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“User Requirements Regarding Information Included in Audio-Tactile Maps for Individuals with Blindness”

Three vertical colored squares: dark grey, blue, and orange.

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A horizontal row of ten small orange squares.

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Audio-Tactile Maps

- **Tactile maps** - include raised graphic patterns that are recognizable only by touch.
- **Touchpad devices** - are touch sensitive pads that can simultaneously provide users with tactile and audio information, while they explore tactile graphics by their fingers.
- **Audio-Tactile Maps** - information is represented by audio, tactile symbols, audio- tactile symbols (combined) and Braille labels.

Aim

- **Investigate user requirements of young adults with blindness (aged 18-30)**

Regarding the information to be included/ mapped in two different types of audio-tactile mobility maps:

- audio-tactile maps of indoors (inner space of buildings)
 - audio-tactile maps of campuses (school, college or university)
- **Define the most important information**
 - that should be included in each one of the two types of audio-tactile maps

Participants

- **40 participants**
 - 14 from Greece, 6 from Germany, 18 from Turkey, 2 from Cyprus
- **Gender**
 - 23 (57.5%) males and 17 (42.5%) females
- **Age**
 - Between 18 – 30 years ($M = 25.48$, $SD = 3.88$)
- **Visual condition**
 - 22 blind, 15 severe visual impairments, 3 legally blind
- **Visual impairment**
 - 22 congenital, 18 acquired

Ability of independent movement

Assistance of a sighted guide

- With assistance
- Sometimes with and sometimes without assistance
- Without any assistance

	Assistance of sighted guide		
	With	With & without	Without
Participants	1	28	11

Frequency of independent movement

Frequency of independent movement

- Based on a 5 point Likert scale

	Frequency of independent movement				
	Never	Rarely	Sometimes	Often	Always
Participants	-	-	8	22	10

Use of tactile graphics

Frequency of use of tactile graphics

- Based on a 5 point Likert scale

	Never	Rarely	Sometimes	Often	Daily
Participants	6	10	14	8	2

Survey instruments

Initial list of information

- For the two types of audio-tactile maps
 - Indoor
 - campus

Focus groups

- Conducted in each partner country
 - Greece, Germany, Turkey, Cyprus
- Enriched list of information
 - 136 different information for indoor maps
 - 213 different information for campus maps

Survey instruments (2)

Questionnaire for evaluation of the information

- **General instructions**
 - As accessible text document

- **List of information to be evaluated**
 - 136 different information for indoor maps
 - 213 different information for campus maps

Questionnaire Procedure

Evaluation of information included in lists

- Close-ended questions included
 1. Significance of the information
 - In regard to safety, location of services, way finding and orientation during movement (5 point Likert scale)
 2. Frequency of occurrence of the information
 - The frequency participants meet the information within their surrounding and the environment they move in (5 point Likert scale), and
 3. The preferred format
 - Results on preference of the format were not analyzed

Results

- For each information in the list the means of the results for “Frequency” of occurrence and “Significance” were calculated
- Two different lists were created from the analysis of participants’ answers
 1. List with the information sorted in descending order starting with those considered being the most **significant** ones.
 2. List with information sorted in descending order starting with the most **frequent** ones.

Importance factor

- In order to identify the information that is most important to be included (mapped) in audio-tactile maps, a third list was created containing the information with the higher **“Importance factor”**.
- Importance factor was calculated by multiplying Frequency of occurrence with Significance of each information respectively.

Results for indoors map

Information	Importance factor	Frequency	Significance
Toilet or bathroom for men, women, or persons with disabilities	20.33	4.25 (3)	4.68 (1)
Entrance or exit	20.28	4.50 (1)	4.43 (6)
Stairs	19.50	4.25 (2)	4.50 (2)
Dangerous area	18.15	3.90 (10)	4.45 (5)
Elevator	17.58	4.03 (6)	4.18 (14)
Door	17.48	4.10 (4)	4.05 (23)
Floor number	17.38	3.93 (9)	4.25 (11)
Clinic or infirmary or doctor	17.35	3.75 (16)	4.45 (4)
Room number	17.33	3.78 (15)	4.48 (3)
Cafeteria or Coffee shop	17.30	4.05 (5)	4.08 (20)
Steps	17.05	3.93 (7)	4.03 (24)
Library, the room or the service	16.88	3.80 (12)	4.28 (9)
Emergency exit	16.85	3.78 (14)	4.35 (8)
Canteen	16.80	3.93 (8)	4.00 (26)
Reception	16.80	3.73 (17)	4.40 (7)
Dangerous point	16.65	3.73 (21)	4.10 (18)
Hanging obstacle or overhead obstacle	16.53	3.73 (18)	4.25 (12)
Office of the commissioner for the disabled	16.48	3.73 (19)	4.28 (10)
Room	16.25	3.88 (11)	4.10 (17)
Tactile paving for the blind	16.20	3.73 (20)	4.18 (13)

Note: The list of the top twenty information sorted by Frequency also includes “Corridor” (13). The list of the top twenty information sorted by Significance also includes “Tactile signpost” (15), “Revolving door” (16), and “Haptic reference point or land-mark” (19).

Results for campus map

Information	Importance factor	Frequency	Significance
Bus stop	21.08	4.35 (1)	4.80 (1)
Point of access to public transport, bus stop, metro station	20.77	4.33 (2)	4.75 (2)
Lecture room	20.15	4.25 (3)	4.58 (8)
Student's registry office	19.63	4.13 (5)	4.70 (3)
Lecture theatre	19.45	4.15 (4)	4.50 (13)
Toilet or bathroom for men, women, or people with disabilities	19.43	4.08 (7)	4.53 (9)
Traffic lights	19.20	4.13 (6)	4.38 (23)
Metro station	19.05	4.03 (9)	4.63 (5)
Service center for students	18.95	4.00 (11)	4.60 (6)
Name of faculties of educational institution	18.55	3.95 (13)	4.45 (16)
Library, the room or the service	18.40	4.00 (10)	4.50 (12)
Entrance or exit	18.35	4.08 (8)	4.23 (35)
Room number	18.28	3.95 (12)	4.40 (21)
Taxi station	18.23	3.88 (17)	4.48 (15)
Academic staff offices	18.03	3.93 (14)	4.48 (14)
Intersection, a place where two or more streets meet or cross	18.03	3.90 (16)	4.40 (20)
Office with accessible books	17.95	3.80 (23)	4.58 (7)
Traffic light with audio signals for the Blind	17.70	3.78 (28)	4.50 (11)
Canteen	17.68	3.85 (19)	4.25 (34)
Area name	17.63	3.83 (20)	4.38 (22)

Note: The list of the top twenty information sorted by Frequency also includes "Stairs" (15) and "Pavement or sidewalk" (18). The list of the top twenty information sorted by Significance also includes "Office of the commissioner for the disabled" (4), "Clinic or infirmary or doctor" (10), "Emergency exit" (17), "Dangerous area" (18), and "Student's office" (19).

Thank You !

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