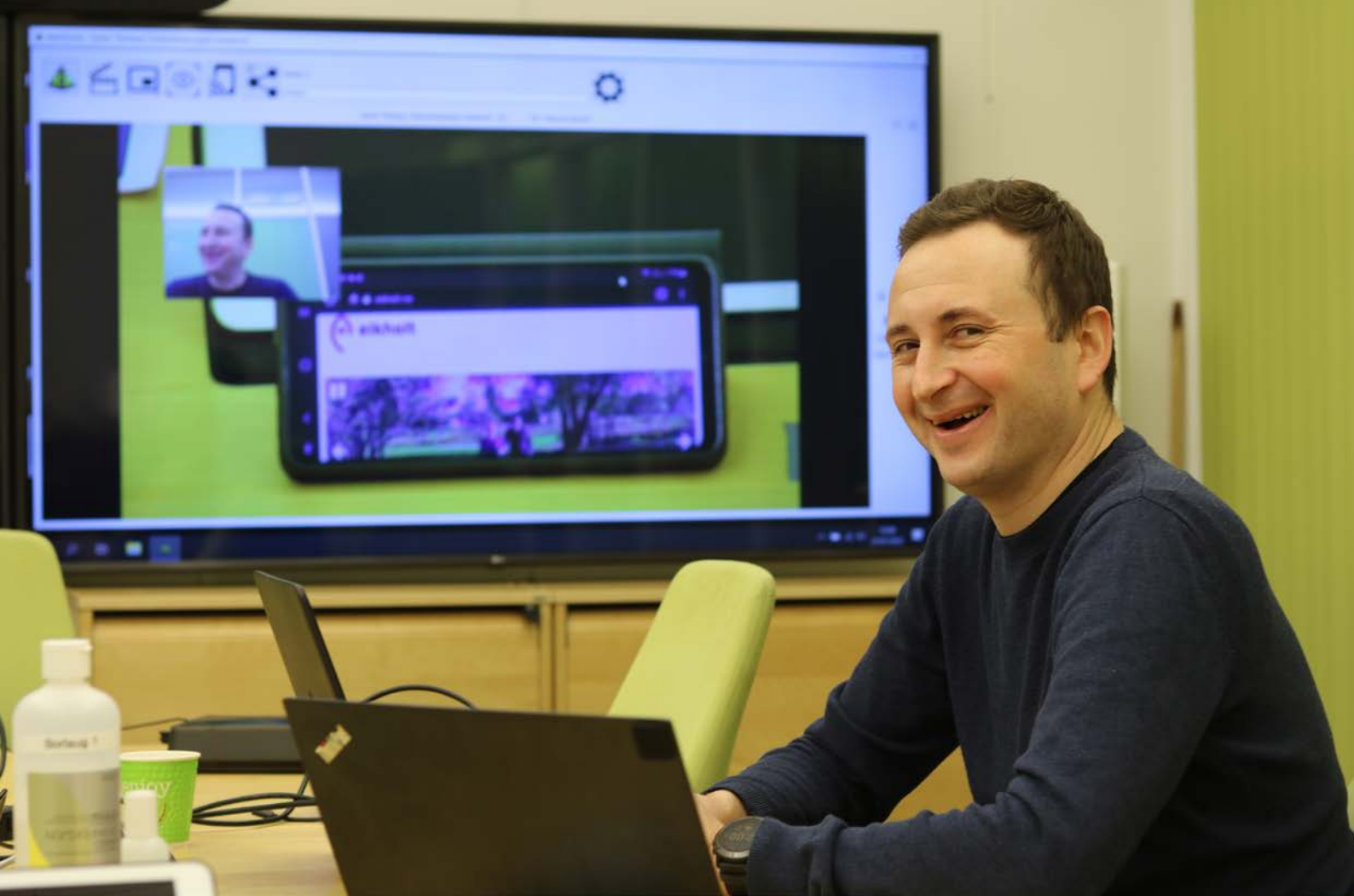
Eikholt participate in setting up an EU funded Consortium together Högsolan i Borås and scientific institutes from Greece, Germany, Holland, and England. The project will pay attention to develop solutions that are reliable, robust, safe, and meet the needs and preferences of people with dual sensory loss. The solutions need to be interoperable with other ICT devices, including other assistive technologies, provides open API (Application Programming Interface) for use by third parties and allow for back-translation of braille or tactile graphics into text or images to enable cooperation between people with dual sensory loss and others. People with visual impairments should be involved in all stages of the research and development. Their involvement in validating the solution is a minimum requirement.

ENVISAGE aims to develop and adapt an open accessible tactile solution, capable of 2-way communication, both for braille and 3D representations for people with dual sensory loss. The designed solutions will provide an open API for third parties to develop new, or port existing solutions tailored to advocate accessibility and inclusion. ENVISAGE will be based on existing production ready solutions and extend them to create the advanced European tactile tablet with open interfaces. Furthermore, to validate the products under development, Eikholt along with some other European institutions and organizations supporting people with dual sensory loss will be included. The end users will be involved in the process, covering a wide range of educational sectors. Eikholt will play an important role in coordinating this part of the project.

The project will focus on innovative haptic solutions, including state of the art 3D capturing and recreation technologies, bridging the gap between people with dual sensory loss and others.



Programme co-funded by the  
**EUROPEAN UNION**



## *INNOVATION*

### TESTING A UNIVERSALLY ADAPTED HYBRID SOLUTION FOR REMOTE TEACHING

The project involves testing in real life a tool that allows instructors/teachers to transfer "the entire classroom" and everything that goes on to home students in an easy and secure way. This can be done simultaneously with teaching participants in the classroom (universally adapted hybrid solution).

This might be very useful for Eikholt's adaptation and mastery courses when a participant must follow the course from a distance. The instructor will be able to transfer live both audio and video directly to those that must be at home in a simple way. The participants can use the settings on their own iPad or computer to customize the audio settings and images in terms of volume, contrasts, zoom levels, reading and speech options, etc. Home students will be able to participate in the teaching in a live way, where they can control a wireless, roof mounted PTZ camera at any angle, 360° horizontally and 180° vertically. They will even be able to OCR process text displayed and save it on their own device.

# *RESEARCH*

## SELECTIVE FILTER GLASSES

For optimization of vision function for persons with combined vision and hearing impairment.

The background for this project is an earlier project that we carried out at Eikholt National Resource Center for the Deafblind, 2017 - 2018. The first project was called "Time for vision" and was supported by the Oslofjord Research Foundation. The overall goal was how a group of people with impaired vision and hearing could improve the opportunities for participation in society through the use of good selective filter glasses. Filter glasses are devices many people with visual impairments benefit from and which NAV (the Norwegian Welfare system) supports under certain rules. The project used methods for optimizing the visual function using the participant's own evaluation of requirements, wishes and needs.

The most important learning effect in the project was the importance of creating user insight. It is a prerequisite for good prescription of filter glasses that the users themselves understand how their vision works under different conditions and how they can use their filter glasses in the right context. Another important outcome was the effect filter glasses are best measured in their effect on endurance and comfort. In the period 2018 - 2019, we carried out a new project following up on some "unexpected discoveries" from the previous project. We saw some of the participants preferred filter glasses that NAV today does not approve as filter glasses. Today it is only filter glasses that cut out the blue light, so-called "blue blockers" that are approved. The project shows that many of our project participants prefers filter glasses with other characteristics with an attenuate of the light in other frequency parts of the visible light. For our user group this seems to be in between 30 - 40% of the cases.

The project shows that many of the participants had their highest sensitivity to light in other frequencies than the blue light (>450nm). The result shows they an improved effect from filter glasses which attenuate the light in the frequency range where the light sensitivity is highest. Although there is a need for more research and documentation of the factors that are crucial for the selection of filter glasses, we can already now tell that today's regulations for what is defined as filter glasses do not meet the needs of many persons with combined vision and hearing impairment and a strong light sensitivity.







## *INNOVATION*

### RETIPLUS

A lot of people with combined vision and hearing impairment suffers from a peripheral field-of-view (FOV) loss. During 2019 Eikholt has done an innovation project on how to use AR smart glasses for people with low vision and a restricted field of view. We have primarily examined the effects on how these new glasses can improve orientation and mobility.

The Retiplus system is a software installed in a pair of smart glasses the user wears and a tablet that the professional operates. Both devices are connected via Bluetooth, so the tablet screen shows the same image as the smart glasses displays. All image parameters the operator configure on the tablet (position, size, zoom, bright, contrast) are shown on the displays in real time. In this way it is possible to adjust the smart glasses to the user's vision. Retiplus uses a camera on the front of the glasses to capture the view in front of the individuals' eyes. Then the image is processed in real-time. This process is defined and calibrated by an eye care professional. Then, the new video image is projected onto the displays inside the glasses, superimposing an image on a user's own view of the real world. This enables the individuals to receive a wider field of view of the space in front of viewer. Other effects are increased contrast, brighter image and control over magnification. We have measured how the new glasses improve skills in mobility tasks such as stability and obstacle avoidance, memory for static displays, and locomotion-based memory or spatial updating tasks in smaller scale (room-sized) real and virtual environments.

The work in this project shows how important peripheral field is for an understanding of spatial layout, but also on how reduced field influences spatial learning on navigation of new unknown spaces.





## *RESEARCH*

### PERSONS WITH DEAFBLINDNESS LIVING WITH CHARLES BONNET SYNDROME

Charles Bonnet Syndrome (CBS) are visual hallucinations experienced by 10 to 60 percent of all persons with reduced vision. Previous studies have found that hearing impairment, stress, fatigue, social and physical isolation increase the risk of experiencing CBS, which means that people with deafblindness are thought to be extra prone to experience CBS.

The project was carried out with a focus group of 6 participants who met twice. It emerged in the group that CBS has an impact on daily life and social life. In the case of double sensory loss, both remote senses are affected, and one is prevented from being able to control what one actually saw or heard when in doubt. Gaining a good knowledge of what CBS is is important to make it easier to live with the consequences of hallucinations.



# *INNOVATION*

## ORCAM

Over the past year at Eikholt we have a number of innovation projects focusing on new aids for people with combined vision and hearing impairment. Together with our individuals, we are constantly looking for new and better ways of coping with everyday life.

OrCam is a relatively new tool for the visually impaired in the Norwegian market, and the device is available through NAV Hjelpemiddelsentral. OrCam is a very small and rechargeable camera that attaches to one eyeglass bar on a regular eyeglass. Camera can photograph most of the plain text and turn it into speech (OCR processing). The user can take a picture with a simple click of the index finger on the camera. The built-in audio output on the back of the camera immediately starts reading with a voice, the text being photographed. We have tested the aid and were impressed. OrCam reads all printed text effortlessly. We were extremely impressed when we discovered that the camera could also read signs at a long distance. On one occasion we stood 100 meters from a supermarket and read the sign with the name of the mall and opening hours. OrCam read everything flawlessly. We also tested the possibility of pointing to what you want to read. We pointed to signs, and we pointed to text on blackboards and in the newspaper. We pointed to instructions and contents on packages, menus and prices. OrCam starts to read the text from where you point. If you want to end the reading, you just do a "stop motion" with your hand in front of the camera and OrCam stops. OrCam can also learn to recognize faces and objects. When OrCam detects a human, it will usually say "a man" or "a woman." But if there is a person you have taught OrCam what is called, it will say the name, such as "Arne". One can therefore store the name of people, but also of products. OrCam, after being told what a product is and its name, will recognize it and say what it has learned. There may be common consumer items that we need to recognize, but also the difference between banknotes and credit cards that can easily be mistaken.

OrCam is a tiny discreet camera that attaches to the glasses via a pair of small magnets. The camera attaches well to the glasses when holding it close to the eyeglass bar. The advantage is that you can easily put the camera on and off the glasses whenever you want. This is probably necessary because the operating time is limited to a couple of hours, which limits the use. The camera is charged in the same way as the mobile phone, so learning the routines is not a big problem. Most Orcam units delivered in Norway understand two languages, usually Norwegian and English, but there are many other combinations of languages. The sound comes out via a mini speaker on the back of the camera, which is closer to the ear due to the placement of an eyeglass temples. At Eikholt, all individuals have impaired hearing, so we were curious about how OrCam would work for them. For most people, this works well with hearing aids without the need to make any settings, as noise in the surroundings can hinder reading.

When we tested OrCam inside a mall, the noise from other people, all the cooling counters and the ventilation system were so disruptive that our individuals had problems. Then it is good that it is possible to send the signals directly via bluetooth from OrCam to the hearing aid. It helps considerably.

Most hearing aid users have their personal settings stored in their hearing aids. There are also some limitations with OrCam. For us, it is important that a potential user has such good hearing that he uses the "voice" from OrCam. So, the potential user cannot be deaf and completely blind, we think. It may be possible for some blind person to learn where the camera looks and learn how to start the camera properly, but it seems difficult. But for people with severe vision, whether reduced vision and / or field of vision, OrCam works elegantly.

It will cooperate and manages to read most of it. Restriction is handwriting - for now. Because we shouldn't wonder if it will do well soon. It's really smart.





## RESEARCH



### HOW I BECAME ME

The topic of this study done at Eikholt is siblings of children with disabilities and their descriptions of their own identity development.

The study focuses on the life world of siblings. It sheds light on how it feels for them to grow up in a family, where a child needs different follow-up and adaptation than they need. This study highlights siblings' own voices, which may be of interest to families with children with disabilities, and for healthcare personnel and auxiliaries who often focus on the "sick child" or parents. Healthcare personnel shall contribute to safeguarding underage children's need for information and follow-up as a result of parents' illness, injury or drug addiction.

## DISSEMINATION



A BOOK ABOUT TACTILE LANGUAGE: "If you can see it, you can support it"

When we put on the language glasses and attach linguistic value to bodily tactile utterances, we can also communicate with people with congenital deafblindness at a linguistic level.

This book, which targets deafblind employees, parents and relatives of people with congenital deafblindness, focuses on how language development in bodily tactile modality can be supported and developed so that the person with congenital deafblindness is met as a person with language.

ISBN: 978-91-88213-31-0

Language: Scandinavian

Pages: 164





# RESEARCH

## SUITCEYES

The overall objective of SUITCEYES is to improve the level of independence and participation of people with deafblindness and to enhance their communication, perception of the environment, knowledge acquisition and conduct of daily routines.

Deafblindness – otherwise known as a dual sensory loss – refers to a unique combination of vision and hearing loss of such severity that it is hard for the impaired senses to compensate for each other (Dammeyer, 2014). Deafblindness is often defined in two different subgroups – congenital deafblindness and acquired deafblindness – due to their different development conditions. People with congenital deafblindness are born deaf or blind or became deaf or blind early in life before the development of language, while acquired deafblindness is labelled as “post-lingual deafblindness”. Individuals with deafblindness often face challenges in fully participating in society, due to difficulties in communication. Furthermore, accessing information and moving around freely and safely is restricted. These limitations lead to a high risk of social isolation and exclusion for individuals with deafblindness.

SUITCEYES aims at combining and developing cutting-edge technologies and ICT tools to develop a haptic intelligent personalized interface (“HIPI”) which is based on sensor technologies, image and signal processing, psychophysics, smart textiles, semantic reasoning and affective computing. The project aims at (i) enhancing the localization awareness and environmental perception of the user (ii) extending and improving individuals’ modes of communication via a haptic interface; promoting and facilitating learning, as well as capturing and extending individuals’ interest and engagement, (iii) incorporate gamification and mediated social interactions.

The project outcome is not limited to a technological solution. Extensive user studies are conducted to improve our understanding of the actual needs of people with deafblindness and to inform the project and design and development decisions. The project also includes policy studies, in order to raise awareness and to facilitate informed policies and decision making.

We are linking the potential of the technology very clearly to the priorities of people with deafblindness. To discover more about user needs we have carried out 81 interviews with 79 people in 5 countries during the earlier stage of the project, asking them about their current situation, access to technology and priorities for the future. Interviewers included technology experts, allowing direct communication between individuals and designers, as well as interviewers experienced in qualitative research. In addition, we are carrying out co-design activities and workshops together with potential individuals, to help further guide the specifications of our prototype. One idea is that the garment, acting as a smart interface, will transfer information to the bearers through haptic signals, and can, for example, tell the bearers if someone is looking at them or where the ball they dropped is in the room. But it is also possible to combine different sensors in the smart textile. Each sensor can address different perceptive channels, which enlarges the communication space.

Although the SUITCEYES prototype will be developed specifically for individuals with deafblindness, the application area of the prototype is not limited to this group. A system that affords improved perception of the surrounding environment and allows an alternative (haptic) mode of communication can scale to multiple other application areas. There are many circumstances where a user lacks full reliance on the visual and auditory senses such as firefighting in smoke-filled rooms, rescue missions in dark and noisy environments, sports training and more.



Haptic signing is a process in which a hearing, sighted person conveys information to a deaf and blind individual by touching their back or other parts of their body. It's effective, but what happens if the deafblind person wants to be more independent? A new haptic-feedback clothing could help. This information is translated into vibrations or other haptic signals, which are delivered to the user's body via a network of actuators built into their clothing.



# *DISSEMINATION*

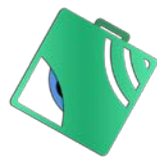
## IMPRESSIVE DOCUMENTARY ABOUT THE LIFE OF DEAFBLIND PERSONS

Video ([https://youtu.be/a18Y\\_HUaR9M](https://youtu.be/a18Y_HUaR9M))

The new film “Suitceyes Documentary” by four students from Offenburg University provides a sensitive insight into the everyday life of persons living with deafblindness. It shows how intelligent wearables developed in the EU-project SUITCEYES can significantly improve their lives.

No vision and a long silence – this are how the 26-minutes documentary introduces the viewer to the situation of persons with deafblindness. The creators, four students from the media faculty at the Offenburg University conveyed a vivid impression of the everyday challenges of these persons. Moreover, it shows how in the EU- project SUITCEYES scientists from seven partners all over Europe are working together to develop communication tools that will seriously improve the lives of those affected. The “SUITCEYES documentary” is the impressive result of a project work by Mübeyra Erkuş, Nico Levicki, Pascal Hoffmann and Tim Wenz in the Department of Media at Offenburg University under the supervision of Prof. Dr. Oliver Korn and Prof. Sabine Burg de Sousa Ferreira.

The film was created throughout the summer term and under strict Corona regulations – including a flight to a partner in Sweden. Prof. Oliver Korn is extremely pleased with the result, which has now been published and can be watched on YouTube: “I am very impressed by the professional work of our media students. Under difficult circumstances, they have managed to document a complex international research project in a straightforward and touching way.”



# SUITCEYES

Smart, User-friendly, Interactive, Tactual, Cognition-Enhancer  
that Yields Extended Sensosphere





# **eikholt**

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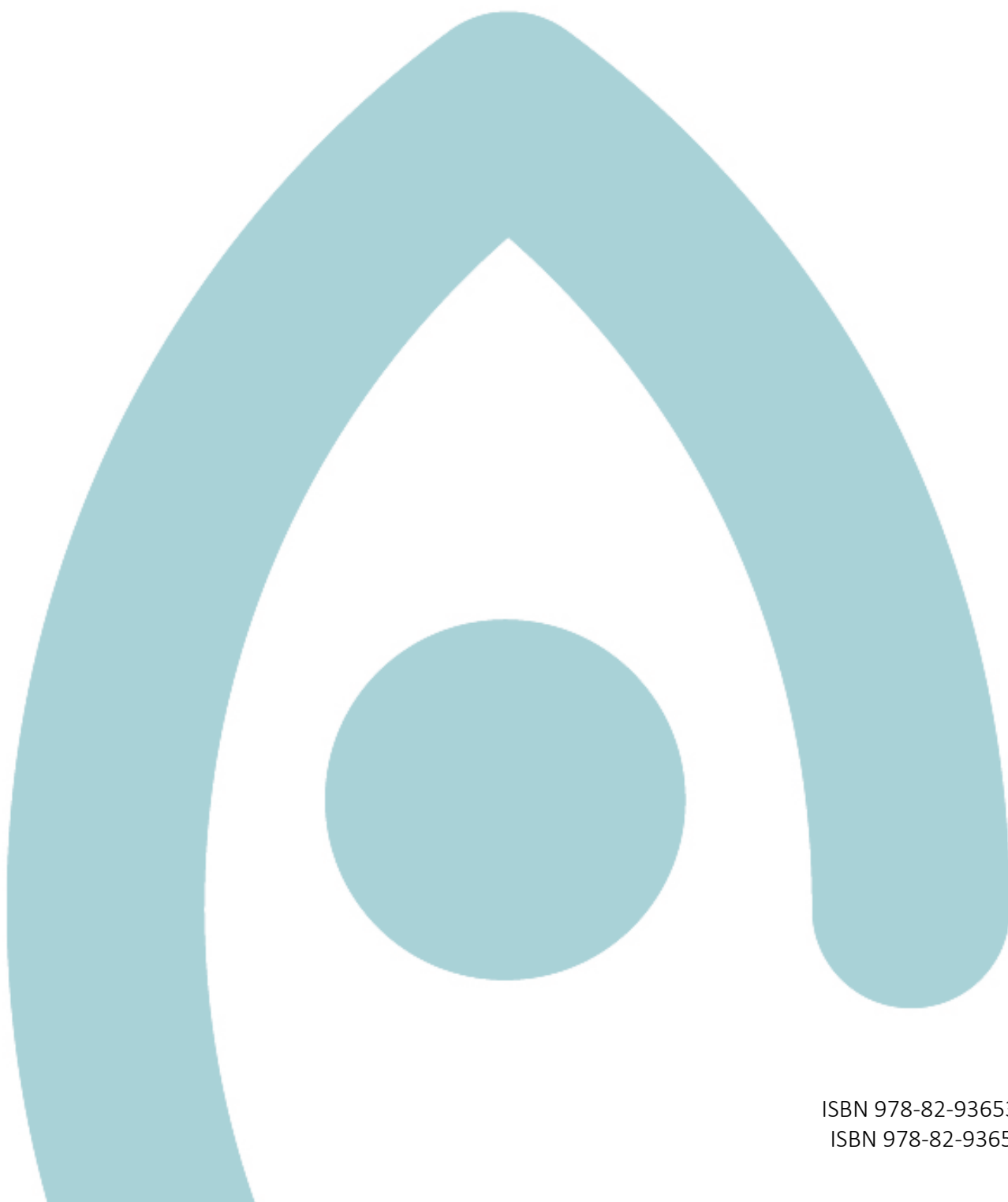
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