April 2022

In-VisIBLe

Innovative and **In**clusive learning tool for **Vis**ually **I**mpaired and **Bl**ind peopl**e**

Preparatory activities

Review of good practices and needs analysis

In-VisIBLe

Innovative and Inclusive learning tool for Visually Impaired and Blind people

Coordinator of the preparatory activities: University of Bologna, Italy

Project Parners

Akademia Humanistyczno-Ekonomicza w Lodzi / AHE, Poland

Centre for Research and Technology Hellas / CERTH, Greece

Centre for Education and Rehabilitation for the Blind / CERB, Greece

Museo Tattile Statale Omero / MO, Italy

Yedetepe University Vakif / TU, Turkey

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The In-VisIBLe project

Accessibility is the core of one of the areas of action of the European Disability Strategy 2020-2030 and culture is one of the most crucial contexts in which

accessibility is declined, because of its centrality in the growth of both the individual and the society. Nevertheless, the level of education of persons with disabilities continues to be lower than the one of persons without disabilities. At present, people with disabilities are only represented on average in 1.1% of the university degree students and the percentage is even lower when talking of master, postgraduate or PhD students (UNESCO Institute for Statistics, Education and Disability. Analysis of Data from 49 countries, March 2018). These figures show that it is still necessary to adopt positive actions to promote access and guarantee Higher Education adapted to special needs, for the largest number of people; promoting equal opportunities for all and leaving no-one behind is more than ever an imperative.

In-VisIBLe project aims at answering to this growing need for inclusion in Higher Education, by using and implementing innovative tools for communication and fruition of cultural contents, to be integrated in HE didactic modules. As its name suggests, the project is focused on visual disability. Inclusion is especially challenging for VIB students in fields of knowledge that apparently exclude them without remedy, like the so-called *visual arts*. Among the disciplines related to visual arts, the project is focused on History of Architecture, because it is a cross-sectorial field which is present in almost all the bachelor/master's degrees in arts/Architecture/Design. The main objective of In-VisIBLe is to foster the inclusion of VIB students/learners by (1) equipping HE courses of History of Architecture with tools that make the visual contents accessible to them, and (2) implementing a Massive Open Online Course (MOOC) on the same topics in order to reach out to as many users (both VIB and nonVIB) as possible, i.e. HE students but also other learners/users outside the academia. The second objective is to foster innovation in learning and teaching practices: both the In-VisIBLe HE courses and MOOC will actually rely on the development of "Innovative and Inclusive Didactic Modules (IDM) that will use advanced technological solutions, interactive pedagogical methods and innovative didactic tools (3D architectural models; 2D tactile plates with architectural drawings; Artificial Intelligence). These innovative digital tools will be specifically designed to meet the needs of students/users with visual disabilities, but they will also enrich the

learning practice of all potential students/users, while also developing their ICT skills and competences. The third objective is to promote collaboration between HEIs and a broader cross-section of society on the issue of inclusion of VIB people: HEIs will work with high schools, museums and cultural institutions, organizations for the blind and policy makers in the areas of education and inclusion: this collaboration will be for the mutual benefit of HEIs and for the larger community of stakeholders, who are also represented in the project consortium and associated partners.

The preparatory activities

The preparatory activities aim is to provide the project a solid background. They are focused on the identification of the specific needs and requirements of the VIB students in visual arts and review of best practices collected and analyzed with the support of the non-academic partners of the consortium, who have extensive experience in the implementation of learning paths specifically addressed to VIB people approaching visual arts.

This preparatory phase has produced a set of documents that will be uploaded on a reserved section shared among all the partners on the reserved area of the project website, that will be constantly updated and implemented during the project duration.

The results of the needs analysis and good practices reviews will be presented to all partners during the first kick-off meeting (26th – 27th April 2022 in Bologna, Italy) and, based on these results, each team will start working on their assigned tasks.

Methodology

To achieving the aims expected by the preparatory activities, the Department of Educational Sciences of the University of Bologna has designed two questionnaires: one for the collection of good practices, the other for the needs analysis. The questionnaires were introduced and described to each European partner during a private online meeting. Subsequently, the Unibo team sent the two questionnaires via email to each partner – giving them the opportunity to fill them out both in Word format and using Google Forms (an application from the Google Drive Suite). The forms received in Word format were subsequently transferred – without making any changes – to Google Forms to facilitate the data analysis process. The data were collected between February and March of 2022. The best practices survey consisted of closed-ended and open-ended questions, while the needs analysis questionnaire consisted of open-ended questions only. In the following report, the results of the closed-ended questions are presented through percentage charts and data analysis. The results of the open-ended questions were processed through top-down methodology and are presented through summary tables and subsequent discussions. It is specified that in this report the data are presented in aggregate form. Should you require further information, please do not hesitate to contact the following addresses:

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Results of the survey of good practices

It is well known that existing best practices are numerous; in our study, in fact, only a few are analyzed as illustrative examples. In addition, it is also worth considering that the collection and analysis of best practices were conducted in a narrow time frame.

To choose which best practices to analyze, the Unibo team used three main data selection criteria:
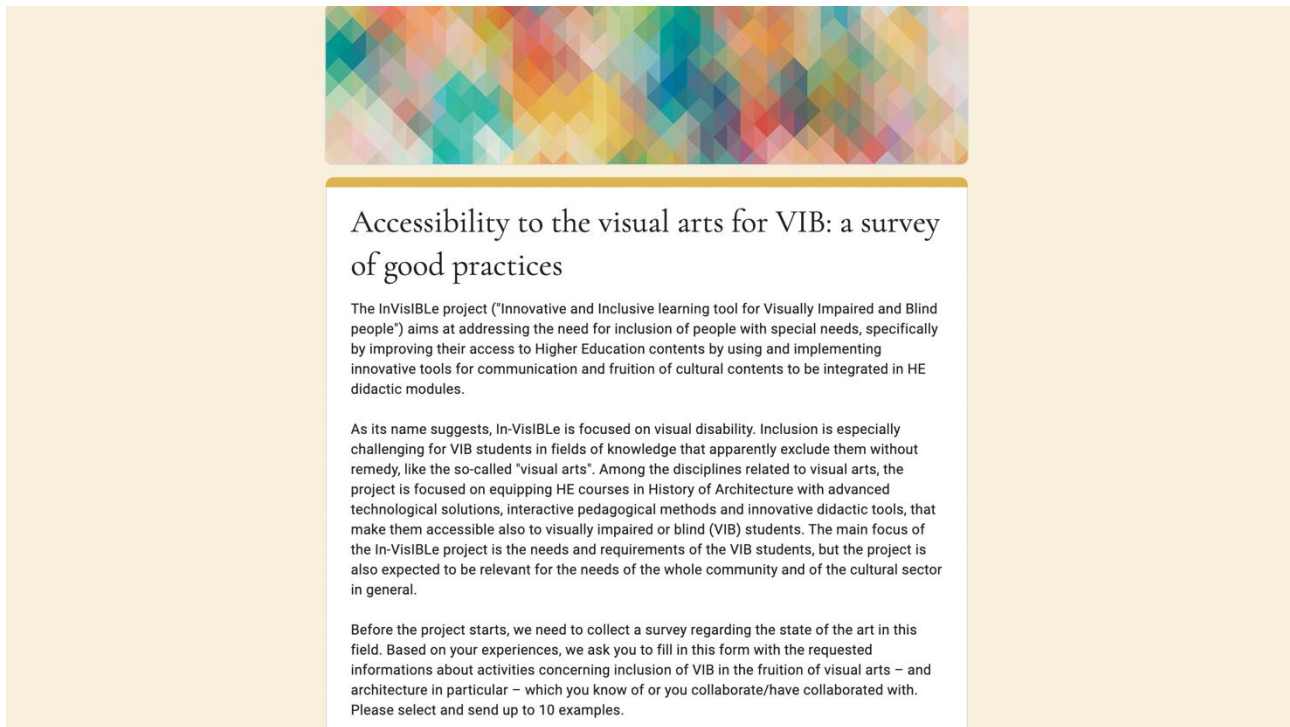
1. projects and activities are developed in Europe
2. project and activities online informations are detailed;
3. projects and activities have a specific focus on the connection between visual arts and visual impairment.

The survey of good practices

The survey of good practices was submitted via email to both the European project partners and the associated partners. Before the project started, it was necessary to collect a survey regarding the state of the art in the field of our interest. Participants were asked to fill in the form with information about activities concerning the inclusion of VIB in the fruition of visual arts - and architecture in particular - which they knew of or they collaborate/have collaborated with.

Figure 1. The survey of good practices on Google Forms

Participants

Each partner was asked to send a maximum of ten examples of good practices; associated partners were asked to send only a few. The University of Bologna, as the results coordinator, collected more than ten good practices in order to have a more complete overview. Seven organizations participated in the questionnaire and a total of 35 examples of best practices were received.

The following table (Table 1) shows the organizations that took part in the best practices survey and the number of submissions they presented.

Partners	No. of projects

Akademia Humanistyczno-Ekonomicza w Lodzi (AHE)	2
Centre for Research and Technology Hellas (CERTH)	5
Centre of Education and Rehabilitation for the Blind (CERB)	1
Institute for the Blind Francesco Cavazza	1
Omero Tactile Museum (MO)	6
Yeditepe University Vakif	7
University of Bologna (UNIBO)	15
Tot.	37

Table 1. Participating partners and the number of good practices they submitted

Names of the projects / activities

The following table (Table 2) collects the names of the projects or activities presented as good practices. The total of these projects is 35 because two projects / activities

were presented from two partners. So, the Unibo team decided to take only one description for each project.

Names of the project / activity
Accessibility observatory
ARCHES - Accessible Resources for Cultural Heritage EcoSystem - Kunsthistorisches Museum
Architectural Paper Model with Understanding of the Congenitally Blind Students: A Case Study of Phra Prang Sam Yod - Tongpong, N., & Santiwes, S. (2019).
Assistive Technology Applied in an Inclusive MOOC for the Blind - Marques, B., Escudeiro, P., Barata, A., Carvalho, P., de Sousa, A., & Queirós, P. (2019).
Blind wood
Double sense
E-Vision
Enabling Access to Cultural Heritage for the visually impaired: An Interactive 3D model of a Cultural Site - Rossetti, V., Furfari, F., Leporini, B., Pelagatti, S., & Quarta, A. (2018)
Face to face with the artwork

Feeling Van Gogh by Van Gogh Museum
Getting in touch with Longobardi
Girobussola APS
Hoy toca el Prado
Joint Architectural Initiative
Limitless
MIXT - Museums for All
Museum of Oriental Art of Turin
Play a Kandisky
Promoting Inclusion through educational 3D Printing
QuaLiSID
REA project
Seeing with the Hands: Teaching Architecture for the Visually Impaired with Digitally Fabricated Scale Models - Celani, G., Zattera, V., de Oliveira, M. F., & da Silva, J. V. L. (2013).

Sensory Totem
Suitable Size of 3D Printing Architecture Models for Tactile Exploration
Suitceyes
Talking Teens
The blind spot
The Color I touch
The Role of Architecture Education on Architectural Space Perception of Blind Students (Study Group: Blind Students of Tabriz Cultural Art Institute of Basir) - Abdolsamadi, M., Namdar, S. A., & Balilan, L. (2019).
Tyflografika - drawings for the blind
Touching Masterpieces
Typhlological Museum of Madrid
Uffizi by Touch
Varese Tactile Museum
Visits for Blind and Visually Impaired visitors

Table 2. Names of the good practices

Developers
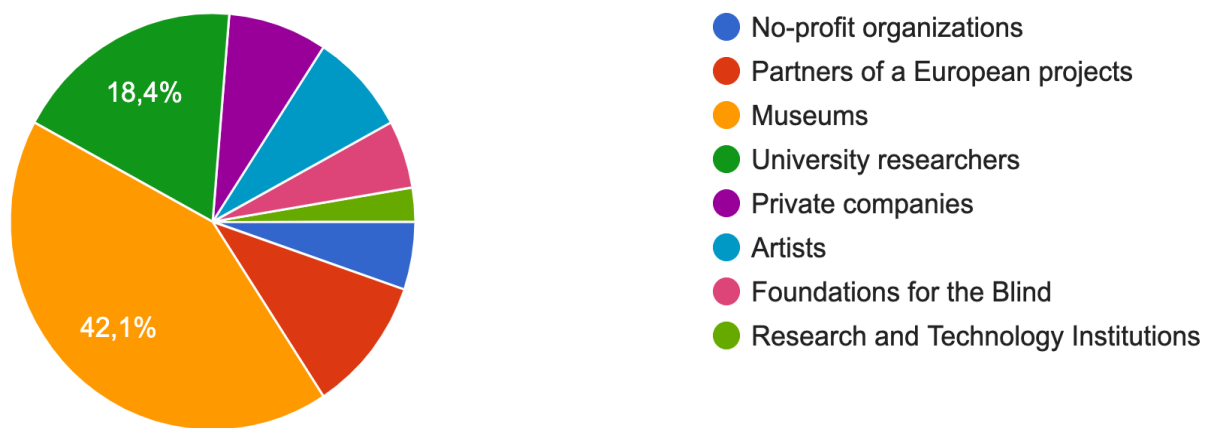
Figure 2. Project / activity developers

In relation to the projects submitted:

15 projects / activities have involved **museums**

7 projects / activities are subjects of study of **university researchers**

4 projects are promoted by the **partners of a European program**

3 projects / activities originate from the initiative of **independent artists**

2 projects / activities are promoted by **non-profit organizations**

2 projects are developed by **private companies**

2 projects are developed by **Associations / Foundations for the Blind**

Generally, it is pointed out that the main actors are the **museums** that, with their activities and projects, want to embrace the concepts of accessibility and inclusion. Some partners have reviewed the literature and found initiatives by **professionals from a variety of European and worldwide universities**. Specifically, three of these seven projects / activities involved the Departments of Architecture (Khon

Kaen University; Thailand and Islamic Azad University, Iran; Faculty of Architecture of the University of Technology, Poland).

4 projects promoted by the **European Union**, that have involved many different partners from Europe and the world, are analyzed; ARCHES, E-Vision, Horizon 2020 and a project whose title is not specified belonging to the Erasmus+ program.

3 projects/ activities grew out of the initiative of **independent artists** (in 1 case in collaboration with other entities) who designed art exhibitions that took place in museums, foundations for the blind and even online. Two projects are promoted by **private companies** that are specifically related to the field of technology.

The projects / activities

The following table presents - in descending order of frequency - the main actions carried out by projects / activities presented as good practices.

Project activities
Museum tactile tours and workshops
Development of technological solutions to make culture and art accessible to VIB
Art exhibitions accessible to VIB
Research to make Architecture accessible to VIB
Training courses
Accessible travel itineraries

Table 3. Activities carried out by the good practices

The projects / activities presented as best practices are mostly related to **museum initiatives** (**11** p/a) 5 of them initiatives that offer tactile visits accessible to VIBs have also organized workshops: sculpture workshops ("Guggenheim Museum"), workshops to raise awareness of the difficulties of blind and visually impaired people ("Sensory Totem"); manipulation and theater workshops to increase creativity and imagination ("The Color I touch"), workshops in which visitors have the opportunity to use senses and feel Van Gogh brush strokes on the 3d reproduction ("Feeling Van Gogh") and workshops on reinterpretation of artworks to understand their form, poetics, and message ("Face to Face with the artworks"). The projects / activities related to the **development of technological solutions** can be divided into two macro-areas: the first aims to make art, architecture, and knowledge accessible ("ARCHES", "Touching Masterpieces" and "Assistive Technology Applied in an Inclusive MOOC for the Blind" projects); the second area aims to make people with visual impairments reach the highest possible degree of autonomy in everyday life ("e-Vision", "Rea" and "QualiSID", "Joint Architecture Initiative" projects).

Art exhibitions differ from the tactile tours offered by museums because they can be temporary (such as, for example, the exhibitions "Getting in touch with Longobards", "Touching Masterpieces"), itinerant (as "Hoy toca el Prado" exhibition) and designed by independent artists (like "Blind Wood" project). A particular case is represented by the exhibition "Play a Kandisky" which takes place online.

Some **research conducted by university professionals** to make art and architecture accessible to VIBs is presented. This research involves the development of 3D printers (2 p/a); the use and implementation of accessible architectural models in the visual arts (3 p/a).

3 project / activities ("Limitless", "Girobussola APS" and "The Role of Architecture Education on Architectural Space Perception of Blind Students") specify that they have organized **training courses**; in the first case addressed to teachers and

professionals, in the second addressed to increase the knowledge of technologies for elderly people with visual impairments. Finally, 2 p/a (Girobussola APS, Talking Teens) have created **travel tours** accessible to people with visual impairments.

Location

In relation to the projects submitted, the following locations where the projects/activities were developed are specified:

13 projects are from **Italy**

4 projects refer to **Europe**

2 projects are from **Greece**

2 projects are from **Netherlands**

2 projects are from **Poland**

2 projects are from **Spain**

1 project is from **Turkey**

1 project is from **Iran**

1 project is from **Portugal**

1 project is from **France**

1 project is from **Austria**

Times

Regarding the times of implementation of the analyzed projects / activities, it is possible to note that **15** of them took place in a time range from 1992 (birth of the Typhological Museum) until 2022. The implementation trend of the analyzed activities is observed in the period from **2017-2019**.

How the projects/ activities were developed

The projects/activities analyzed have been implemented by:

1. **experimenting with the technologies designed** in museums, classrooms and itineraries frequented by both visually impaired and sighted people (**13 p/a**)

2. **organizing tactile or multisensory experiences** and visits whose characteristics differ according to the specific nature of the project examined (**18 p/a**)

Reference to evidence-based theories
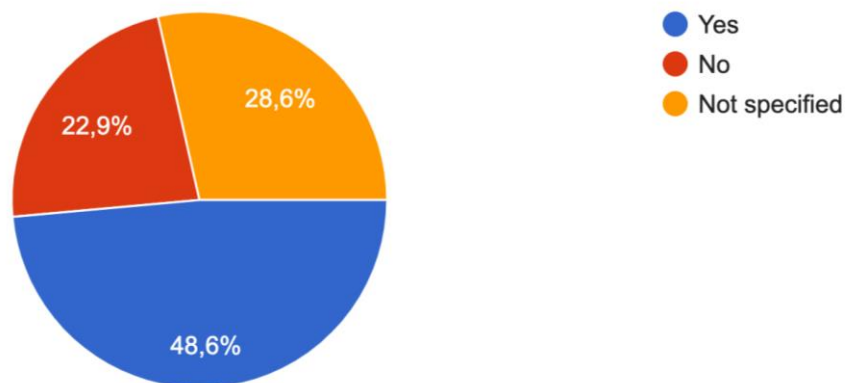
Figure 3. Project / activity reference to evidence-based theories

The data analysis shows that **17** of projects/activities presented as best practices are constructed sound generally accepted and evidence-based theories versus **8** p/a that are not based on scientific studies. For **10** this data is not specified.

Target groups
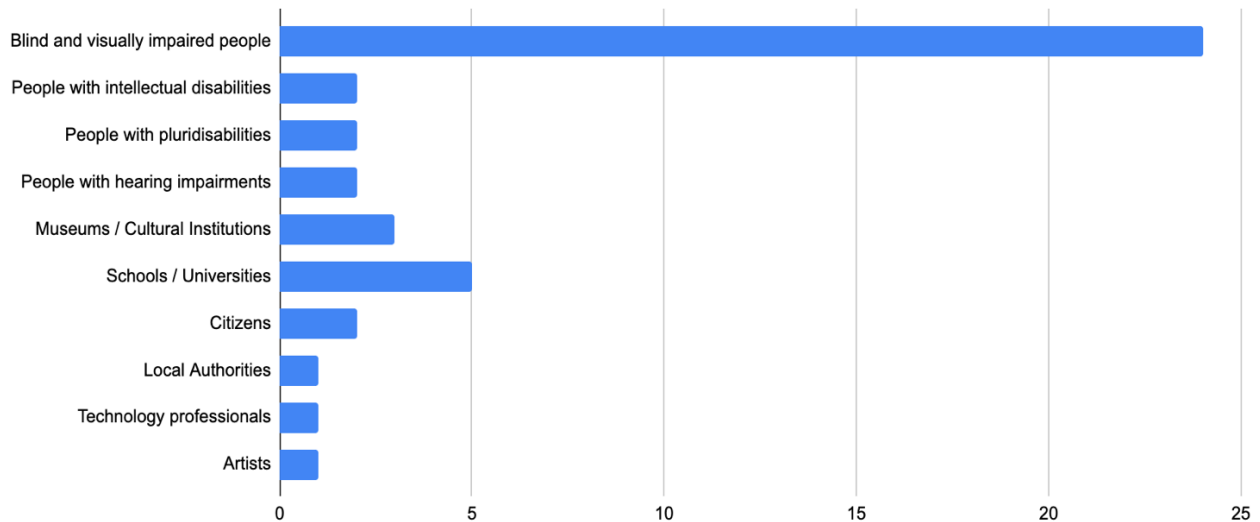
Figure 3. Target groups of the projects / activities

From the analysis on target groups, it is possible to generalize one fact: the projects/activities described are aimed at all people - while maintaining a specific focus on the inclusion of those with visual impairments. The target group "people with pluridisabilities" includes people with mobility impairments (2 p/a), with hearing impairments (2 p/a) and with deafblindness (1 p/a). In addiction 5 p/a has students with visual impairments as their target group.

Projects / activities tools

The following table (Table 3) presents - in descending order of frequency - the main tools employed in the projects / activities presented as good practices. From the data analysis, it is possible to notice that the same project may have used multiple tools in its development.

Project / activity tools	No.
Tactile tools	22
Auditory tools	13
Braille panels / Large printed descriptions	12

Technological tools	10
Survey instruments	6
Graphic software and 3D printers	6
Trained staff / guides	5
Olfactory tools	3
Online platforms	2
Movies	1
Multisensory games	1
Physical activities	1
Soft skills	1

Table 4. The main tools employed in the projects / activities

It is evident that the most used tools in activity projects are **tactile tools** (22 p/a). Tactile tools include: 4D models ("The blind spot"); architectural or artistic 3D models composed of different materials ("ARCHES", "Sensory Totem", "Uffizi by touch", "Girobussola APS", "MIXT", "Varese Tactile Museum"...); paper models ("Architectural Paper Model with Understanding of the Congenitally Blind Students: A Case Study of Phra Prang Sam Yod, Tongpong, N., & Santiwes, S., 2019"); tactile books ("Sensory Totem," "Face to Face with the Artworks"); manipulation of different materials ("The Color I touch").

10 p/a use **technological tools**. Some projects (such as "Talking teens", "QualiSID", "ARCHES", "MIXT" and the Tiftological Museum", "Girobussola APS") equipped themselves with special mobile phone apps and devices. Other projects (such as "Suitceyes", "REA project" and "e-Vision") developed artificial intelligence systems. Finally, some projects have developed innovative technological products: "Touching Masterpieces" created a pair of high-tect gloves that contain sensors that power the tactile sensation by vibrating at different frequencies and intensities;

"Qualisid", instead, developed smart clocks to facilitate daily life or recognize emergency situations.

6 p/a were conducted through both **qualitative and quantitative survey instruments** ("Suitable Size of 3D Printing Architecture Models for Tactile Exploration - Watanabe, T., & Sato, K., 2019", "Joint Architectural Initiative", "The Role of Architecture Education on Architectural Space Perception of Blind Students - Abdolsamadi, M., Namdar, S. A., & Balilan, L., 2019", "Architectural Paper Model with Understanding of the Congenitally Blind Students: A Case Study of Phra Prang Sam Yod, Tongpong, N., & Santiwes, S., 2019", "Accessibility observatory" and " Enabling Access to Cultural Heritage for the visually impaired: An Interactive 3D model of a Cultural Site, Rossetti, V., Furfari, F., Leporini, B., Pelagatti, S., & Quarta, A., 2018).

6 p/a analyzed ("Tyflografika", "Seeing with hands [...]", "Enabling Access to Cultural Heritage for the visually impaired [...]" and "Promoting Inclusion through educational 3D Printing", "Girobussola APS") **used graphic software and 3D printers** to make papers and architectural models accessible to blind and visually impaired people.

5 p/a ("Uffizi by Touch", "ARCHES - Kunsthistorisches Museum", "Feeling Van Gogh", "Girobussola APS" and "Museum of Oriental Art") **trained their staff** to be responsive to the needs of people with disabilities.

3 p/a ("Girobussola APS", "Feeling Van Gogh" and "The blind spot") used olfactory tools to employ other senses.

2 p/a ("ARCHES", "MIXT" and "Play a Kandisky") have developed **accessible web platforms**.

Methodologies

The methodologies used to develop the projects/activities are very diversified; the following is a summary of the main ones:

- 7 p/a state that they used **experimental and evaluation methodologies** of a quantitative and qualitative nature. The research methodologies mentioned are

experimental tests, participated observations, literature reviews, interviews, constant comparative analysis methods, non-parametric tests, questionnaires, focus groups, dialogue management and speech analysis.

- 5 p/a analyzed described the procedure for **implementing the technology products** (MOOCs, tactile papers, historical building models, high-tech gloves, and smart mobile devices) they aim to develop to ensure accessibility for people with disabilities.

- 3 p/a involved **medical and health procedures**: orthoptic screening and education ("Limitless") sensory and visual analysis ("REA project") and measurement and testing of functional status of individuals with various types of disabilities ("Join Architectural initiative").

- 2 p/a described the actions through which they have designed **accessible tourist routes** ("Talking Teens" and "Girobussola APS")

- 1 project illustrated the various steps in **teacher training** ("Promoting Inclusion through educational 3D Printing").

Strategies

The following table (Table 3) presents - in descending order of frequency - the main strategies employed in the projects / activities presented as good practices. Analysis of the data shows that the same project may have deployed multiple strategies.

Statgies	No.

Cooperation with professionals	16
Cooperation with the target group	15
Identification of target group needs	5
Staff training	5
Gamification	1
Cooperation with health services and families	1
Dissemination plans	1

Table 5. The main tools employed in the projects / activities

16 of the analyzed best practices cooperated with **various experts and professionals**. Specifically, 5 p/a ("Touching Masterpieces", "Double sense", "Face to face with the artwork", "Varese Tactile Museum" and "Visits for the Blind and Visually Impaired visitors") cooperated with unions and foundations for the blind and visually impaired; 6 p/a with museums ("Varese Tactile Museum", "Face to face with the artwork", "Sensory Totem", "Getting in touch with Longobardi", "ARCHES" and "MIXT"); 2 p/a ("Tyflografika – drawings for the blind" and "Visits for Blind and Visually Impaired visitors") with teachers and 1 p/a ("MIXT") with IT staff.

15 p/a cooperated with **their target group** - which, in most cases, is generalizable to "blind or visually impaired people"; 8 p/a involved these people in experimental pilot tests. Instead, 2 p/a specifically involved high school or architectural school students.

5 p/a specify that they base their work on the **needs of their users** - which requires a process of analyzing their requirements, characteristics, and expectations.

5 p/a focus on **training their staff** to make them more competent about sensory disabilities.

Projects / activities stakeholders

The following table defines - in descending order of frequency - the main stakeholders of the projects analyzed. It is evident that the projects involved multiple stakeholders in its processes.

Stakeholders	No.
Cultural institutions	15
Education institutions	15
Category unions	12
Professionals from various fields	9
Public and private companies	6
People with disabilities	4

Health services / healthcare professionals	3
Socially engaged organizations	2
Local authorities	2
Braille Typography	2
Citizenship	1
Jailhouses	1

Table 6. Stakeholders of the projects / activities presented as good practices

The **Cultural Institutions** category includes 15 projects/activities that found their stakeholders in museums, foundations for the blind and visually impaired, or both. 15 p/a had support from stakeholders belonging to the **Education Institutions** category - which includes schools (10 p/a) and universities (7 p/a). Universities often played the leading role in research presented as best practices. As the data analysis shows, some initiatives took place with the collaboration of both educational institutions.

12 p/a stakeholders belong to **Union Categories**. Specifically, 10 p/a addressed the Union of the Blind and Visually Impaired; 1 p/a addressed the National Board of the Deaf and 1 p/a addressed the National Association of Civilian Amputees and Invalids.

9 p/a have found their stakeholders in **professionals belonging to various fields**. In 7 p/a it is specified that artistic and/or architectural professionals are included; in 2 p/a IT professionals are involved; in 2 p/a health professionals are involved.

6 p/a stakeholders are **public and private companies**; 2 of them specifically targeted two companies in the technology development field.

4 p/a stakeholders are **people with disabilities** - specifically, 4 p/a involve people who are blind or visually impaired and 1 p/a involves people with mobility impairments.

3 p/a stakeholders are **health services or healthcare professionals** – like occupational therapist, physiotherapist, specialists in visual pathologies and in treatment of blindness.

2 p/a stakeholders are **socially engaged organizations**; specifically, these are two non-profit organizations.
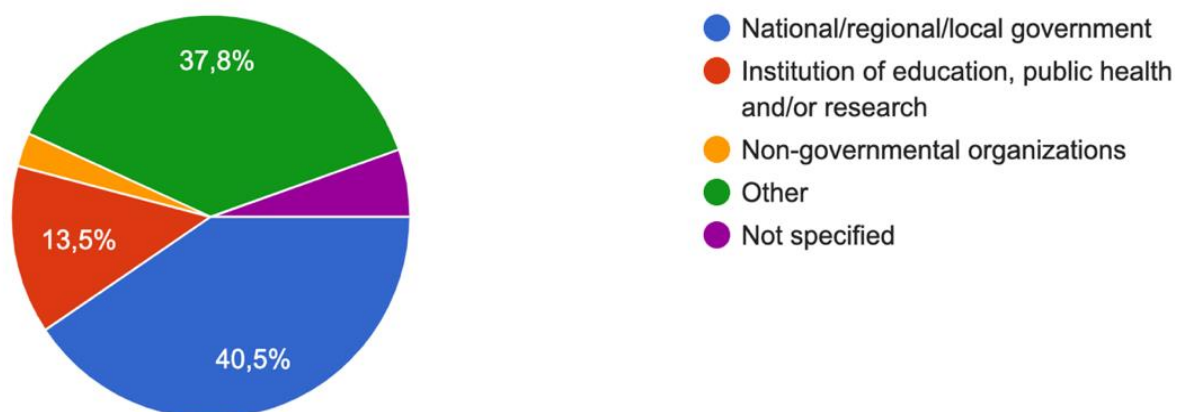
Funders

Figure 4. Funders of the projects / activities

Participants in the questionnaire were allowed to check off more than one of the answers. In relation to the projects submitted as good practices:

5 p/a are funded by **national, regional, or local funds**.

5 p/a are funded by **educational, public health and/or research institutions**.

Only **1 p/a** is funded by **non-governmental organizations**.

14 p/a are funded by entities not included among the questionnaire responses.

In the item "**Other**" we find the following funders:

- **private foundations** (4 p/a);
- **Erasmus + programs** (3 p/a);
- **insurance groups and private companies** (3 p/a);
- **crowdfunding** (2 p/a);
- **museums** (1 p/a);
- **Google Arts & Culture** (1 p/a);
- **no-profit organization** (1 p/a);
- **the activity participants** (1 p/a).

Results

Since the reviewed best practices have many and varied aims to achieve, the results of the individual projects/activities can be found in Attachment #1.

To give a general overview of the data regarding the results of good practices, it is possible to state that most of have allowed to:

1.   increase the **quality of life of people with disabilities** (mobility, visual, hearing);

2.   enhance the **quality of school/university education and learning of people with visual impairments**;

3.   promote the **importance of universality and accessibility of artistic and architectural culture for all people** without any distinction;

5.   develop **tools and technologies that facilitate the daily life or cultural experiences of people with disabilities**;

6.   foster **opportunity and equity** in society.

Problems occurred during the projects / activities

12 of the 33 projects submitted as best practices faced some problems during their development. These problems can be summarized as follows:

1.   **Accessibility problems for the blind and visually impaired**. These difficulties concerning the handling of complex forms or the need for additional supports to facilitate the use of online platforms;

1.   **Low quality of architectural models**. Some visitors complained that the layers of wire were too thick and interfered with tactile perception;

2.   **Difficulty in using technological tools and technical faults**. For exemple, some VIBs had problems in handling their phone's camera; the images captured were not of quality and the computer vision modules could not operate appropriately. Several teachers encountered several problems using 3D printers;

3.   **Covid-19 pandemic**. This situation has caused problems on user pilots and problems in the use of tactile materials (due to hygiene norms);

4.   **Professional relations issues**;

5.   **Finding stakeholders** because of the bureauracy issues;

6.   **Finding funds**.

Attachment #1

The main results of the projects / activities

Accessibility Observatory

https://portal.paratiritirioanapirias.gr and also the backend of the platform

ARCHES - Kunsthistorisches Museum in Vienna

The ARCHES project has succeeded and is still succeeding in its inclusive intent. This is underlined by the multitude of prizes it has won, some of which I will mention below: Zero Project Award 2020 (The App ARCHES - KHM für alle received an award at the Zero Project Conference 2020); eAward 2020, Austrias best digitization project (ARCHES was awarded in the category "social responsibilities"); Heritage in Motion Award Winner 2020

(ARCHES is winner of the Heritage in Motion Award 2020 in the category apps and interactive projects). That said, there are many testimonials to the success of the project. All the results of Arches can also be consulted directly on their website.

The congArchitectural Paper Model with Understanding of the Congenitally Blind Students: A Case Study of Phra Prang Sam Yod Tongpong, N., & Santiwes, S. (2019)

The congenitally blind students can touch and recognize the shape of the Phra Prang Sam Yod model, which is a famous Thai architecture, with the help of the teacher gradually describing the style and the shape of the model from the entrance of the main Prang (Than), the corridor connecting the three Prangs, the opening, the walls to the main body of the Prang (Ruen That) and the Prang spire (Yod). The blind students can understand the scale and the design of architectural features, such as the corridor, the entrance and the walkway level. Although the samples were still unable to recognize and understand all the elements of the architecture, the model can help them understand the shape of the overall architecture well. The conceptual framework of this research for creating learning materials included that they must be easy to produce, reproduce, repair and share in order to create networks and applications for schools with blind students. Therefore, the size and the method of production of an architectural learning material using folding paper model were defined. Giving the opportunity for the blind to recognize and understand the shape of the architecture which is a valuable art is considered a great matter and creates knowledge and understanding, leading to educational opportunities and equality in society. Although this study is only a small part, it can be integrated into knowledge and lead to the creation of rules and theories of architectural design that are suitable for the blind.

Assistive Technology Applied in an Inclusive MOOC for the Blind Marques, B., Escudeiro, P., Barata, A., Carvalho, P., de Sousa, A., & Queirós, P. (2019)

This paper's main objective was to detail the inclusive and innovating MOOC, focusing on the new pedagogical model developed to enable the blind/visually impaired individuals to access online digital higher education training content easily. Devising this inclusive and innovating MOOC model implies developing an application capable of converting text into sound, supported by the already developed model targeted at the deaf. It has been described that these models are combined, coexisting in the Blind/Deaf Communications-

API, which simplifies access, content integration and adaptability while fostering inclusion. Contributing to enlarge the access to knowledge of visually impaired/blind individuals by devising a friendly-to-use system that may be fed and maintained by people with no programming knowledge and/or skills is the aim of the inclusive MOOC solution and architecture described in this paper. Involving a multidisciplinary team of professionals, ranging from computer engineers to design, content producers and cooperative management, the inclusive MOOC has complied with every factor considered in the Quantitative Evaluation Framework (QEF) dimensions. There is still room for improvement and further study, the following step is to get direct feedback from a considerable number of blind/visually impaired individuals after direct use of this inclusive MOOC model.

Blind Wood

The exhibitions emphasized the importance of the universality and accessibility of artistic culture for everyone without distinctions and promoted a valorizing perspective of the visual disabilities. As stated by Rodolfo Masto (President of the Fondazione Istituto dei Ciechi di Milano), the "FIAT LUX" art exhibition was a way to go beyond the stereotypes linked to visual impairment and make the public aware of the knowledge and skills of visual impaired people.

Double Sense

The project increased the process of raising awareness of art through touch

e-Vision

A smartphone app that describes through the auditory pathway (narration) what the camera captures.

Enabling Access to Cultural Heritage for the visually impaired: An Interactive 3D model of a Cultural Site Rossetti, V., Furfari, F., Leporini, B., Pelagatti, S., & Quarta, A. (2018).

Based on this research, the following points can also be explained directly or indirectly as part of the results: 1. The results of pre-training and post-training tests, both by examining the mean scores (qualitative) by the teachers and also by examining the t- test

(quantitative) results, show that teaching architecture to the blind students increases their space perception. 2. Recognizing the student's physical abilities and disabilities, exploring the tools needed for better learning and trying to use the tools appropriate for the physical conditions, improves the teaching process and enhances the quality of learning. 3. Education, regardless of physical condition, can lead a person to a new understanding, which in many cases can improve their living conditions and reduce the problems. 4. By educating the blind students, not only they can understand their surroundings better, but also it helps us to understand the problems of this group and seek to improve their life quality.

Face to face with the artwork

great involvement of students in inclusive activities

Feeling Van Gogh

Feeling Van Gogh has been running for a couple of years, and several positive impacts are evident. Not only for the participants themselves, but also for other visitors and our museum staff. For the blind and partially sighted: - Positive experience with art and the museum. - Experiencing a sense of equal participation. Outside the target group: - Positive influence on awareness amongst other museum visitors: 'On days like these, our disability is understood by sighted people. We are not scary people'. - Exemplary role for other museums follow. - Expertise grows within the Van Gogh Museum and its employees

Getting in touch with Longobardi

The exhibition allowed both blind and sighted visitors to gain a better knowledge of Longobards' architecture

Girobussola APS

Social, cultural and sometimes professional participation for people with disabilities who are otherwise often marginalised in said fields. . Promotion of the right to culture for all, as a primary and not an accessory prerogative. . Promotion of a culture of inclusion within the whole community through cultivating awareness of the existence, rights and wishes of people with visual impairments. Fostering the agency of people with visual impairments

as actors on the cultural scene through collaborations and co-designing of cultural activities.

Hoy toca el Prado

The exhibition made a few representative works from the Prado accessible to people with visual impairments. The features of the exhibition allow visitors to perceive the reality of the painting to mentally recreate it as a whole and thus provide an emotional perception of the work. Blind visitors are able to achieve a high degree of artistic-aesthetic-creative enjoyment in explaining, discussing, and analyzing these works in the Prado.

Joint Architectural Initiative

The 2018 edition of the WIA was attended by students from the Faculty of Architecture of the Wrocław University of Technology, the Faculty of Physiotherapy and students from the Academy of Fine Arts from the Faculty of Interior Architecture and Design. For two months, the students, under the supervision of tutors, designed a barrier-free apartment for a specific person with specific disabilities, and the result of these works was a professional architectural design. The students also designed the Rehabilitation Center for the "Potrafię Pomóc" Foundation and the House of Independence for people suffering from the rare Prader-Willi disease. The WIA event was addressed to students who want to explore the secrets of universal design and people who need changes in their apartment or house due to various types of disabilities. Students of all universities willingly participated in the Joint Architectural Initiative, because it was an opportunity not only to gain knowledge, competences and practical experience, but also the possibility of making their own real project, which may be implemented in the future. The individual workshop activities highlighted the complexity of the "accessible to all" design process.

Limitless

We had dozens of people going through this program and their personal life improved from a practical day to day basis to a social-relational one.

MIXT – Museums for all

Good use of technologies to create a completely accessible itinerary Collaboration between museum operators and VIBs Inclusive and accessible itinerary Good reviews from VIBs

Museum of Oriental Art

Surely the best result of the inclusive project promoted by the MAO is to give the real opportunity of a suggestive experience to any kind of user. As reported in the "Guide to the museums of Turin", edited and promoted by the members of A.P.R.I. Onlus (association pro visually impaired people), the experience is on the whole very positive and the guides are open to listening and constructive criticism.

Play Kandisky

The project fosters an understanding that involves the senses of the viewer, allowing them to become fully immersed in Kandinsky's work. Synaesthesia is an emotional process that totals the concept of "feeling" and that is what this experiment manages to do in a simple and intuitive way.

Promoting Inclusion through educational 3D Printing

On line courses for the 3D design On line courses for the visual impairment Teacher's manual Student's mini textbook

QualiSID

A complete system with panic button, smartwatch for the intellectually disabled individual that monitors certain biomedical signals to detect health-related emergencies and a software system to recommend content for education and entertainment purposes.

REA Project

Assisting in smart living of patients with mobility problems

"Seeing" with the Hands: Teaching Architecture for the Visually-Impaired with Digitally-Fabricated Scale Models Celani, G., Zattera, V., de Oliveira, M. F., & da Silva, J. V. L. (2013).

As it is an ongoing project, expectations are explained below instead of main results: It is planned to set up a protocol for training school teachers who work with blind children and teenagers to develop their own tactile models using geometric modeling and digital fabrication techniques. Ultimate goal of the project is to develop a simple and economically viable protocol that can be used in public schools, so that any image material can be made accessible in 3D for blind students. This protocol will include the ability to develop 3D models or search for 3D models that are available for download on the web and the necessary skills to convert them from different formats into standard rapid prototyping file formats. It is expected that, by making this method available for school teachers, it can help introducing a new paradigm for the education of the blind, based in the possibility of producing custom 3D objects instead of adapting 2D materials, and thus helping in the formation of an image vocabulary, which is a fundamental step for the formation of more abstract concepts.

Suitable Size of 3D Printing Architecture Models for Tactile Exploration Watanabe, T., & Sato, K. (2019)

Three different-sized architectural models were presented to blind and visually impaired subjects and measured the comprehensiveness and subjective rating of each model. In the comprehension test, the smallest 6-cm model often presented a few problems with undetectable objects, undetectable concaves, and feeling different from what they present. This "feeling different" problem was also observed in the 18-cm model of one particular architecture. In contrast, the subjective rating clearly showed the superiority of bigger models. The subjective rating also shows the effect of complexity: simple architectures were comprehensible enough with middle- or small-sized models. At present, it is not clear whether models that are bigger than 18-cm can be evaluated as being more comprehensive or too big to explore by touch.

SUITCEYES

A vest with hardware/software and infrastructure in order to convey vibration signals to the user based on environmental cues.

Talking Teens

The phone calls with the statues allow students to understand the historical evolution of their territory but also to use new technologies in a virtuous way to "connect" to the cultural heritage of their city. (education / innovation). The project is engaging and has brought the entire community together - who supported Talking Teens with the adoption of the Garibaldi statue (aggregation). Giving voice to the statues has allowed us to revitalize both the city squares and the most peripheral and normally less visited places. Enhancing the statues means enhancing the squares and the community that lives in them (regeneration). Finally, the project makes Parma a more welcoming place for all tourists (attraction).

The blind spot

Visually impaired or blind visitors said the exhibit was "totally mind-blowing" or that the experience gave them the ability to "really see the art." One blind visitor also said that he could "feel warm and cold textures" that gave him a sense of light and shadow. Cate and Prins' future ambition is to design a large art exhibition that can travel the world and have a greater impact.

The Color I touch

Levent Çalıkoğlu - director of Istanbul Modern - said that Istanbul Modern has reached thousands of children and youth with disabilities - contributing to their mental and perceptual development.

Tyflografika - drawings for the blind

Convex drawings are printed on ordinary Braille paper, the same as used for handwriting or typing on a Braille typewriter. As the adapted version of the drawing is saved on the computer - there is no problem with printing any number of each of the drawings already prepared for printing. Currently, it can be printed in black print or convex - on a TIGER printer. Our drawings are not colored. However, the black print version is a good help for teachers (especially those working in a mainstream school and not using Braille on a daily basis), it can also be useful for many visually impaired students, especially for those for whom the drawings in textbooks are not legible enough and do not have access to Braille. they have the option of viewing them during the lesson with an enlarger.

Touching Masterpieces

"Touching Masterpieces" represents a unique tactile experience that opens up a "new era of digital accessibility." The exhibit highlights the great potential the technology has for the future of accessible art - which currently relies on audio descriptive aids for people with visual disabilities. A video of a blind student documenting the experience was posted online and resonated globally, helping to spread NeuroDigital's message of digital accessibility and igniting a public debate about how much more virtual reality and technology can offer to humanity.

Typhlological Museum

Surely the best result of the inclusive project promoted by the Typhological Museum is to give the real possibility of a suggestive experience to any type of user, while maintaining the parameters expected of a museum specifically designed for a blind and visually impaired public.

Uffizi by touch

The best result of this project is the ability of the art world to welcome the blind. Antonio Quatraro, provincial president of the Italian Blind Union, tells us that being able to link Braille to art, to the feeling of beauty, is a source of great joy which, added to the opportunity of touching independently some original sculptures from the Medici collection, is a great pleasure. This also represents a further step in the process that the Uffizi and the entire Florentine Superintendence undertake to adapt the use of the spaces of the collections to the widest and most varied public possible.

Varese Tactile Museum

About 13.000 visitors (sighted or blind) per year.

Visits for Blind and Visually Impaired visitors

Tactile visits give VIBs the possibility of understanding art and architecture. Feedbacks are usually positive and VIB visitors tend to return for a second visit.