SUITCEYES

SUITCEYES Scoping Report on Law and Policy on Deafblindness, Disability and New Technologies

Working Paper

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Executive Summary

Constantly progressing developments in the field of new technology hold considerable promise for better chances of inclusion for disabled people. Nevertheless, disabled people's access to and control of new technologies is not yet well established. Particularly for people with complex multiple impairments (e.g. deafblindness), the question arises as to how new technologies can be best used to enable improved participation.

The international and interdisciplinary **SUITCEYES** project (**S**mart, **U**ser-friendly, **I**nteractive, **T**actual, **C**ognition-**E**nhancer that **Y**ields **E**xtended **S**ensosphere) aims to create new, smart haptic communication and orientation possibilities for people with deafblindness.[1] Besides the development of an intelligent haptic prototype for deafblind people, the project aims to develop an overview of disability law and policy on new technologies within different counties in the EU. Therefore, national reports on the developments in Germany, Sweden, Greece, the Netherlands and UK were prepared.

In this report, the **Federal Institute for Vocational Education and Training (BIBB)** presents a scoping review of law and policy in Germany with a view to providing information about how technology is being used and whether deployment supports accessibility and inclusion for disabled people. The report aims to inform about the impact of developments in new technologies on accessibility, wider risks and opportunities for disabled people in Germany, to support improved structures and policies within a human rights framework. The report is based on desk research into academic, policy and grey literature. Moreover, three interviews with experts from the area of research were conducted in order to get answers to open questions that could not be answered through literature.[2] The report is structured as follows:

After giving a general overview on the situation of people with deafblindness in Germany (**Part 1**), we present the main law and policy determining disabled people's access to new technologies (**Part 2**). Several instruments of the government aim to improve opportunities for participation in the sense of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) through sponsorships of research and the development and application of new technologies for people with disabilities.

Following this, we discuss the existing regulations on technology in general and point to further regulation plans for different types of technologies that are relevant for the development of assistive aids for disabled people (e.g. personal cameras and sensors, face and object recognition etc., **Part 3**). We have found that data privacy questions are subject to a great deal of discussion in Germany with regard to the regulation of image processing and face recognition.

Chapter 4 focusses on the ethical frameworks relevant to disabled people and new technologies in Germany. New technologies offer opportunities and risks, which need to be considered particularly if they affect people with special needs. Therefore, new technologies are the subject of controversial discussion in Germany. Leading stakeholders, their ideas and contributions will be presented.

In the next section, we report on the availability of information about new technology (**Chapter 5**). We present numerous sources of information on new technologies for people with disabilities which are provided by the federal government, NGOs, the private sector and the media. In addition to an extensive web-based information system, there is also the possibility of obtaining information at trade fairs or through special consulting facilities offered by disabled people.

In Germany, a complex system with a number of different state actors is responsible for financing aids (**Chapter 6**). Two large online portals, as well as various counselling services provide information on equipment available for people with disabilities. However, studies show that the people affected are not well informed and equipment is used to a surprisingly low extent.

The next chapter focusses on accessibility measures in the built environment (**Chapter 7**). While conventional aids like the long cane are still commonly used, smartphone Apps, which can improve the mobility of disabled people, have been developed in the past decade. We discuss smart city initiatives and their consideration of disabled people's needs.

In **Chapter 8** we describe the skill development and work opportunities of people with disabilities in Germany and focus on initiatives to increase disabled people's participation in education and training in new technologies.

The next section discusses relevant aspects on Cybersecurity and Safeguards against Hate Crime and abuse (**Chapter 9**). We show that there is evidence that violence, abuse and hate crimes against disabled people can be perpetrated through new technologies. We give an overview of initiatives and how the German law is acting against cyber violence and hate crime.

In **Chapter 10**, we present examples of good practice in the inclusion of disabled people in developing policy on new technologies.

The report closes with a summary of research findings (Chapter 11) and recommendations based on the findings (Chapter 12).

1. People with Deafblindness

„Deafblindness (is) a distinct disability arising from a dual sensory impairment of a severity that makes it hard for the impaired senses to compensate for each other. In interaction with barriers in the environment, it affects social life, communication, access to information, orientation and mobility. Enabling inclusion and participation requires accessibility measures and access to specific support services, such as guide interpreters, among others."[1]

This report uses the above definition, used by the World Federation of The Deafblind and in this chapter we provide a summary of the situation of deafblind people in Germany.[2]

After a description of official national definition of deafblindness (Chapter 1.1), the available data on this particular group of people is discussed (Chapter 1.2). Legal regulations are also outlined (Chapter 1.3), and the report concludes by presenting a list of organisations that are relevant to deafblind people in Germany (Chapter 1.4).

1.1 Official recognition of people with deafblindness as an eligible group

The European Parliament recognised deafblindness as a distinct disability in 2004.[3] German disability law, however, did not acknowledge deafblindness as a separate type of disability until the end of 2016. The **Ordinance on Passes for Disabled Persons** (Schwerbehindertenausweisverordnung, **SchwbAwV**) also did not contain any dedicated classification for deafblindness. Instead of this, disabled passes[4] issued to deafblind persons usually included the designations "Bl" (blindness) and "Gl" (deafness) rather than a stand-alone marker denoting deafblindness. Increasing criticism was levelled at such an approach by bodies representing the deafblind, and calls for such persons to receive their own marker began to intensify. The aim was for deafblindness to be treated as a distinct disability.[5] In 2012, members of all parliamentary parties in the German Bundestag expressed their support for the

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[1] https://www.wfdb.eu/introduction/ accessed on 2nd of July 2020.
[2] It should be pointed out that various definitions of deafblindness can be found in literature on the subject. Neither is the legal definition of deafblindness in German disability law congruent with the definition stated above (see Paragraph 1.1).
[3] European Parliament (2004); Gemeinsamer Fachausschuss hörsehbehindert / taubblind (GFTB) (2010).
[4] A disability pass is a document which persons with an officially recognised disability can use all over Germany in order to prove their disabled status. Entries made in the pass include the nature and degree of the disability
(https://www.dbsv.org/iii-der-schwerbehindertenausweis.html accessed on 2nd of July 2020).
[5] Gemeinsamer Fachausschuss hörsehbehindert / taubblind (GFTB) (2010); De Oliveira, D. (2015).

introduction of a separate category.[1] Deafblindness finally gained statutory acceptance in Germany as a distinct type of disability once the **Federal Participation Act** (Bundesteilhabegesetz, **BTHG**) was passed on 30 December 2016.[2]

Since the recognition of deafblindness as a distinct disability, the marker "TBl" can now be officially entered in a disability pass to denote deafblindness – regardless of whether the mark "Bl" or "Gl" has been recognised. The prerequisite in this regard is that the degree of disability (DoD)[3] relating to loss of vision must be 100, whilst the degree of hearing impairment needs to be at least 70.[4] In Germany, sight impairment corresponding to a DoD of 100 is deemed present if visual acuity (minimum separable) in both eyes is no higher than 0.05.[5] This means that a person's vision is five percent or lower even given the best possible corrective measures. A hearing impairment that constitutes a DoD of at least 70 percent is presumed to be present if a person has hearing loss of a minimum of "80 to 95 percent" in both ears.[6] Under certain circumstances, further limitations (such as problems with wearing hearing aids) can count towards obtaining the "TBl" marker even if the hearing restriction in itself gives rise to a degree of disability of less than 70.[7]

German federal states have authorities which are responsible for the identification and official recognition of deafblindness and other (severe) disabilities. These are normally designated as "Offices for Social Provision" or "Social Services Administration Offices". In some federal states, however, local government bodies are also responsible for the official recognition of disabilities.[8]

It should be pointed out that no political agreement has so far been reached with regard to whether compensations for disadvantage should apply under federal law in connection with the "TBl" marker for deafblindness or indeed as to which compensations should be awarded. "Impairments to participation by the group of persons covered by this category [TBl] are extremely heterogeneous, and this means that standardised specific requirements cannot be identified".[9] The status does not

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[1] http://bundesarbeitsgemeinschaft-taubblinden.de/?p=1130 accessed on 2nd of July 2020.

[2] Federal Participation Act Federal Participation Act (BTHG) Article 18, Section 3; Ordinance on Passes for   Disabled Persons (SchwbAwV), § 3.

[3] The purpose of the degree of disability (DoD) is to provide an indicator for the extent of the impairment a person experiences as the result of a disability. This figure is entered into his or her disability pass. The lowest DoD is 20, and the highest figure is 100. In Germany, those with a DoD of 50 or more are considered to be severely disabled (German Social Security Code (SGB) IX, § 151 and 152).

[4] Federal Participation Act Federal Participation Act (BTHG), Article 18, Section 3; Ordinance on Passes for Disabled Persons (SchwbAwV) § 3.

[5] General Medical Ordinance (VersMedV), Annex to § 2, Part B "Degree of damage table", Item 4 "Eye".

[6] (VersMedV), Annex to § 2, Part B "Degree of damage table", Item 5 "Ear and organ of equilibrium".

[7] Deutscher Blinden- und Sehbehindertenverband (DBSV) (2017), pp. 5–6.

[8] http://www.rehadat-adressen.de/de/interessenvertretung-dachverbaende-rehatraeger/versorgungsaemter-schwerbehindertenausweis/index.html accessed on 2nd of July 2020.

[9] Bundesministerium für Arbeit und Soziales (BMAS) (2018a), p. 53.

currently encompass compensations for disadvantage for blindness and deafness. In order for relevant services to be received, the "Bl" and "Gl" marker would need to be accorded official recognition alongside "TBl".[1]

1.2 National data on people with deafblindness

No secure data currently exists on the prevalence of deafblindness in Germany. Publications usually assume that the number of people is between 2,500 and 10,000.[2] Some individual international studies also estimate the number of deafblind persons in Germany to be significantly higher.[3] The reasons given as to why it is difficult to make statements on prevalence data for deafblind persons are the varying definitions of deafblindness in research, the small size of the target group and the complex disability picture.[4] There are also reports from the field of practice that many people with deafblindness live very isolated lives because the consequences of the condition frequently cause social withdrawal on the part of those affected.[5] This makes it difficult for practitioners working with the deafblind and for empirical research to gain access to this target group.

A study undertaken by Kaul and Niehaus provided well- documented and transparent estimated values on the prevalence of deafblindness in the State of North Rhine-Westphalia.[6] Kaul and Niehaus used prevalence rates from international research in order to produce their assessments.[7] The following estimated values emerge if the prevalence rates are applied to the whole of the German population. Given a prevalence rate of 11 in 100,000, we can assume that approximately 9,100 persons in Germany are living with deafblindness.[8] The prevalence rates applied also give rise to the supposition that some 6,100 persons in Germany have become deafblind during the course of their lifetime whilst around 3,000 were born with the condition. An estimation was also made regarding how many people are affected by Usher Syndrome, a particular form of deafblindness. Two prevalence rates were applied in

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[1] BMAS 2018a, p. 53; Fischer, C. (2018)
DBSV 2017, p. 10; see Chap. 1.3 for detailed information about services for people with deafblindness.
[2] De Oliveira, D. (2015), p.15; Stiftung Taubblind Leben (2015)., p. 4;
Bieling, T. and Joost, G. (2018), p. 78.
[3] Jarrold, K. et al. (2014) put the figure at over 400,000.
[4] Kaul, T. and Niehaus, M. (2014), pp. 52–53.
[5] Stiftung Taubblind Leben (2015), p. 5.
[6] Kaul, T. and Niehaus, M. (2014).
[7] including Munroe, S. (2001); Watters, C., Owen, M. and Munroe, S. (2004).
[8] Own calculations for Germany based on the prevalence rates used by Kaul and Niehaus (2014, pp. 53 and 55,
chart 18) and the population status of Germany of September 2019 (≈83,149,000; https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Bevoelkerungsstand/Tabellen/zensus-geschlecht-staatsangehoerigkeit-2019.html
accessed on 2nd of July 2020).

this case.[1] A prevalence rate of 3.3 in 100,000 would produce a total number of approximately 2,700 people in Germany with Usher Syndrome. If a prevalence rate of 6.2 in 100,000 is applied, the calculation results in around 5,200 persons affected by Usher Syndrome.

The disability statistics of the Federal Statistical Office contains official data on persons with sensory impairment.[2] Deafblindness is, however, not listed as a separate type of disability. Neither is it possible to obtain data on the number of severely disabled persons who are affected by both a hearing and visual impairment. Nevertheless, the following information can be gleaned from the disability statistics. In 2017, around 351,000 severely disabled persons with "blindness or visual impairment" as their most serious officially recognised disability were living in Germany.[3] The disability statistics further show that there are around 318,000 severely disabled persons in Germany whose major officially recognised disability falls within the overarching category of "Language or speech impairments, deafness, hardness of hearing, balance disorders".[4]

The BIBB-BAuA Labour Force Survey, which also provides information about participation in the labour market, is a further data source.[5] In 2018, the Federal Institute for Vocational Education and Training (BIBB) collected data on persons with a disability within the scope of a follow-up questionnaire to accompany the Labour Force Survey. Respondents included 85 members of the labour force with a visual or hearing impairment; 42 of these persons had a visual impairment, 35 had a hearing impairment and 8 had both a visual and hearing impairment.

A number of ad hoc studies relating to the situation of deafblind people in Germany are listed below.

1,012 deaf people and 67 deafblind persons were asked about their preferred types of communication as part of the project "**Innovative forms of living for deaf and deafblind people requiring care and support**".[6] It emerged that a majority of the deaf respondent group (85.1 percent) preferred communication via sign language. The deafblind persons interviewed also expressed a preference for sign language, although

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[1] Kaul, T. and Niehaus, M. (2014).
[2] Statistisches Bundesamt (Destatis) (2019).
[3] This main category comprises the sub-categories of blindness or loss of both eyes (around 73,000 persons), serious visual impairment (48,000) and other visual impairment (231,000) (Destatis 2019, p. 8).
[4] This overarching category is composed of the categories of deafness (around 28,000 persons), deafness combined with disruptions to language development and relevant disruptions to mental development (20,000), hardness of hearing including in combination with balance disorders (253,000), language or speech impairments (7,000) and balance disorders (9,000) (Destatis 2019, p. 8).
[5] http://www.bibb.de/de/65740.php accessed on 2nd of July 2020.
[6] Glatz, A. and Zelle, U. (2017), p. 31.

not to the same extent (56.1 percent).[1] Significant differences also exist with regard to the communication forms of "spoken language" (preferred by 4.7 percent of deaf respondents and by 15.8 percent amongst the group of deafblind) and "tactile sign language" (preferred by 0.5 percent of the deaf and by 12.3 percent of the deafblind). No large difference between the deaf respondents (8.4 percent) and the deafblind group (7.0 percent) was observed in the case of the preference of "sign language accompanied by spoken language" (manually coded language, MCL). Very few respondents in either group indicated a preference for communication via "written language" or the "Lorm alphabet". Respondents were also asked about their residential situation. Both the deaf (62.1 percent) and the deafblind group (53.5 percent) were most likely to be living with a partner or spouse.[2] In the deafblind group of respondents, more (34.9 percent) were living alone. The corresponding figure for the deaf group was 25.1 percent. One further finding was that the deafblind group had more frequent contact with hearing friends and acquaintances than was the case amongst the deaf respondents.[3]

A further survey (of persons with a hearing and visual impairment and deafblind persons) was conducted in North Rhine-Westphalia in 2014 within the scope of the "**Clarify Find and Include**" project (Aufklären Finden Inkludieren, **AFI**) initiated by the Foundation for People Living with Deafblindness.[4] 40 percent of the 57 respondents were aged between 25 and 50 at the time when the questionnaire took place. Even though the findings can only make limited claims with respect to being representative[5], they still offer valuable insights into the living environment of those affected. The study revealed that many of the persons concerned still lived with their parents at an advanced stage of adulthood. Around a quarter lived with their own family or with a spouse or partner, and a further quarter lived alone. 16 percent of respondents were in assisted living or resident at special institutions.[6] The findings also revealed that 30 of the 57 respondents were living with Usher Syndrome.[7] The overwhelming majority was still in possession of at least a residual amount of one of the two senses (hearing or sight) (48 persons, 84 percent). Only three respondents were entirely deafblind. Because some of those affected had different limitations to hearing and sight, various forms of communication were used. Sometimes, these were combined: 43

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[1] Glatz, A. and Zelle, U. (2017), p. 32.

[2] Glatz, A. and Zelle, U. (2017), p. 34.

[3] Glatz, A. and Zelle, U. (2017), p. 35.

[4] The objective of the project was to find and include people with a hearing and visual impairment or deafblind persons who were not being reached by guidance and support provision (Stiftung Taubblind Leben 2015).

[5] Only 29 percent of respondents were aged over 50. This was judged a relatively small proportion in light of the fact that increasing visual and hearing impairment is dictated by age. This low quota strongly suggested that "a considerable proportion of these people are already leading very withdrawn lives and cannot be reached for this reason" (Stiftung Taubblind Leben 2015, p. 11). 23 percent of respondents were aged under 25, and around half were under 14.

[6] Stiftung Taubblind Leben (2015), pp. 12–13.

[7] Stiftung Taubblind Leben (2015), p. 14.

respondents used spoken language; 31 used sign language (DGS); 19 persons used computers, 7 Braille, 5 persons the Lorm alphabet, 3 used upper case letters and 2 persons used tracking and tactile sign language.[1] Many had not thus far completed any rehabilitation measures (17 persons, 30 percent). Mobility training was the most likely measure to be undertaken (27 percent). Further results from the study relating to the supply of auxiliary aids and equipment are presented in Chapter 6.

The "**Participation Survey**", which was commissioned by the Federal Ministry of Labour and Social Affairs, is a further unpublished questionnaire also including data on persons with deafblindness.[2] The aim is to carry out a representative enquiry into the life situations and quality of life of persons in Germany with a disability. A quantitative questionnaire of around 22,000 disadvantaged persons is being conducted with a view to reducing the knowledge gap regarding life with a disability.[3] Data collection seeks to take all relevant groups of persons into account, even those who are difficult to reach.[4] In order to include people with deafblindness in the survey in an appropriate way, the sampling procedure, for example, takes a targeted approach towards according consideration to venues where large numbers of deafblind persons can be found, e.g. centres of excellence for the deafblind. [5] As well as carrying out quantitative surveys, it is further intended to conduct a small number of biographical interviews, problem-oriented individual interviews and group discussions.[6] The Participation Survey is still in the field phase[7], and a report on the results is not expected before 2021.

1.3 National law and policies specific to people with deafblindness / sensory impairment

Within German funding practice, the time at which a person suffers a sensory impairment exerts a material influence on his or her development and educational pathway. Those with a congenital hearing and visual disability or deafblindness often receive specific deafblind support during early education, whereas persons who have acquired deafblindness largely attend educational establishments for the deaf.[8]

The most important funding support measures that are of relevance to persons with deafblindness are enumerated below.

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[1] Stiftung Taubblind Leben (2015), p. 16.
[2] Bundesministerium für Arbeit und Soziales (BMAS) (2017); Bundesministerium für Arbeit und Soziales (BMAS) (2020); Harand, J. et al. (2018).
[3] Bundesministerium für Arbeit und Soziales (BMAS) (2016a), p. 31;
https://www.infas.de/neuigkeit/teilhabe-von-menschen-mit-behinderung/ accessed on 2nd of July 2020.
[4] Bundesministerium für Arbeit und Soziales (BMAS) (2017), p. 31.
[5] Bundesministerium für Arbeit und Soziales (BMAS) (2017), p. 32.
[6] Bundesministerium für Arbeit und Soziales (BMAS) (2017), p. 33.
[7] Bundesministerium für Arbeit und Soziales (BMAS) (2020), pp. 34–43.
[8] Kubis, H. (2016), p. 32.

Blind person's support allowance and blind person's living allowance – persons who have the "Bl" marker in their disability pass are able to apply for blind person's living allowance and blind person's support allowance. The "Bl" marker is approved upon application "if the severely disabled person is blind within the meaning of § 72 Section 5 German Social Security Code Volume Twelve or in accordance with other relevant regulations"[1] or if a person is completely blind (visual acuity in both eyes of a maximum of one fiftieth, visus of 0.02). Persons with a visual disability also receive the "Bl" marker if the level of impairment meets the relevant lack of visual acuity.[2] Blind person's living allowance is paid across Germany depending on income and assets. "Blind persons are compensated for the additional expenditure incurred as a result of blindness in the form of blind person's living allowance insofar as they are not in receipt of benefits of the same kind pursuant to other legal stipulations".[3] Unlike blind person's living allowance, the blind person's support allowance is governed by federal state law[4] and is paid regardless of income. The amount of the benefit varies from federal state to federal state.[5] Some federal states also provide deaf person's support allowance as long as deafness has been officially recognised.[6]

Integration assistance – persons who have or are likely to develop a significant disability are able to receive cash or non-cash benefits (under federal law) within the scope of the Integration Assistance System.[7] The aims of integration assistance are to counter any impending disability, to remedy or alleviate existing disabilities and to support the societal involvement of disabled persons. Integration assistance is based on an individual participation plan procedure, in which a person's specific requirements are set out in formal terms upon application. This provides a foundation through which deafblind persons can, for example, apply for interpreting services, special assistance or aids and equipment (see below). The benchmarks for stipulation of the needs of

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[1] Ordinance on Passes for Disabled Persons (SchwbAwV), § 3.
[2] https://www.schwerbehindertenausweis.de/behinderung/ausweis/die-merkzeichen accessed on 2nd of July 2020.
[3] German Social Security Code (SGB) XII, § 72, Section 1; if a person is also able to claim blind person's support allowance, then the amount of this benefit is set off. As of July 2019, blind person's living allowance for those aged over 18 was just under €740 per month (just under €370 for residents of homes). The general income and savings limits for the payment of social benefits apply.
[4] Some federal states provide other financial allowances instead of blind person's support allowance.
[5] In Bavaria, for instance, blind persons receive around €630 per month (around €1,260 in the case of deafblindness). Persons in Thuringia who are completely blind are entitled to a monthly blind person's support allowance of €400 (€500 for deafblind persons). Deaf-blind people do not receive increased blind benefit (respectively deaf-blind benefit) in all federal states (https://www.amd-netz.de/leben-mit-amd/staatliche-hilfen-und-finanzierung/blinden-und-sehbehindertengeld#blindengeld accessed on 2nd of July 2020).
[6] http://www.gehoerlosen-bund.de/gesetze/gehörlosengeld accessed on 2nd of July 2020.
[7] § 109 of German Social Security Code (SGB) IX relates to medical rehabilitation benefits, § 111 to employment benefits, § 113 to social participation benefits, § 112 to benefits for participation in education and training.

deafblind persons within the application procedure were drawn up within the scope of an expert assessment prepared by the GFTB.[1]

Regulations for deafblind assistance/personal assistance – access to deafblind assistance is important in terms of enabling affected persons to participate in social life. Assistance is required in order to secure mobility, orientation and communication.[2] There are various possible ways of receiving deafblind assistance in Germany. Deafblind assistance for doctor's visits or other medical measures can be paid via the health insurance companies. This is possible in all federal states upon making an application.[3] A second possibility is receiving assistance services within the scope of integration assistance (see above, standard provision is 20 hours per week).[4] A new paragraph has applied to assistance benefits since integration assistance was transferred to German Social Security Code (SGB) Volume IX at the start of 2020.[5] This paragraph states that personal assistance is a benefit that forms part of integration assistance. The German Federation of the Blind and Partially Sighted (DBSV) expects that this system could help deafblind persons to receive payment for qualified assistance in future.[6] The financing of assistance within the framework of outpatient-based assisted living represents a third possibility.[7] It should be noted that, according to the Deafblind Assistants' Association (TBA-Verband), many assistants currently still work on a volunteer or expenses basis because payment for assistance services is not statutorily regulated. In addition to this, needs cannot be covered owing to a shortage of assistants for people with deafblindness in Germany.[8]

Regulations relating to interpreting services and communication aids – interpreting services may be claimed within the scope of integration assistance.[9] For persons with "hearing and language impairments", these benefits particularly include assistance via sign language interpreters and other suitable communication aids. Within the scope of integration assistance, however, these support measures are only granted "for special occasions" (e.g. family celebrations). The explanatory memorandum to the law defines communication aids in more precise terms. "Communication aids comprise sign language interpreters, who are able to provide support via sign language and manually coded language, and other suitable assistance

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[1] Gemeinsamer Fachausschuss hörsehbehindert / taubblind (GFTB) (2010).

[2] www.tba-verband.de/Infothek/taubblinden-assistenz.php accessed on 2nd of July 2020.

[3] Contracts between the TBA-Verband and health insurance companies and long-term care insurance funds have been concluded in some federal states. Pursuant to these agreements, persons with a hearing and visual impairment and deafblind persons have a right to receive deafblind assistance in respect of every service provided by healthcare or long-term care insurance companies (http://www.gesellschaft-taubblindheit.de/assistenzvermittlung accessed on 2nd of July 2020).

[4] Gemeinsamer Fachausschuss hörsehbehindert / taubblind (GFTB) (2010).

[5] German Securiy Code (SGB) IX, § 78.

[6] Deutscher Blinden- und Sehbehindertenverband (DBSV) (2017), p. 14.

[7] https://www.gesellschaft-taubblindheit.de/assistenzvermittlung accessed on 2nd of July 2020.

[8] http://www.tba-verband.de/Infothek/taubblinden-assistenz.php accessed on 2nd of July 2020.

[9] German Security Code (SGB) IX, § 82.

measures. The Communication Aids Ordinance [KHV] states what other communication aids are. These particularly include the Lorm alphabet and tactile sign language. Assistance may, however, also be provided in a different way".[1] One of the criticisms levelled by bodies representing disabled people is that the limiting of interpreting services to special occasions does not sufficiently foster full and equal participation in community life and could encourage the adoption of a restrictive procedural approach in practice.[2] It should be added that the respective social services providers may pay interpreting costs for communication with social services.[3]

As mentioned in Paragraph 1.1, the "TBl" marker was introduced in the German Ordinance on Passes for Disabled Persons in 2016. This is, however, not necessarily linked with comprehensive nationwide services for deafblind persons.[4] This marker merely enables deafblind persons to obtain an exemption from radio and TV licence fees.[5] In some federal states, the "TBl" marker means that application may be made for an enhanced blind person's support allowance.[6] Although "TBl" status can help people to obtain deafblind-specific benefits (such as special deafblind assistance), approval of such services is not formally guaranteed by dint of the marker alone. Neither does the marker provide a general entitlement to benefits under federal state law such as blind or deaf person's support allowance, and this is an object of criticism amongst bodies representing disabled people.[7] It is apparent in overall terms that numerous benefits to assist deafblind persons exist in Germany. Nevertheless, the way in which the statutory regulations are structured is attracting criticism from specialist associations in some cases, and there are calls for more comprehensive or more standardised benefits such as the introduction of a uniform national deafblind person's support allowance.[8] Many regulations governed by federal state law apply in Germany.

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[1] Deutscher Bundestag (2016), p. 273.

[2] Gemeinsamer Fachausschuss hörsehbehindert / taubblind (GFTB) (2016).

[3] Social services providers are health insurance companies (meeting the costs of, for example, doctor's visits and also for in-patient hospital treatment since 2020), the Federal Employment Agency (for consultations and job interviews), long-term care insurance companies, German pension insurance, employers' liability insurance associations, social welfare offices, youth welfare services (www.landesdolmetscherzentrale-gebaerdensprache.de/dolmetscher-suchen/anfordern/kosten-kostenuebernahme accessed on 2nd of July 2020).

[4] Bundesministerium für Arbeit und Soziales (BMAS) (2018b), p. 53.

[5] German citizens over the age of 18 pay a mandatory public radio and TV licence fee of €18.50 per month (http://www.rundfunkbeitrag.de/informationen/index_ger.html accessed on 2nd of July 2020).

[6] Moldenhauer, M. (2018), p. 86.

[7] Gemeinsamer Fachausschuss hörsehbehindert / taubblind (GFTB) (2016); the Joint Committee for the Hearing and Visually Impaired and the Deafblind (Gemeinsamer Fachausschuss hörsehbehindert / taubblind [GFTB] recommends that deafblind persons across the country should receive compensation for disadvantage in the form of a deafblind person's support allowance which is paid at a standard rate and is not dependent on income. The GFTB believes that such a benefit is urgently necessary in order to overcome the particularly high barriers to participation faced by the deafblind (GFTB 2017).

[8] Gemeinsamer Fachausschuss hörsehbehindert / taubblind (GFTB) (2017).

This means the federal state in which a deafblind person lives exerts a crucial influence on his or her individual living conditions.

1.4 Important bodies that represent, report on or have responsibility for people with deafblindness

Relevant committees and organisations that work for or are operated by persons with deafblindness are presented below. Given the scope of the present report, it is not possible to acknowledge every organisation in Germany that has committed itself to the issue of deafblindness. Comprehensive lists of organisations may, for example, be found on the websites of the Kompetenzzentrum Selbstbestimmt Leben NRW *[North Rhine-Westphalia Centre of Excellence for Self-Sufficient Living]*[1], the Bundesarbeitsgemeinschaft der Taubblinden *[National Deafblind Working Group]*[2] or the Deutsche Gesellschaft für Taubblindheit *[German Deafblindness Society]*[3]. Sources for member lists are provided in the footnotes if not all members of an umbrella organisation are mentioned below.

Arbeitsgemeinschaft der Einrichtungen und Dienste für taubblinde Menschen *[Association of Institutions and Services for the Deafblind]* (AGTB) – the AGTB is a consortium of various institutions offering guidance and help to persons affected and to their families. Its members include the Blindeninstitutsstiftung Würzburg *[Würzburg Blind Institute Foundation]*, the Deutsche Taubblindenwerk [*German Deafblind Training and Support Establishment]* and Stiftung St. Franziskus Heiligenbronn *[Heiligenbronn St. Francis Foundation]*.[4] The AGTB promotes cooperation between its members at a specialist, organisational and policy level. Members are familiar with current scientific research findings and also have many years of experience in practical work with deafblind persons. This knowledge and expertise are reflected in various specialist publications and in the continuing training provision on offer.

Bundesarbeitsgemeinschaft der Taubblinden *[National Deafblind Working Group]* (BAT) – the BAT is made up of self-help groups from several German cities and regions.[5] Although members largely communicate via sign language, the BAT also supports deafblind persons who prefer to use spoken language. The working group's main objectives are to strengthen the social status of those affected and to foster their social integration. To this end, it is seeking to create meeting opportunities, to encourage social contacts and to set up a central office for deafblind assistants as well as endeavouring to engage in networking both nationally and internationally. The BAT

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[1] www.ksl-msi-nrw.de/de/fachbereich/taubblind accessed on 2nd of July 2020.

[2] http://bundesarbeitsgemeinschaft-taubblinden.de/?page_id=8%20accessed on 2nd of July 2020.

[3] https://www.gesellschaft-taubblindheit.de/links accessed on 2nd of July 2020.

[4] Contact information for all members is available on the homepage of the AGTB (http://www.agtb-deutschland.de/ accessed on 2nd of July 2020).

[5] The BAT Internet presence contains a full listing of members (http://bundesarbeitsgemeinschaft-taubblinden.de/?page_id=3 accessed on 2nd of July 2020).

also helps deafblind persons to assert their rights to assistance, information, education and training and work. The BAT website provides information on the forms of communication used by persons affected.

Deutscher Blinden- und Sehbehindertenverband *[German Federation of the Blind and Partially Sighted]*(DBSV) – the DBSV is a self-help organisation which represents the interests of persons with a hearing and visual impairment and deafblindness and persons who have a condition that may result in visual impairment or blindness. Their objectives include maintenance and improvement of the social status and medical care of people affected and encouragement of self-sufficiency and of equal rights with regard to societal participation. The DBSV organises education and training and guidance provision for persons with a hearing and visual impairment and deafblind persons and publishes a journal entitled "taubblind".[1] This magazine (which is available in Braille and normal print) contains information on aspects such as aids and equipment, and includes advice on social law and field reports for the deafblind. Current news stories for the deafblind are also presented in Braille. The DBSV's Internet presence provides a wide range of information on the topic of deafblindness. This is aimed both at persons affected and at a broader specialist target audience.[2]

Deutsche Gesellschaft für Taubblindheit *[German Deafblindness Society]* (DGfT) – the DGfT[3] is focused on improving living conditions for deafblind persons and persons with a hearing and visual impairment in Germany. From its base in North Rhine-Westphalia, the society works to create guidance and placement provision for persons affected, family members and institutions. The DGfT is also involved with funding for residential and sporting facilities and with the development of provision to foster communication skills. Medium-term goals are the establishment of widespread rehabilitation services, improvement of opportunities for early years support and the creation of psychological support provision. In the long term, the DGfT is seeking to set up deafblind-specific continuing training programmes for skilled workers and other programmes within the fields of education, training and work.[4]

Gemeinsamer Fachausschuss Hörsehbehindert/Taubblind *[Joint Committee for the Hearing and Visually Impaired and the Deafblind]* (GFTB) – the GFTB pools

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[1] Deutscher Blinden- und Sehbehindertenverband (DBSV) 2017.

[2] http://www.dbsv.org/ accessed on 2nd of July 2020.

[3] The stakeholders are Verein Leben mit Usher-Syndrom [Life with Usher Syndrome Association] (LMU), the
Bundesarbeitsgemeinschaft der Taubblinden [National Deafblind Working Group] (BAT), the Deutsches
Taubblindenwerk [German Deafblind Training and Support Establishment] and the Stiftung taubblind Leben
[Foundation for People Living with Deafblindness].

[4] https://www.gesellschaft-taubblindheit.de/ accessed on 2nd of July 2020.

several organisations.[1] The aim of the Joint Committee is to support the interests of persons with a hearing and visual impairment and deafblind persons at a national level. The associations involved in the consortium have taken on the task of conducting political lobbying on behalf of those affected. This work is reflected in various policy recommendations and official responses.[2] Members also develop concepts to aid deafblind persons and persons with a hearing and visual impairment. The main focus is on specialist networking and on interlinking the work carried out with and for the persons affected. Mention should be made of a specialist report drawn up by the GFTB in 2010 on the particular needs of deafblind persons regarding social participation.[3] This report was used to help inform policy considerations for subsequent recognition of deafblindness as a distinct disability.[4]

Kompetenzzentrum Selbstbestimmt Leben für Menschen mit Sinnesbehinderung Nordrhein-Westfalen *[North Rhine-Westphalia Centre of Excellence for Self-Sufficient Living for Persons with Sensory Impairment]* (KSL-MSi-NRW) – the KSL-MSi-NRW was established by the Ministry of Labour, Social Affairs and Health of the Federal State of North Rhine-Westphalia and focuses on supporting persons with sensory impairments in living a self-sufficient life. Provision offered includes structural guidance for government authorities, associations, schools and companies. It also supports cooperation agreements between experts, corporate entities, self-help representative bodies and trade and industry. The KSL-MSi-NRW comprises three specialist divisions – "Sight", "Hearing" and "Deafblind". The functions of the "Deafblind" specialist division include provision of information on deafblindness and visual and hearing impairment, contact lists for relevant self-help groups, societies,

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[1] Deutscher Blinden- und Sehbehindertenverband [German Federation of the Blind and Partially Sighted](DBSV)
[the GFTB itself is housed at the DBSV], Arbeitsgemeinschaft der Dienste und Einrichtungen für taubblinde
Menschen [Association of Institutions and Services for the Deafblind] (AGTB), Bundesarbeitsgemeinschaft
Taubblinder [National Deafblind Working Group] (BAT), Taubblindendienst [Deafblind Service](EKD), Pro Retina
Deutschland, Deutsches Katholisches Blindenwerk [German Catholic Deafblind Training and Support
Establishment] (DKBW), Verband der Katholischen Gehörlosen Deutschlands [Association of Deaf Catholics in
Germany], Taubblindenassistentenverband [Deafblind Assistants' Association] (TBA-Verband), Verband für
Blinden- und Sehbehindertenpädagogik [Pedagogical Association for the Blind and Visually Impaired] (VBS);
http://www.dbsv.org/gftb.html accessed on 2nd of July 2020.
[2] inter alia GFTB 2010, 2017 (see bibliography) or the resolution from 2007
https://www.dbsv.org/stellungnahme/gftb-resolution-resolution-fuer-ein-merkzeichen-tbl-im-schwerbehindertenausweis.html accessed on 2nd of July 2020.
[3] Gemeinsamer Fachausschuss hörsehbehindert / taubblind (GFTB) (2010).
[4] Bundesministerium für Arbeit und Soziales (BMAS) (2018a), p. 53.

associations, networks, guidance bodies and institutions for deafblind persons from all over Germany.[1]

Stiftung taubblind leben *[Foundation for People Living with Deafblindness]* **–** the foundation was set up as a trust in 2010 under the umbrella of another foundation entitled Stiftung Gemeinsam Handeln (roughly translated "Foundation for Joint Action"), which in turn forms part of the North Rhine-Westphalia Association of Social Welfare Organisations. Its purpose is to support deafblind people (e.g. by offering guidance or assistance with living arrangements), self-help groups and other provision which is aimed at improving the quality of life for the deafblind and persons with a hearing and visual impairment. All of the activities carried out by the foundation are set out in its detailed annual reports.[2] One of the actions conducted by the foundation as part of an inclusion project was a questionnaire of persons with a hearing and visual impairment and deafblind persons on their life situation.[3]

Taubblindendienst der Evangelischen Kirche in Deutschland *[Deafblind Service of the Protestant Church in Germany]* **–** the Deafblind Service is a specialist association within the Social Welfare Organisation of the Protestant Churches in Germany. It works on behalf of deafblind and blind persons with multiple disabilities. The Deafblind Service maintains a guidance agency, a meeting centre and institution offering out-patient care and assisted living for people with deafblindness and persons with a hearing and visual impairment. The meeting centre hosts regular seminars, holidays and leisure services for the target group. The Deafblind Service also operates Germany's only botanical garden for the blind. This facility is home to a multitude of scented plants and has been specially designed to meet the needs of blind or deafblind persons.[4]

Taubblindenassistentenverband *[Deafblind Assistants' Association]* **(TBA-Verband) –** the TBA-Verband is a professional association for deaf and hearing deafblind assistants. The objectives of the association include achieving recognition for the occupational profile of "deafblind assistant" and obtaining secure payment for persons providing such services. It also focuses on specialist networking between deafblind assistants at a national level, on public relations work within this field and on cooperation with various service providers, training institutions and other organisations. The association's website offers detailed information on the topics of deafblindness and deafblind assistance.[5]

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[1] http://www.ksl-msi-nrw.de/de/fachbereich/taubblind accessed on 2nd of July 2020.
[2] Stiftung Taubblind Leben (2018), p. 13; as well as the annual report cited, the foundation's Internet presence
also contains further annual reports (http://stiftung-taubblind-leben.de/stiftung-taubblind-leben accessed on
2nd of July 2020).
[3] Stiftung Taubblind Leben (2015).
[4] http://www.taubblindendienst.de/ accessed on 2nd of July 2020.
[5] https://www.tba-verband.de/ accessed on 2nd of July 2020.

2. Overview of Law and Policy on New Technologies and Disabled People

By signing the UN Convention on the Rights of Persons with Disabilities (UN-BRK) in 2009, Germany committed itself to taking appropriate measures to ensure that the right to accessibility in built and digital environments in particular is guaranteed. The legal steps taken by Germany to implement the UN-BRK, to give people with disabilities better access to new technologies and to establish accessibility are explained in the following chapter. First, Chapter 2.1 deals with the extent to which people with disabilities have access to new technologies. Chapter 2.2 describes how legal foundations in the area of accessibility are further developed.

2.1 Overall legal and policy framework for access to technology

In order to provide people with disabilities with technologies, Germany has a **catalogue of aids (Hilfsmittelverzeichnis der gesetzlichen Krankenversicherung)**, which are financed by the statutory health insurance funds. The legal basis for the financing is §33 SGB V (**Social Security Code V**). Accordingly, insured persons are entitled to the provision of hearing aids, body prostheses, orthopaedic and other aids. Visual aids are financed under certain conditions depending on age and type of disability. However, the aids to be financed must not be considered general items of daily use.[1] An interview conducted in the context of this report points out that the application for reimbursement of the costs of aids does not always go smoothly in practice.

> "Health insurance companies often initially refuse to fund such aids, and this means that an appeal then has to be lodged" (see respondent 3 2020, from minute 13:40 to minute 15:28).

The case law of the Federal Social Court also plays a role in court decisions on whether costs for medical aids can be covered. The catalogue contains more than 32,000 technical products that include aids and care products. In 2017, insured persons received benefits in this connection amounting to 8 billion euros. In addition to primary care products, the catalogue contains technologically innovative products that are in line with medical and technical knowledge and developments relevant to care. The products offered include in particular computer-controlled exoskeletons, mechatronic joints, myoelectrically controlled arm prostheses and electric vehicles. The **Rehadat** information system provides an overview of the products currently available (see Chapter 6). The European standard EN ISO 9999 was used to categorise the products and was transferred to the German standard DIN EN ISO 9999.[2] Manufacturers have

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[1] § 33 SGB V.

[2] The standards describe aids for people with disabilities and include a classification and terminology. The standards are published by the International Organization for Standardization (ISO) and the German Institute for Standardization (DIN).

the option of having their products included in the list of aids. The application is made via the nationwide association of all statutory health insurance companies and nursing care insurance companies (**GKV-Spitzenverband**).[1]   Applicants must prove the functional capability, safety and quality of their products. If necessary, the medical or nursing benefit must also be demonstrated. Products included in the list are given an identification number and a reference to the manufacturer and design features.

In addition to statutory health insurance, technical aids in Germany may also be financed by care insurance, private health insurance, accident insurance and within the framework of social welfare.[2]   For the professional sector, aids such as a Braille display can also be financed by the Employment Agency. The same assistive devices can be financed by both health insurance funds and vocational rehabilitation, although the regulations are rather more generous for vocational rehabilitation[3]

In order to provide people with disabilities with new technologies, Germany promotes the development of new technologies in addition to the above-mentioned list of aids and related services. At this point, the **National Action Plan (NAP)** of the Federal Government should be mentioned in particular.[4] In Germany, the National Action Plan is a central instrument for implementing the UN Convention on the Rights of Persons with Disabilities and it contains a large number of funding projects for the development of new technologies for people with disabilities (see Chapter 10). In its current version 2.0, it runs until 2021, with the Federal Ministry of Labour and Social Affairs (BMAS) as the governmental focal point responsible for its implementation. For example, the NAP supports projects that serve to compensate deaf-blindness with technological means. The projects **Haptivest** and **Lidarsee**, which will be presented in more detail in chapter 10, should be mentioned here in particular. In Germany, the NAP's support measures continue efforts to ensure that people with disabilities continue to have access to innovative technologies.

In Germany, as described above, a wide range of new technologies are being provided and developed for people with disabilities. The **Federal Government's AI strategy** plays a particularly important role in the development of nine technologies and Chapter 4 presents the AI strategy in more detail. Even though Germany aims to play a pioneering role in the field of artificial intelligence internationally and the provision of care for people with disabilities is a political concern, no **legislation** or **regulations** could be identified at the time of writing this report that explicitly formulate the goal of

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[1] https://www.gkv-spitzenverband.de/krankenversicherung/hilfsmittel/hilfsmittelverzeichnis/antragsverfahren/antragsverfahren.jsp accessed on 2nd of July 2020.
[2] https://www.rehadat-hilfsmittel.de/de/ablauf-finanzierung/hilfsmittel-fuer-private-nutzung/kostentraeger/ accessed on 2nd of July 2020.
[3] Respondent 3.
[4] https://www.bmas.de/DE/Schwerpunkte/Inklusion/nationaler-aktionsplan-2-0.html accessed on 2nd of July 2020.

making technologies in the fields of **artificial intelligence (AI) or Internet of Things (IoT)** accessible to people with disabilities.

2.2 Overall legal and policy framework for accessibility

The German **Equal Opportunities for Disabled Persons Act (BGG)** of 2002 defines the concept of accessibility in Germany. According to this, a barrier-free design of the environment means that it can also be used and perceived by people with disabilities without additional aids.[1] The BGG is intended to eliminate or prevent disadvantages for people with disabilities and to lead to greater participation in society. In particular, the law contains provisions for barrier-free information technology (§12 BGG) as well as provisions for the creation of accessibility in the areas of construction and transport (§8 BGG). According to this law, organisations of disabled persons can demand negotiations on target agreements with companies and thus achieve improved accessibility. With the **Act on the Further Development of the Equal Opportunities for Disabled Persons Act** of 2016, the BGG was further developed and the accessibility of the federal public administration was further improved.[2] In this amendment, the concept of disability was adapted to the requirements of the UN-BRK and improvements were implemented to ensure accessibility in the areas of construction and information technology. A further amendment to the BGG was made in 2018 to implement **EU Directive 2016/2102** on barrier-free access to websites and mobile applications of public authorities.[3] [4] This transposed European law into German law and obliged public bodies of the Federal Government to make their websites and mobile applications barrier-free.[5] As a follow-up to the EU Directive 2016/2102, regulations were also incorporated into the disability equality laws of the federal states, which also apply to the municipal level.[6] [7] The BGG mentioned above is supplemented in Germany by the **Barrier-Free Information Technology Ordinance (BITV)**. The BITV contains technical details on accessibility that were not included in the legal text of the BGG in the course of implementing the requirements of EU Directive 2016/2102. The BITV, which came into force in Germany in 2002, is intended to ensure the barrier-free design of information and communication technology (websites, mobile applications, electronic administrative processes, program interfaces). This regulation

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[1] https://www.bundesfachstelle-barrierefreiheit.de/DE/Ueber-Uns/Definition-Barrierefreiheit/definition-barrierefreiheit_node.html accessed on 2nd of July 2020.

[2] https://www.bmas.de/DE/Presse/Meldungen/2016/gesetz-zur-weiterentwicklung-des-behindertengleichstellungsrechts-in-kraft.html accessed on 2nd of July 2020.

[3] Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on barrier-free access to the websites and mobile applications of public authorities.

[4] https://www.einfach-fuer-alle.de/artikel/eu-richtlinie-2016-2102/ accessed on 2nd of July 2020.

[5] https://www.dvbs-online.de/images/uploads/Stellungnahmen/bf_Forderungen_an_BIBB_zur_Modernisierung_des_Ausbildungsberufe_FI.pdf accessed on 2nd of July 2020.

[6] Ibid.

[7] https://bik-fuer-alle.de/gesetzgebung-und-standards.html accessed on 2nd of July 2020.

is based on the **Web Content Accessibility Guidelines (WCAG)**.[1] After the WCAG was updated in 2008, the BITV was also adapted and was available as **BITV 2.0** after the adaptation. The guidelines apply to electronic content and information and refer to the principles of perceptibility, usability, comprehensibility and robustness. The BITV 2.0 was last updated in 2019 and regulates in detail the barrier-free design of federal websites.[2] The BITV 2.0 no longer describes the standard for barrier-free design itself, but refers to European harmonised standards.[3]

In order to implement accessibility based on the BGG, the **Federal Office for Accessibility** was established in 2016 to support German authorities and administrations.[4] Businesses, associations and civil society are also advised by the Federal Office of Accessibility. The federal accessibility office also has other tasks that serve to establish accessibility in Germany, including the bundling of practical and scientific knowledge, the support of target agreements and the establishment of a network on the topic of accessibility. We also discuss this in Chapter 7, which deals with Smart Cities.

More accessibility is also being sought in Germany through the integration of administrative processes and support services. In this context, the **Federal Participation Act (BTHG)** and the **Online Access Act (OZG)** should be mentioned. The **Bundesteilhabegesetz (BTHG)**, which will come into force between 2017 and 2023, is intended to enable more social participation for people with disabilities. The BTHG simplifies the application process for funding by eliminating the need to submit applications for funding individually to different authorities.[5] Such a unified funding procedure can facilitate access to new technologies for people with disabilities and also help to reduce barriers. Since 2017, the **Online Access Act (OZG)** has obliged the federal and state governments to make their administrative services available digitally via portals.[6] This additional digital offer is to be implemented by 2022 at the latest. The law is intended to establish a federal portal where users can log in with a personal account. Federal and state administration portals will be merged and an integrated platform will be provided. According to §2 OZG, access to digital administration should be barrier-free and free of media breaks. Freedom from media

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[1] https://www.einfach-fuer-alle.de/artikel/eu-richtlinie-2016-2102/ accessed on 2nd of July 2020.
[2] https://www.bundesfachstelle-barrierefreiheit.de/DE/Themen/EU-Webseitenrichtlinie/BGG-und-BITV-2-0/Die-neue-BITV-2-0/die-neue-bitv-2-0_node.html accessed on 2nd of July 2020.
[3] Ibid.
[4] https://www.bundesfachstelle-barrierefreiheit.de/DE/Home/home_node.html accessed on 2nd of July 2020.
[5] https://www.bmas.de/DE/Schwerpunkte/Inklusion/bundesteilhabegesetz.html accessed on 2nd of July 2020.
[6] https://www.bmi.bund.de/DE/themen/moderne-verwaltung/verwaltungsmodernisierung/onlinezugangsgesetz/onlinezugangsgesetz-node.html accessed on 2nd of July 2020.

discontinuity means that a single identification on the system is sufficient and information does not have to be managed separately in different areas.

The **European Accessibility Act (EAA)** came into force in 2019 as a European instrument for improving accessibility.[1] The EAA must be transposed into national law by 2022 and applied by 2025. Under the EAA, various areas must be made accessible, including online commerce, desktop computers, notebooks, smartphones, tablets, payment terminals, operating systems, ATMs, consumer electronic communications and transportation. In Germany, the EAA is implemented by the Federal Ministry of Economics and Energy. The German Council for the Disabled describes the EAA as a "major step towards more participation by more than 80 million people with disabilities (in the EU)".[2] Furthermore, the German Disability Council states that it is now imperative that the Federal Government begins to implement this directive conscientiously and promptly.[3] It is expected that as a result of the implementation, not only the German federal administration but also the private sector will increasingly deal with the requirements of accessibility.[4] The German Association of Blind and Visually Impaired Students and Professionals, with reference to the EAA, has demanded that the subject area of "accessibility" be included in the training framework plan in the course of the modernisation of IT specialist occupations.[5] In the training occupation "IT specialist for application development", the subject area "Development of barrier-free IT applications" is also to be included in the training framework plan. The justification of the demand will clarify the importance of accessible user interfaces for inclusion in the information society. Graduates should acquire various competencies in the field of accessibility. In particular, the following training content should be included: barrier-free documentation, evaluation of existing systems with regard to usability and accessibility, analyses of requirements for accessibility and development of barrier-free user interfaces.

The signing of the **Marrakesh Treaty** is another measure to increase accessibility in Germany. This treaty obliges signatory states to introduce restrictions in copyright law in favour of blind and visually impaired persons. In 2018, the European Union ratified the treaty so that it will apply to all member states. More than 70 countries worldwide have signed the treaty. In 2018, Germany has already adapted its copyright law against

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[1] https://www.bundesfachstelle-barrierefreiheit.de/DE/Themen/European-Accessibility-Act/european-accessibility-act.html accessed on 2nd of July 2020.

[2] https://www.reha-recht.de/infothek/beitrag/artikel/europaeische-richtlinie-zur-barrierefreiheit-verabschiedet/ accessed on 2nd of July 2020.

[3] Ibid.

[4] https://www.dvbs-online.de/images/uploads/Stellungnahmen/bf_Forderungen_an_BIBB_zur_Modernisierung_des_Ausbildungsberufe_FI.pdf accessed on 2nd of July 2020.

[5] Ibid.

the background of the Marrakesh Treaty.[1] This will make it easier for those affected to access barrier-free works.

In addition to the listed measures at the federal level to ensure accessibility, there are also NGOs in Germany that are active in this area. The **foundation barrierefrei kommunizieren** promotes barrier-free communication for people with disabilities.[2] To this end, this institution, which is financed by companies from the IT sector, deals with accessibility on the Internet and assistive technologies in a practice-oriented manner. Activities include in particular the testing of technologies with regard to their accessibility, the networking of relevant actors in the field of technology and society, counselling of affected persons and public relations work. Under the patronage of German federal ministries, the **Digital Opportunities Foundation** researches the social consequences of digitisation and aims to counteract a "digital divide" in society.[3] The foundation is committed to equal access to the Internet and aims to strengthen media competence.

This chapter provides an overview of laws and regulatory measures in Germany that affect the access of people with disabilities to new technologies. In implementing accessibility, it is positive to note that the concept of accessibility has been incorporated into laws and regulations in a differentiated form. Successful steps have been taken in Germany with regard to the implementation of accessible websites in the federal sector. One challenge is certainly the further implementation of accessibility outside the federal administration in the private sector.

3. Regulation of New Technologies

Regulatory requirements are increasingly arising as a result of accelerating developments in the area of new technologies. With regard to regulation of new technologies, particular significance is currently being attached in Germany to ensuring data privacy and accessibility. In respect of the former, the **General Data Protection Regulation (GDPR)**[4] is directly binding and applicable in the country by dint of its status as a regulation of the European Parliament. The **German Data Protection Act,** (Bundesdatenschutzgesetz) **(BDSG)**[5] implements the provisions of the GDPR in German law and, together with the data protection acts of the federal states, governs the way in which data processed via information and communication systems is handled. The number of publications produced by the Federal Commissioner for Data Protection and Freedom of Information (BfDI) shows that there is a high perceived

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[1] https://www.dbsv.org/vertrag-von-marrakesch.html accessed on 2nd of July 2020.
[2] https://www.stiftung-barrierefrei-kommunizieren.de/ accessed on 2nd of July 2020.
[3] https://www.digitale-chancen.de accessed on 2nd of July 2020.
[4] Datenschutz-Grundverordnung (DSGVO).
[5] https://www.bmi.bund.de/DE/themen/it-und-digitalpolitik/datenpolitik/bundesdatenschutzgesetz/bundesdatenschutzgesetz-node.html accessed on 2nd of July 2020.

need for regulation.[1] Aside from issues relating to data privacy, regulatory requirements also arise in the field of accessibility. In Germany, advice on regulatory provisions in the area of information technology is provided by the **Federal Accessibility Agency**[2] on the basis of ordinances on "Use of sign language and other communication aids"[3] and on "Ensuring access to documents for the blind and visually impaired".[4]

The following sections address the regulation of new technologies in Germany. Reference is made to the aspects of personal cameras and sensors (3.1), facial and object recognition (3.2), handling and ownership of data (3.3) and data analysis (3.4). This presentation takes place against the background that such new technologies (will) take on a central role in the development of tools for disabled persons.

3.1 Use of personal cameras and sensors

Video surveillance is becoming increasingly widespread in public spaces in Germany and is a subject of controversial debate in terms of the possible introduction of more restrictive regulations.[5] According to the BDSG, video surveillance for purposes other than policing is only permissible to the extent necessary for public bodies to perform their tasks, for the exercising of the right of property owners to determine who should be allowed or denied access, or for the safeguarding of legitimate interests for specifically defined reasons.[6]

Alongside the police, German Railways (DB) are also using "body cameras" to assist with security at stations.[7] [8] At the moment, the purpose of this deployment is to provide evidence of criminal acts (such as assault). When using body cameras, both the police and DB Security make persons aware that video material is being recorded and stored and that this will be passed on to the police authorities.

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[1] https://www.bfdi.bund.de/DE/Home/home_node.html accessed on 2nd of July 2020.
[2] https://www.bundesfachstelle-barrierefreiheit.de/DE/Praxishilfen/Informationstechnik/informationstechnik_node.html accessed on 2nd of July 2020.
[3] Verordnung zur Verwendung von Gebärdensprache und anderen Kommunikationshilfen im Verwaltungsverfahren nach dem Behindertengleichstellungsgesetz (Kommunikationshilfenverordnung - KHV).
[4] Verordnung zur Zugänglichmachung von Dokumenten für blinde und sehbehinderte Menschen im Verwaltungsverfahren nach dem Behindertengleichstellungsgesetz (Verordnung über barrierefreie Dokumente in der Bundesverwaltung - VBD).
[5] https://www.bfdi.bund.de/DE/Datenschutz/Themen/Technische_Anwendungen/TechnischeAnwendungenArtikel/Videoueberwachung.html?cms_templateQueryString=kamera&cms_sortOrder=score+desc accessed on 2nd of July 2020.
[6] https://www.bmi.bund.de/DE/themen/it-und-digitalpolitik/datenpolitik/bundesdatenschutzgesetz/bundesdatenschutzgesetz-node.html accessed on 2nd of July 2020.
[7] https://taz.de/Die-Deutsche-Bahn-ruestet-auf/!5529394/ accessed on 2nd of July 2020.
[8] https://www.bfdi.bund.de/DE/Datenschutz/Themen/Technische_Anwendungen/TechnischeAnwendungenArtikel/Videoueberwachung.html?nn=5217386#doc5214330bodyText5 accessed on 2nd of July 2020.

Further technologies employing sensors are also being used in public areas in Germany in addition to the personal cameras described above. These include new developments in the areas of dash cams (video cameras installed in vehicles) and drones. The Federal Commissioner for Data Protection and Freedom of Information names video surveillance as one of the most important data protection issues in Germany.[1] For the data protection authorities, the subject of video surveillance and the associated adaption of regulations remain important, particularly because technology in this area is constantly evolving. The legal requirements for the implementation of video surveillance are usually not sufficiently taken into account when technical innovations are made.[2] One particular perceived problem is that new technologies often do not provide any indication that recording is taking place. The opinion of the federal state data protection authorities is that the use of dash cams is impermissible, even if recordings are of short duration and relate to specific events.[3] According to German law, a delineation is to be drawn between public spaces and the family sphere. Data processing, and therefore also video recordings, are excluded from data protection legislation in Germany if they take place within a family context[4].

Stipulation of what constitutes legitimate purposes for recordings and of the significance these purposes have vis-à-vis the right not to be observed by cameras will continue to be of major significance under data protection law in Germany and will also be an object of supervisory scrutiny.[5] Storage of video recordings must be restricted to the minimum necessary extent under the law, and notification of the circumstance that surveillance is taking place must be provided at as early as possible.[6]

3.2 Face and object recognition

At a conference in 2014, the Commissioners for Data Protection of the Federal Government and the federal states arrived at the view that the collection, processing and use of biometric data via Internet services for the purpose of facial recognition could only take place in Germany if consent has been obtained from the parties involved.[7] A different interpretation is being applied to the legal situation regarding actions undertaken by the police. The Federal Ministry of the Interior is currently piloting the use of image recognition technologies. It believes that deployment of such technologies is legally possible, although consideration naturally also needs to be

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[1] https://www.bfdi.bund.de/DE/Datenschutz/Themen/Technische_Anwendungen/TechnischeAnwendungenArtikel/Videoueberwachung.html accessed on 2nd of July 2020.

[2] Ibid.

[3] https://www.adac.de/verkehr/recht/verkehrsvorschriften-deutschland/dashcam/ accessed on 2nd of July 2020.

[4] https://www.bfdi.bund.de/DE/Datenschutz/Themen/Technische_Anwendungen/TechnischeAnwendungenArtikel/Videoueberwachung.html?cms_templateQueryString=kamera&cms_sortOrder=score+desc accessed on 2nd of July 2020.

[5] Ibid.

[6] Ibid.

[7] https://www.bfdi.bund.de/SharedDocs/Publikationen/Entschliessungssammlung/DSBundLaender/87_DSKBiometrischeGesichtserkennung.pdf?__blob=publicationFile&v=3 accessed on 2nd of July 2020.

accorded to issues relating to data privacy and the right to informational self-determination. A clear legal basis has, however, not yet been created.[1]

Facial recognition cameras are similar to personal cameras in that they represent a technical opportunity which could permit disadvantaged persons to enjoy greater social participation and involvement. Many people with a visual impairment are interested in facial recognition technologies in order to be able to identify people in illustrations (noted by respondent 2) This possibly presents a certain conflict with the endeavours of the EU to restrict the use of image recognition technologies for data protection reasons.

3.3 Handling and ownership of data

The rapid development of new information technologies means that regulation of the handling and ownership of data has become a complex topic. The Perinorm database, for example, contains a large and constantly growing number of German standards, legal provisions relating to new technologies, technical rules and EU Directives currently in force.[2] However, standards guaranteeing users that applications are secure are absent in many areas. Ethical standards for algorithms and standards for private data security of applications are similarly lacking[3]. In the field of new technologies, the Institute for Innovation and Technology recently drew up regulation requirements in the areas of (1) terminology (2) interoperability (3) security and quality (4) ethical standards.[4]

The Federal Government's **National Artificial Intelligence Strategy (AI Strategy)** is putting the prerequisites in place that will enable Germany to meet the regulatory requirements arising via processes of digitalisation.[5] Within the scope of this strategy, the Federal Government is seeking to review and make any necessary adjustments to the legal framework for decisions, services and products that are based on algorithms and AI in order to ensure that it is possible to provide effective protection against distortions, instances of discrimination, manipulations or other types of misuse.[6] The intention is that the AI Strategy will encompass diverse measures to increase the amount of data available and improve ease of handling. A particular objective is to achieve closer networking of data resources in the transport and logistics sector. The **GAIA-X Project** is, for example, pursuing the goal of creating networked, secure and innovative data infrastructures.[7] Networking and provision of health-related data for

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[1] https://www.bmi.bund.de/SharedDocs/pressemitteilungen/DE/2018/10/gesichtserkennung-suedkreuz.html accessed on 2nd of July 2020.

[2] https://www.ulb.uni-bonn.de/de/aktuelles-ulb/neue-datenbank-perinorm accessed on 2nd of July 2020.

[3] Gabriel, P. (2019).

[4] Ibid.

[5] https://www.ki-strategie-deutschland.de/home.html accessed on 2nd of July 2020.

[6] Ibid.

[7] https://www.bmwi.de/Redaktion/DE/Publikationen/Digitale-Welt/das-projekt-gaia-x.pdf?__blob=publicationFile&v=22 accessed on 2nd of July 2020.

and by the scientific research community is also contributing towards the development of assistive technologies, from which disabled persons may be able to benefit. The open and growing **mCLOUD data portal** is being used to make mobility data, geo data and weather information available to scientific researchers and companies free of charge.[1] The projects funded by the German Government under the umbrella of the AI Strategy since 2018 have therefore been directed towards achieving greater ease of handing of data and clearer ownership rights.

3.4 Data Analysis

Procedures for the **analysis of big data** are increasingly undergoing further development and are being deployed to an ever greater extent. In Germany, statutory regulations for the control of big data analysis procedures only exist with regard to the police using a dragnet investigation ("Rasterfahndung").[2] A dragnet investigation can only be carried out in Germany if there is a concrete danger to high ranking legal goods, such as a danger to life.[3] There is, therefore, a discernible need for relevant regulation.

So-called **scoring algorithms** continue to be used by companies in Germany within the context of applicant selection. In the report "Discrimination risks through the use of algorithms", the Federal Antidiscrimination Agency describes current and concrete examples of unequal treatment and discrimination from the years 2018 and 2019, in particular an application which divides job seekers into categories and uses the characteristic "degree of disability" in data analysis.[4] These scoring algorithms are also deployed for the purpose of carrying out creditworthiness checks in the financial sector, where they enable a statistical evaluation of personal characteristics to be made.[5] The German police has also turned to software applications which are able to predict domestic burglaries and other criminal acts.[6] This type of data analysis is legally permissible in Germany, although critical debate is also taking place with regard to the sphere of data privacy in particular.[7] Critics assume that suspicion can generally be directed at single and innocent individuals.[8] One justification for the use of such

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[1] https://www.bmvi.de/DE/Themen/Digitales/mFund/mCloud/mcloud.html accessed on 2nd of July 2020.
[2] Konferenz der Datenschutzbeauftragten des Bundes und der Länder am 18. und 19. März 2015 in Wiesbaden.
https://www.bfdi.bund.de/SharedDocs/Publikationen/Entschliessungssammlung/DSBundLaender/89DSK-BigData.pdf?__blob=publicationFile&v=6 accessed on 2nd of July 2020.
[3] Urteil des Bundesverfassungsgerichtes vom 4. April 2006, Az.:1 BvR 518/02.
https://www.bundesverfassungsgericht.de/e/rs20060404_1bvr051802.html accessed on 1st April 2020.
[4] Orwat, C. (2019), pp. 34-76.
[5] https://www.deutschlandfunk.de/algorithmen-im-alltag-4-12-der-bewerter.676.de.html?dram:article_id=445783 accessed on 2nd of July 2020.
[6] https://www.oeffentliche-it.de/-/Vorhersagende-Polizeiarbeit accessed on 2nd of July 2020.
[7] Der Bundesbeauftragte für den Datenschutz und die Informationsfreiheit (BfDI) (2019).
[8] Richter, S. and Kind, S. (2016).

systems lies in the prevention of threats, especially in the area of terrorism.[1] A Study by the Bertelsman Stiftung on predictive policing in Germany does not see a danger to civil rights[2] or the presumption of innocence. In some cases, the ways in which the algorithms used actually work are virtually impossible to comprehend because of their sheer complexity, and this is perceived as especially problematic. AI permits evaluation of huge amounts of data and it distinguishes between white-box and black-box methods.[3] White-box methods are rule-based systems whose calculations are transparent and comprehensive. For example, decisions can be traced in detail. Conversely, black-box procedures are not easily comprehended. These can be neuronal networks, which are trained using example data and form complex and dynamically developing structures. These structures can become so complex that they can hardly be understood by humans. In some cases, however, traceability is needed to detect bias in the training data and to prevent discrimination, especially against people with disabilities. If calculation processes are traceable, they can be made more responsible and ethical.[4] This lack of traceability has been identified as a problem, by the 2017 International Joint Conference on AI: Workshop on Explainable AI (XAI).[5] The AI Now Institute of New York University has also demanded that no black box AI systems should be used by central public institutions.[6]

We were unable to identify any specific examples of the use of big data within the context of technologies for disabled persons at the time when the present report was prepared.

4. Ethical frameworks relevant to disabled people and new technologies in place or under development

Use of new technologies for people with disabilities, especially those using artificial intelligence, is a young field of research. This is also made clear by the fact that not only legal regulations, e.g. regarding the legal responsibility for misconduct of AI systems or the use of body cameras, but also the ethical framework for the use of these technologies, still have to be developed and put in place. Although new technologies offer opportunities for people with disabilities (better communication and orientation, more independence and improved possibilities to work) they also come with certain risks (less support from humans, dependence on technology that might fail to work properly or that people with disabilities might not fully be capable to

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[1] http://www.jura.uni-bielefeld.de/lehrstuehle/wischmeyer/dokumente/Wischmeyer_Predictive_Policing_20190513.pdf accessed on 2nd of July 2020.
[2] Knobloch, T. (2018).
[3] Bitkom (2019).
[4] Bitkom (2019).
[5] https://web.archive.org/web/20200610231418/http://home.earthlink.net/~dwaha/research/meetings/ijcai17-xai/ accessed on 7th of May 2020.
[6] AI Now Institute (2017).

understand). Not everything that is technically possible should also be permitted from an ethical point of view, especially when people with special needs for protection and support are affected. Discussions on the ethical dimension of new technologies in German society have started and are ongoing. In the following section some key stakeholders, their ideas and contributions will be presented.

Concerning the ethical framework relevant to disabled people and new technologies the **Deutsche Ethikrat** (German Ethics Council)[1] is an important actor. The German Ethics Council monitors ethical, societal, scientific, medical and legal issues as well as probable consequences for individuals and society, which arise from research and their application to humans. The Council has the task of informing the public as well as encouraging discussions in society, which is done through organising public events and providing information via newsletters, reports and its website. Furthermore, the council's task is to prepare statements and recommendations for political and legislative action for the Federal Government and the German Parliament.[2] As the German Ethics Council seems not to have publications focusing in particular on people with deafblindness,[3] the following four publications of the council with reference to people with disabilities will be presented.[4]

A publication on **The Challenges of Providing Care for Rare Diseases** (2018b)[5] discusses ethical principles regarding affected persons. General rights like self-determination harm reduction, justice and empowerment as well as the right to the provision and funding of an effective and appropriate medical treatment[6] mentioned in this publication would also be applicable to people with deafblindness. The argument in this publication is that from the point of view of justice the economic efficiency of the treatment envisaged needs to be considered because resources in health care are scarce and there are debates on the prioritisation of health services to achieve an equitable distribution for all members of society. However, one should also consider that the health care system focuses on research and treatment of common diseases. Therefore, rare diseases[7] get less attention. Interestingly, in addition to that it has been

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[1] https://www.ethikrat.org/ accessed on 2nd of July 2020.

[2] The German Ethics Council has been commissioned three times by the Federal Government to prepare a statement.

[3] The German Ethics Council has been contacted by e-mail with the request to provide further information.

[4] Other publications deal with new technologies especially in the field of new genetic engineering techniques. The *Conference Report Global health, global ethics, global justice* (2018a) for example discusses two ethical perspectives on human germline editing: the "reductionist pluralist" view, a more individually oriented morality and in contrast to this the "holistic communitarian" view with a collective oriented morality (see page 53).

[5] Deutscher Ethikrat (2018a).

[6] see § 12 German Social Security Code (SGB) Volume V.

[7] Rare diseases are very heterogeneous in terms of clinical picture and symptoms. They are often very complex diseases, some of which occur in childhood and which, due to their complex, often severe symptoms, make it difficult for doctors to make the right diagnosis. In total, there are approximately 7,000 to 8,000 of these rare diseases affecting no more than 5 per 10,000 people in the EU. Rare diseases include multiple sclerosis (chronic inflammatory nerve disease), autism spectrum disorders

pointed out that the handling of rare diseases can be a pilot for the future organisation of the health care system. With the growing importance of a more personalised, predictive, preventive and participatory biomarker-based and big-data-driven medicine, common diseases will split increasingly into subgroups.[1] The health care system has to be prepared in order to deal fairly, effectively and efficiently with this development. With adjustment of the health care system to better treatment of people with rare diseases, we gain experience that will help us to cope with this development in medicine. The authors see in this an important ethical argument to pay particular attention to the fair allocation of resources to the medical treatment of people with rare diseases.

In its opinion from April 2016, the **German Ethics Council calls for anchoring patient welfare as a standard for hospitals**.[2] In the opinion, groups of patients with special needs who are not well cared for in hospitals are described in Chapter 4.5.[3] People with disabilities are discussed as one of seven identified disadvantaged groups.[4] The council states that one of the problems is communication between hospital personnel and patients with disabilities. Communication in hospitals is tailored to non-disabled patients. In contrast, communication with people with disabilities requires additional time and skills.[5] Furthermore, diagnosis, therapy and care of patients with disabilities require more time and expertise.[6] Hospitals should be designed to be barrier-free, in accordance with the UN Convention on the Rights of Persons with Disabilities which, according to the opinion, was largely implemented in the majority of hospitals with regard to the structural conditions and the equipment with technical aids.[7] However, there are deficits with regard to barrier-free communication and the assistance systems for people with sensory disabilities.[8] Moreover, additional funding is needed for the provision of care for this target group in hospitals and improved access to personal hospital assistance that supports affected persons during their stay in hospital.[9]

In 2017, the German Ethics Council released an opinion on **Big Data and Health - Data sovereignty as an informational freedom[10]** which looks into chances (e. g.

(neurological developmental disorder/disorder of information and perception processing affecting social interaction, communication and behaviour) and Cornelia de Lange syndrome (dysmorphia syndrome with multiple congenital malformations, usually associated with cognitive impairment). For reference see: https://www.portal-se.de/informationsbereiche accessed on 2nd of July 2020; https://www.amsel.de/multiple-sklerose/ accessed on 2nd of July 2020; https://www.autismus.de/was-ist-autismus.html accessed on 2nd of July 2020; https://www.corneliadelange.de/index.php/de/ueber-cdls accessed on 2nd of July 2020.

[1] Deutscher Ethikrat (2018b), 3.
[2] Deutscher Ethikrat (2016a).
[3] See also Respondent 1, 2020 from Minute 03:22 until Minute 04:40.
[4] Ibid., 108-111.
[5] Ibid., 108.
[6] Ibid., 110.
[7] Deutscher Ethikrat (2016b), 110.
[8] Ibid., 110.
[9] Ibid., 111.
[10] Deutscher Ethikrat (2017).

better diagnosis, therapy and prevention; increasing efficiency and effectiveness; support for health-promoting behaviour) and risks (e. g. differing data quality, lack of transparency of data flows, loss of control over own personal data) of big data in health.[1] The Councils states in the opinion that even the General Data Protection Regulation (GDPR) of the European Union (2018) as well as the German data protection law is not sufficiently adjusted to big data.[2] According to the opinion, vulnerable groups such as young and elderly people as well as people with disabilities, particularly in the case of limited ability to give consent, require special protection.[3]

In March 2020, the German Ethics Council released its opinion **Robotics for Good Care**[4] in which the Council discusses opportunities and risks of the use of robots in care with the focus on elderly people and younger people with permanent and severe disabilities.[5] According to the Council, robots can contribute to improve both the life quality (regarding participation and independence including living longer at home) of those receiving care as well as the working conditions of caregivers.[6] However, robots should not replace interpersonal communications and relations.[7] Moreover, robots should not be used in care against the will of either people receiving care or giving care.[8] The application of robotic assistance, monitoring and support systems should not be merely determined by financial and organisational considerations such as efficiency of care, potential savings regarding costs and personnel. Rather, the needs and wishes of persons dependent on care must be considered and continuously reflected.[9] Furthermore, the use of robotics must not lead to cuts in resources and efforts in other areas of care such as improving care through, among other things, higher salaries and reducing the workloads of care personnel, which are necessary to improve the overall situation in care.[10] Ethical considerations must be taken into account at an early stage in the development of robotic systems. Furthermore, the perspective of affected persons, in particular people dependent on care, as well as nursing staff must be considered. For this reason, a participatory approach is recommended.[11]

In Germany there are quite a number of associations working with and for people with disabilities.[12] Some of the associations are cooperating and therefore have agreed on joint ethical principles as a basis for their work. One example is *Die **Fachverbände für***

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[1] Ibid., 111.
[2] Ibid., 128f.
[3] Ibid., 273f.
[4] Deutscher Ethikrat (2020a) and Deutscher Ethikrat/ Ethics Council (2020b).
[5] Deutscher Ethikrat/ Ethics Council (2020b), 10.
[6] Ibid., 44.
[7] Ibid., 19 and 51.
[8] Deutscher Ethikrat/ Ethics Council (2020b), 32f.
[9] Deutscher Ethikrat/ Ethics Council (2020b), 44 and 51.
[10] Deutscher Ethikrat/ Ethics Council (2020b), 46f and 50.
[11] Deutscher Ethikrat/ Ethics Council (2020b), 49.
[12] Some of these focus on people with dual sense impairment / deafblindness (see chapter 1.4).

Menschen mit Behinderung (*Professional Association for People with Disability*), which includes five professional associations[1] that, according to their website, represent 90 % of all services and facilities for people with disabilities in Germany.[2] The Professional Association for People with Disability describes their ethical principles as being dignity, self-acceptance, autonomy, diversity, mutuality, participation, societal change, encounter and assistance.[3]

Besides the German Ethics Council and associations working with persons with disabilities, state actors also deal with the ethical aspects of new technologies, in particular AI. The German Federal Government adopted its *Strategie Künstliche Intelligenz der Bundesregierung*[4] (*Artificial Intelligence Strategy*) in November 2018, thus setting the political framework for the further development and application of artificial intelligence in Germany. The strategy is based on the democratic claim that artificial intelligence, a technology that will affect the society profoundly, needs to be ethically, legally, culturally and institutionally embedded in such a way that basic societal values and individual fundamental rights remain protected. The Artificial Intelligence Strategy is part of the *Umsetzungsstrategie der Bundesregierung zur Gestaltung des digitalen Wandels*[5] (*Implementation strategy of the Federal Government for shaping the digital change*). The German government has identified 12 fields of action for the implementation of the AI Strategy. About 100 interdepartmental funding programmes, initiatives and cooperation have been started and others are planned.[6] One of these is the *Standardisation Roadmap on Artificial Intelligence*.[7] The Website *Lernende Systeme – Die Plattform für künstliche Intelligenz* (Learning Systems – the platform for Artificial Intelligence)[8] contains the AI map, which gives an interesting overview on the application of AI (projects) as well as research institutions in Germany.[9]

As knowledge and experience with artificial intelligence are still limited there still does not exist a good understanding of its chances and risks. Therefore, the German Federal Government has set up the *Datenethikkommission*[10] (*Data Ethics*

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[1] Bundesvereinigung Lebenshilfe e.V., Bundesverband anthroposophisches Sozialwesen e.V., Bundesverband evangelische Behindertenhilfe e.V., Caritas Behindertenhilfe und Psychiatrie e.V., Bundesverband für körper- und mehrfachbehinderte Menschen e.V.

[2] www.diefachverbaende.de/ accessed on 2nd of July 2020.

[3] www.diefachverbaende.de/ethische-grundaussagen.html accessed on 2nd of July 2020.

[4] Die Bundesregierung (2018).

[5] Die Bundesregierung (2019).

[6] https://www.ki-strategie-deutschland.de/home.html accessed on 2nd of July 2020.

[7] For more on this see Chapter 3 of this report on Regulation of New Technologies.

[8] https://www.plattform-lernende-systeme.de/ki-landkarte.html accessed on 2nd of July 2020.

[9] One project from this map is an interaction system developed by the Fraunhofer Institute for Applied Information Technology that opens up new communication possibilities for people with cerebral movement disorders who often cannot control their facial expressions and movements. https://www.fit.fraunhofer.de/de/fb/ucc/projects/abc.html accessed on 2nd of July 2020.

[10] www.bmi.bund.de/DE/themen/it-und-digitalpolitik/datenethikkommission/datenethikkommission-node.html accessed on 2nd of July 2020.

Commission), an independent and autonomous body of experts, with the task[1] of suggesting ethical standards and guidelines, concrete recommendations for measures for the protection of individuals and the social coexistence as well as the promotion of prosperity. Some of the guiding questions concerning artificial intelligence the Data Ethics Commission was supposed to answer seem particularly relevant in this context: Where are the ethical boundaries for the use of AI and robots, especially in fields like care and support and for particularly vulnerable groups (children, elderly, disabled people)? Who will be responsible for systems that fail to work properly? What responsibility is shared by the actors involved in development and use of AI systems such as programmers, data scientists or purchasers and operators of AI systems? What will be necessary in the long term to guarantee the freedoms and fundamental rights that are constitutive for our society? According to the key questions, special attention should be paid to vulnerable groups, including people with disabilities.[2] Recommendations include the ***ethics by design approach***, whereby ethical questions with regard to the particular user group is considered right from the start of a technology development and its related services.[3]

In October 2019, the committee submitted its final report[4] to the federal government. It proposes a **criticality pyramid**[5] and a **risk-adapted regulatory system**[6] for the use of algorithmic systems, including AI. Thereby, the probability of damage occurring and the severity of the damage to be feared are taken into account. With regard to the damage potential, five levels are thus distinguished, each of which requires specific regulatory measures (from level 1: no measures, via levels 2 to 4: with admission requirements, up to level 5: complete or partial prohibition of the algorithmic system). As the regulatory system is still at a theoretical stage, statements regarding the regulation of smart clothes for people with deaf-blindness cannot be made yet. Further political actions and an adoption of the regulatory framework are necessary. Our Interviewee 1 was of the opinion that smart clothing, depending on its concrete technical design, could range anywhere between level 2 and 5.[7]

Interviewee 2 was critical of the criticality pyramid because in her opinion it is difficult to define critical values for the five levels in algorithmic systems and to think about criteria or indicators for defining them. According to Interviewee 2, people with disabilities do not play a role in the current discussion about AI and should therefore be given more focus. Moreover, it is particularly difficult for people with disabilities to

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[1] Bundesministerium des Innern, für Bau und Heimat (BMI), and Bundesministerium der Justiz und für Verbraucherschutz (BMJV) (2018), 2.

[2] See Respondent 1, 2020 from Minute 06:20 until Minute 09:22.

[3] Examples here could be that entering cookie settings needs to be done only once per device. Respondent 1 mentions also a data trust system.

[4] Datenethikkommission der Bundesregierung (DEK) (2019).

[5] Ibid., 177.

[6] Ibid., 173ff.

[7] See Respondent 1, 2020 from Minute 17:56 until Minute 19:27.

defend themselves against discrimination caused by decisions of algorithmic systems. Nevertheless, interviewee 2 believes that the criticality pyramid is the right way to go because, among other things, it is easy to understand and therefore manageable. Nevertheless, she calls for very careful consideration and further development.[1]

Technologies are means by which certain purposes can be achieved. Our fundamental values (such as the preservation of democracy, justice, self-determination, protection of privacy, security and mental and physical integrity) and the resulting ethical standards for their assessment already exist in the Charter of Fundamental Rights of the European Union and in the German Constitution. They do not need to be reinvented but it must be ensured that they are also applicable to new technologies and to changing social realities. Wherever technologies encroach upon or endanger fundamental rights and freedoms, legal regulations are needed.[2] Interviewee 1 sees a significant potential for discrimination in AI, because people with disabilities are unlikely to be adequately included in the training data and thus not sufficiently considered later in the application of the system. For example, application evaluation software could discriminate against people with disabilities if this is not taken into account in the programming.[3] Even so, the use of body cameras with face recognition is currently a highly discussed topic.[4] Interviewee 1 believes that in the future, for people with deafblindness because of their particular situation, special regulations could be developed which allow them to make use of body cameras with face recognition.[5]

5. Disabled People's Access to Information

Various sources of information on the topic of new technologies and persons with a disability can be accessed in Germany. Information provision is available from the Federal Government, from NGOs, from the private sector and via the media. Large sections of this information are offered in a web-based manner in the form of information systems. The available information systems, presented below, provide a simple opportunity to carry out extensive research into new technologies for disabled persons. Access to information is more or less easily possible depending on the design of the website and on the nature of the disability of the interested party. Interviewee 2 pointed out that many disabled persons (particularly those with a visual impairment or autism) are very open to the use of digital technologies or media and therefore it is helpful for many disabled persons to be able to access web-based information.

Various ways which make it possible for persons with a disability to find information on new technologies are explored below.

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[1] See Respondent 2, 2020.
[2] See Respondent 1, 2020.
[3] See Respondent 1, 2020.
[4] See Respondent 1, 2020.
[5] See Respondent 1, 2020.

Persons with a disability in Germany are able to obtain guidance on issues relating to participation. Independent advisory centres were introduced under the auspices of the **Federal Participation Act (BTHG)** in order to facilitate easy access to an appropriate point of contact for persons with a disability or health condition. Wherever possible, the advisors deployed are also persons who are affected by disability (so-called peer counselling). Their own experience enables them to impart important information[1]. The **Supplementary Independent Participation Guidance Agency (EUTB)** runs 500 guidance centres offering free advice to persons with or without a disability who require support in order to be able to participate in society.[2]

The **Rehadat Information System**, which is presented in Chapter 6, is probably the most extensive online tool providing information on new technologies for disabled persons.[3] The "**Statutory Health Insurance System's Index of Medical Aids and Equipment**" can also be used to search for technologies to assist disabled persons in Germany.[4] Although this index contains a listing of all aids and items of equipment which are funded by German statutory health insurance companies, the focus is on more established technologies rather than on the latest developments. More detailed information is provided in Chapter 6.

Trade fairs offering information on new technologies for persons with a disability are hosted in Germany on a regular basis. The **REHACARE International** is a specialist fair which centres on the topics of rehabilitation, nursing, prevention and inclusion.[5] It has been providing an overview of the technical aids and equipment available to people with disabilities for over 40 years. Both simple products and complex systems are showcased. The fair offers both specialist information and a space in which professional networking can take place.

REHAB is another of Germany's largest and most significant trade fairs in the areas of rehabilitation, treatment, long-term care and inclusion. It has been in existence since 1980 and presents the latest trends in rehabilitation technology as well as innovations produced by the medical aids industry[6]. Joint workshops involving therapists, specialist retailers and professional long-term care staff provide information on the supply of medical aids and equipment and encourage interdisciplinary networking.

NGOs operating in Germany also continue to provide information on technologies for persons with a disability. **Aktion Mensch** is a social organisation and NGO which is involved in the provision of assistance for people with disabilities. It finances itself from

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[1] https://www.betanet.de/unabhaengige-teilhabeberatung.html accessed on 2nd of July 2020.
[2] www.teilhabeberatung.de accessed on 2nd of July 2020.
[3] https://www.rehadat-hilfsmittel.de/de/informationen/ueber-uns/ accessed on 2nd of July 2020.
[4] https://www.gkvspitzenverband.de/krankenversicherung/hilfsmittel/hilfsmittelverzeichnis/hilfsmittelverzeichnis.jsp accessed on 2nd of July 2020.
[5] https://www.rehacare.de/ accessed on 2nd of July 2020.
[6] https://www.rehab-karlsruhe.com/de/rehab/die-fachmesse/ accessed on 2nd of July 2020.

the revenues it gains by running Germany's largest charity lottery.[1] Aktion Mensch ("Mensch" means "human") regularly publishes information which is of relevance to people with disabilities. Every year in particular, it joins forces with the Handelsblatt Research Institute to draw up the "Inclusion Barometer", which monitors the progress or regression of inclusion in the world of work and observes developments on a long-term basis.[2] The barometer acts as an instrument for the measurement of the advancements being made with regard to inclusion on the German labour market of persons with a disability. A campaign film on new technologies for people with disabilities produced by Aktion Mensch in 2016 succeeded in attracting an audience of millions.[3] [4]

For people with deafblindness, there is furthermore the possibility to obtain information through deafblind assistants (Respondent 3). The **German Blind and Visually Impaired Association**, which develops the qualification profile for deafblind assistants, also publishes the **magazine "taubblind"** for deafblind and hearing impaired people, which also reports on technical aids.

In addition to the information possibilities for people with disabilities, the question arises as to how these are used in practice. With regard to the use of media by people with disabilities, a survey that examined general media use and television use was conducted for the first time in 2016 in Germany.[5] Television was reported to be the most frequently used medium overall, but people with visual impairments rarely used daily newspapers, Internet and television. Although the focus of the study was on the media use of people with disabilities, it did not discuss new technologies or how people with disabilities inform themselves about these. Nevertheless, the barriers to media use identified seem likely to be relevant when people with disabilities want to learn about new technologies.

6. Disabled People's Access to Equipment

The following section looks at access to aids and equipment for persons with a disability whilst placing a particular focus on deafblindness.

Germany has a whole series of stakeholders who are involved in the financing of aids and equipment (so-called rehabilitation providers). These include pension insurance providers, the Federal Employment Agency, the statutory accident insurance companies, the integration offices and health insurance companies.[6] This is a complex

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[1] https://www.aktion-mensch.de/ accessed on 2nd of July 2020.
[2] https://www.aktion-mensch.de/inklusion/arbeit/inklusionsbarometer.html accessed on 31th March 2020.
[3] https://www.leadacademy.de/2016/diepreistraeger.html accessed on 2nd of July 2020.
[4] https://www.youtube.com/watch?v=NJbAjxkaxnA accessed on 2nd of July 2020.
[5] Bosse, I. and Hasebrink, U. (2016).
[6] https://www.rehadat-literatur.de/de/rehabilitation-und-teilhabe/rehabilitationstraeger/ accessed on 2nd of July 2020.

system, and overlaps and areas of uncertainty in respect of the fields of responsibility of the various stakeholders remain to the present day.[1] The stakeholders involved have come together to form the **Bundesgemeinschaft für Rehabilitation** (*National Rehabilitation Alliance*), which aims to bring about improvements in this situation. On 11 December 2019, an administrative agreement was concluded in respect of the provision of supplementary support services in working life pursuant to German Social Security Code (SGB) Volume IX Part 3 in relation to the participation in working life benefits available in accordance with Part 1 of German Social Security Code (SGB) Volume IX.[2] This agreement states that it is primarily incumbent upon the health insurance companies pursuant to § 33 German Social Security Code (SGB) Volume V to provide equipment required for the exercising of an occupational activity.[3]

The **Spitzenverband Bund der Krankenkassen / GKV-Spitzenverband** (*National Association of Statutory Health Insurance Funds*) also acts as the umbrella organisation for long-term care insurance providers. In its capacity as an entity under public law, it is responsible for the self-administration of the statutory health insurance companies. Pursuant to § 139 German Social Security Code (SGB) Volume V, the National Association of Statutory Health Insurance Funds is required to draw up an **Index of Medical Aids and Equipment** and an *Index of Long-Term Care Aids* containing the items which the insurance providers are required to fund.[4] The GKV's Index of Medical Aids and Equipment also includes technologies that can be used by persons with a visual and hearing impairment. Framework recommendations are in place relating to the implementation of the supply of equipment (e.g. for the purpose of simplification and standardisation of the organisation and billing of supply of equipment in accordance with § 127 Section 9 German Social Security Code (SGB) Volume V or in order to secure quality in the supply of equipment pursuant to § 127 Paragraph 5b German Social Security Code (SGB) Volume V). The statutory health insurance companies investigate the necessity and cost-effectiveness of equipment prior to agreeing to funding. Any additional expense incurred must be borne by the insured persons themselves.[5] Children of school age receive funding for Braille printers and stencils as part of general education provision.[6] For employed, severely disabled persons the employer is responsible for equipping their workplace according to their disability. Insofar as reasonable, employers also bear the costs of modifications to buildings to take the needs of disabled persons into account and the costs of devices

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[1] Bundesarbeitsgemeinschaft für Rehabilitation e. V. (BAR) (2020), 5.
[2] Ibid.
[3] Ibid., 12.
[4] https://hilfsmittel.gkv-spitzenverband.de/HimiWeb/home.action accessed on 2nd of July 2020.
[5] https://www.rehadat-gkv.de/info/index.html?pgnr=7&pginfo=true accessed on 2nd of July 2020.
[6] Ibid.

and machines. Employers receive financial support from e. g. employment agencies, the integration offices and other rehabilitation providers.[1]

The homepage of **REHADAT**[2] includes the **REHADAT Equipment Portal**, which can be used to research the items that are available to persons with disabilities. The assignment of aids to categories is based on the international classification of *Aids for Persons with Disability — Classification and Terminology (ISO 9999).*[3] The portal offers current and manufacturer-independent information. The REHADAT homepage consists of 14 interlinked portals relating to inclusion and occupational participation for persons with a disability. Information on literature, research, legal information as well as workshops and continuing education and training are provided. REHADAT is operated by the *German Institute for Business Research* in Cologne and is funded by the *Federal Ministry of Labour and Social Affairs.*[4]

Counselling centres[5] play a crucial role in the imparting of information about existing aids and equipment and in terms of providing support for applying for specific benefits.[6] Account needs to be taken of the fact that the group of persons with a visual and hearing impairment or deafblindness is highly heterogeneous. For example, the circumstance of whether the persons affected were deaf and blind at birth or whether one or both of these senses became impaired in later life as the result of illness or an accident makes a difference in terms of the possible equipment that can be used. In the case of a later onset of the disability, speaking and reading could possibly be learned beforehand and thus also facilitate the learning of special forms of communication such as Braille, Lorm alphabet etc. and thus possibly make the use of aids such as Braille possible or facilitate it. The degree of severity of both sensory impairments also continues to determine which equipment is required. Persons with residual sight may be able to use magnification software to read computer screens in some cases. This option is no longer open to persons who have become completely blind. Braille terminals are a possible aid for the latter group.

The publication "*Deafblindness as a distinct disability – expert assessment of the special needs of deafblind persons with regard to participation in society*"[7] (2010), which was produced by the *Joint Committee for the Hearing and Visually Impaired and the Deafblind* (GFTB) describes a number of specific cases and also addresses aspects such as the aids and equipment used by the persons concerned. This report makes it clear that completely different types of equipment are useful depending on

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[1] https://www.bmas.de/DE/Themen/Teilhabe-Inklusion/Politik-fuer-behinderte-Menschen/sgb-ix-leistungen.html accessed on 2nd of July 2020.
[2] www.rehadat.de accessed on 2nd of July 2020.
[3] https://www.rehadat-hilfsmittel.de/de/iso-klassifikation/ accessed on 2nd of July 2020.
[4] https://www.rehadat-hilfsmittel.de/de/informationen/ueber-uns/ accessed on 2nd of July 2020.
[5] For a list of counselling centres see www.dbsv.org/beratungsstellen.html accessed on 2nd of July 2020.
[6] GFTB (2010).
[7] Ibid.

the concrete situation. It also states that the persons concerned are frequently unaware of existing aids. The publication further points out that public funding is not provided for all items that would be helpful with regard to achieving participation in society and in working life and that the application process may in some cases extend over a period of several month or even years.[1] Respondent 3 reported that health insurances frequently decline to fund Braille displays. These notifications must be contested by the affected person, which requires assistance and extends the process. Furthermore, not only the Braille display needs funding but also a training that enables to handle it.[2] Respondent 3 estimates that about 70 % of the deafblind / hearing and visually impaired do not have aids and equipment's that are already on the market that would help them.[3]

According to Respondent 3, self-help associations provide information on aids and equipment. For example, DBSV publishes 6 times a year a magazine for people with deafblindness that also contains information on aids and equipment.[4] Companies producing aids and equipment also provide information on their products for people with deafblindness through newsletters. The problem here is that in order to access this information people concerned need to know about self-help associations and companies. Access to this kind of information can be problematic for people whose deafblindness occurred just recently, people who develop deafblindness in older age or people with multiple disabilities, especially if intellectual disabilities are involved.[5] For newly affected people counselling centres are a very important source of information. According to Respondent 3, the annual fair Sightcity in Frankfurt[6] is a very important source of information for the blind and visually impaired community. New products will not only be presented on the fair but also through podcasts and articles.

In Germany, a distinction is made between aids for (mainly) private use[7] and aids for professional use[8]. However, some authors do not consider this distinction to be meaningful.[9] The complex German system of rehabilitation providers has already been mentioned. Which institution is responsible depends on a number of factors, e.g. whether the disability is the result of an accident (in which case accident insurance may be eligible for funding), but also on how old the person concerned is (up to the age of 27, public youth welfare institutions are eligible; after retirement age, persons concerned no longer have the possibility of claiming aids for professional use). In

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[1] Ibid., 8.
[2] Respondent 3 2020, from minute 13:40 until minute 15:28.
[3] Respondent 3 2020, from minute 17:32 until minute 21:12.
[4] https://www.dbsv.org/dbsv-zeitschriften.html accessed on 2nd of July 2020;
https://www.dbsv.org/zeitschrift-taubblind.html accessed on 2nd of July 2020.
[5] Respondent 3 2020, from minute 8:18 until minute 13:22.
[6] http://www.sightcity.net/ accessed on 2nd of July 2020.
[7] https://www.rehadat-hilfsmittel.de/de/ablauf-finanzierung/hilfsmittel-fuer-private-nutzung/ accessed on 2nd of July 2020.
[8] https://www.rehadat-hilfsmittel.de/de/ablauf-finanzierung/hilfsmittel-fuer-den-beruf/vorgehen/ accessed on 2nd of July 2020.
[9] Haralampidis, T. F. (2019), 16.

addition, the individual insurance periods (less than 15 years of employment subject to social insurance contributions is the responsibility of the employment agencies and more than 15 years of employment isubject to social insurance contributions is the responsibility of pension insurance funds) also determine which rehabilitation provider is responsible. Finally, it also depends on where you live (different responsibilities in the federal states and municipalities) and the severity of the disability (severely disabled persons and persons with equivalent disabilities can make use of the services of the integration or inclusion offices).

Aids for private use are usually financed by the statutory health insurance (§ 33 SGB V). This requires a prescription from a doctor and a cost estimate from the service provider, such as a medical supply store or an orthopaedic shoemaker.

An application for occupational assistive devices may be made by the person concerned or his/ her employer. External counselling and job evaluation can take place before the application is made. Professional aids can be financed via "benefits for participation in working life" (§ 49 and 50 SGB IX) by rehabilitation agencies such as employment agencies, job centres, pension insurance companies, accident insurance companies, youth welfare organisations (§ 86 and § 35a SGB VIII) or integration assistance agencies (depending on the federal state, these may be e.g. cities or regional associations; § 111 SGB IX). Subordinate financing of professional aids is also possible via the supplementary services of the integration or inclusion offices within the framework of "accompanying assistance in working life" (§ 185 SGB IX, in conjunction with § 19 and § 26 SchwbAV) for people with recognised severe disabilities or equal opportunities.

Theoretically, a Braille display can be applied for as an aid for private use (for example for school age children and youth) as well as an aid for professional use (if required in workplace), provided it is appropriate to the individual's situation. According to the experts we interviewed, it is often easier to obtain certain aids for professional use. The professional activity seems to have a higher significance in Germany. Accordingly, people who have reached retirement age are no longer entitled to receive funding for professional aids. If the disability occurs later, access to assistive devices is therefore more difficult.[1]

Deafblind persons are entitled to receive *deafblind assistance*, in the form of a person who provides everyday support with communications and mobility (e.g. shopping, telephone calls, dealing with government authorities, doctor's visits).[2] The public sector

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[1] Respondent 3 2020.

[2] Further information on deafblind assistance is provided in Chapter 1.3. The GFTB has drawn up a training profile for deafblind assistants: https://www.dbsv.org/gftb-qualifikationsprofil-fuer-taubblindenassistentinnen-und-assistenten.html accessed on 2nd of July 2020. Currently, DBSV / GFTB are discussing with the responsible ministry (BMAS) on how to develop this training further and how to improve the funding of deafblind assistances (Respondent 3 2020, from minute 3:37 until minute 4:21).

should bear the costs of the deafblind assistance.[1] Persons affected are also frequently reliant on receiving *household assistance*: people who perform everyday tasks such as cleaning, cooking and laundry. *Assistance dogs* constitute a further aid (see *Index of Medical Aids and Equipment* § 139 German Social Security Code (SGB) Volume V)[2] to support blind and deafblind persons with their mobility.[3] *Work assistance* supports people with deafblindness in their professional activities. However, this is used sporadically.[4]

In addition to government support, there are also offers from non-state actors. Some of the counselling centres are non-governmental organisations whose work is of great importance for the target group concerned. Finally, there are also *self-help groups* and *associations* that support people with deafblindness, e.g. in their leisure activities or through counselling. In addition to state support, those affected receive help through *voluntary work by private individuals*, e.g. in the household or in leisure activities. In the course of our research, however, it also became clear that if the public authorities do not cover the costs of aids and assistance, those affected and their families may finance this privately.

Three technical items of equipment aimed at the target group and listed in **REHADAT** are presented below– the **feelSpace naviGürtel®**, the **Victor Reader Trek** and the **Smartstick**. It is not possible to make any statements regarding how widely disseminated the use of these items of equipment is, nor can any information be provided as to in which cases public funding of costs is available. This topic is addressed in a publication produced by *Stiftung taubblind leben* in 2015.[5] 57 persons

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[1] Gemeinsamer Fachausschuss hörsehbehindert / taubblind (GFTB) (2010), 10.
https://www.gesellschaft-taubblindheit.de/assistenzvermittlung accessed on 2nd of July 2020.
[2] https://hilfsmittel.gkv-spitzenverband.de/HimiWeb/produktartAnzeigen_input.action?artId=8714
accessed on 2nd of July 2020.
[3] No recognised curriculum and no independent certification for the training of guide dog trainers has yet existed in Europe. A project entitled Collaborative Best Practice Collection in Preparation of a European Curriculum and Certification for Assistance Dog Trainers/Instructors, with Special Emphasis on Enabling Job Entry for People with Disabilities, which is funded within the scope of Erasmus + Strategic Partnerships in Education and Training and is coordinated in Germany by the Alliance for Assistance Dogs (Allianz für Assistenzhunde - Pfotenpiloten e. V.), is now being implemented together with partners across a whole range of European countries and aims to close this gap. The plan is that the not-for-profit organisation L.E.A.D. – Lifelong Education for Assistance Dog Professionals – will provide a teaching programme (open resource) from 2023/2024 and will also make independent testing and certification available https://www.pfotenpiloten.org/leadcert accessed on 2nd of July 2020.
[4] The work assistance can be financed through various institutions. If financing through the rehabilitation providers is possible, it is limited to a period of 3 years. An unlimited financing of the work assistance is only possible via the integration or inclusion offices and is therefore only available to a subgroup, namely severely disabled persons and those of equal status. The integration offices can only access limited funds from the equalization levy. According to Maren Giese, the restriction of the possibilities of work assistance by the financial power of the integration offices runs counter to the intention of the legislator and is also to be seen critically with regard to the UN CRPD. (Giese, M. (2014), 3-5).
[5] Stiftung Taubblind Leben (2015).

with a hearing and visual impairment were asked about the equipment they used. The survey showed that around half of respondents did not possess any aids. The item of equipment most likely to be used was a long stick (37 percent). This was followed by magnification or reading software (18 percent).[1] Respondent 3 explained that the most important aid for orientation is the long stick and that there are usually no difficulties in receiving funding for this. There might rather be difficulties in receiving the outdoor mobility training for this. However, for people who are deaf and blind the long stick is not sufficient.[2] Respondent 3 describes this as follows:

And if the hearing and vision impairment has progressed so far that one is restricted in mobility outside, there are no aids available yet to compensate for this. If you think of crossing the road, for example, that is of course the main danger, there are already traffic lights with vibrating signals. There is also an app that can detect the traffic light. That means you can somehow tell when it is green. But other unpredictable factors like an ambulance coming are of course not included. That means, even for the traffic situation, which is actually safe, there is still a residual risk (...).[3]

The **feelSpace naviGürtel®** is a belt-like device which produces vibrations to show persons who are severely visually impaired or blind the direction in which they should walk. The belt is connected with a smart phone via Bluetooth. Destinations can be entered into a route planner (feelSpace App). The feelSpace naviGürtel® is manufactured and distributed by the *feelSpace GmbH InnovationsCentrum* in Osnabrück.[4] The *German Federation of the Blind and Partially Sighted* and *feelSpace GmbH InnovationsCentrum* are running a joint project where people with deafblindness are testing the naviGürtel. The company now wants to make the feelSpace App accessible for Braille, including mobile Braille, connected to the mobile phone via Bluetooth. This way also people with deafblindness could use the belt independently for navigation. According to Respondent 3, health insurance companies should be responsible for funding this type of equipment, as they obviously are an aid for blind and deafblind people. Nevertheless, Respondent 3 believes that in reality it will not be easy: health insurances will decline funding, which then must be contested by affected persons.[5] The **Victor Reader Trek** combines a DAISY player (DAISY stands for Digital Accessible Information System) with a GPS navigation system. The DAISY player enables users to listen to DAISY audio books, which have been specially developed for persons with a visual impairment / deafblindness. The format of these audio books

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[1] Stiftung Taubblind Leben (2015), 17. More information on the study is provided in Chapter 1.2.
[2] Respondent 3 2020.
[3] Respondent 3 2020.
[4] https://www.rehadat-hilfsmittel.de/de/produkte/?infobox=/infobox1.html&serviceCounter=1&wsdb=TEC&connectdb=hilfsmittel_detail&referenznr=Hil132493&from=1&detailCounter=0&search=global accessed 2nd of July 2020; https://www.feelspace.de/ sales information accessed on 2nd of July 2020.
[5] Respondent 3 2020.

has been enhanced to meet the needs of this particular target group. There are, for example, navigation functions that allow listeners to jump from chapter to chapter, from page to page or even from sentence to sentence. Voice speed can be varied too. Audio notes can also be recorded using a microphone.[1] The costs of this device may be funded by the statutory health insurance company if the insured person is in possession of the cognitive capacity necessary to use it and is able to demonstrate why a reading system is not sufficient for his or her needs.[2] The navigation system is, for example, able to show users their current position. It can also give instructions and directions if they are on a pre-defined route. The device is iBeacon-ready (software update required) and aligned to the European satellite system Galileo. The product is manufactured by the company HumanWare and distributed by **PABS Hilfsmittel für Blinde und Sehbehinderte**.[3]

The **Smartstick** is a walking stick with an integrated position tracking system within Europe via GPS. The stick is equipped with a GSM modem, a GPS aerial and a Deutsche Telekom SIM card. It is distributed by the company Ossenberg GmbH.[4]

The following addresses research projects, which are developing various aids and equipment of relevance to the target group.

The **Lorm Glove**[5] project is being conducted at the *Design Research Lab* of the Berlin University of the Arts. It is consulting with persons primarily and indirectly affected to develop a glove that can be used as a mobile device to enable deafblind people to communicate remotely. This was previously only possible by using a mediator. The Lorm Glove is able to receive texts, which it then conveys via vibrations in the palm of the hand. Likewise, it can also convert touches to the palm into spoken or written text and then send them as messages. The Lorm Glove has progressed from its original form since initial prototyping and now features a contact area, which can be fastened onto the hand. Development is not yet complete. The "glove" is connected with a smart phone via Bluetooth and thus makes it possible to operate the smart phone. Another product under development is the **Lorm Hand**. This comprises a stationary hand-shaped sculpture on which users can place their hand. The device is currently only

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[1] https://www.rehadat-hilfsmittel.de/de/produkte/mobilitaet-orientierung/orientierungshilfen-blindenstoecke/akustische-taktile-visuelle-elektronische-orientierungshilfen/?infobox=/infobox1.html&serviceCounter=1&wsdb=TEC&connectdb=hilfsmittel_detail&referenznr=Hil132945&from=1&anzahl=26&detailCounter=25&suche=index.html?iso_nr=12+39+06+oder+12+39+09+oder+12+39+18+oder+12+39+21 accessed on 2nd of July 2020.

[2] https://hilfsmittel.gkv-spitzenverband.de/HimiWeb/produktartAnzeigen_input.action?artId=8706 accessed on 2nd of July 2020.

[3] http://www.pabs-online.de/daisy2.htm accessed on 2nd of July 2020.

[4] https://www.rehadat-hilfsmittel.de/de/produkte/mobilitaet-orientierung/gehhilfen/gehstoecke/?infobox=/infobox1.html&serviceCounter=1&wsdb=TEC&connectdb=hilfsmittel_detail&referenznr=Hil133738&from=1&anzahl=63&detailCounter=46&suche=index.html?iso_nr=12+03+03+oder+12+03+16+oder+12+03+18 accessed 2nd of July 2020; https://www.ossenberg-smartstick.de/der-handstock/ accessed 2nd of July 2020.

[5] https://www.inklusionslandkarte.de/IKL/Projekt_Vollansicht/vollansicht_node.html?cms_idNewInclusion=544 accessed on 2nd of July 2020.

capable of writing and sending messages and is linked to various social network sites. Work is continuing with the aim of making receipt of texts possible in the near future.[1]

Work is ongoing to develop a **smart walking stick for the blind** within the scope of a project entitled *Selbstständige Mobilität blinder und sehbehinderter Menschen im urbanen Raum durch audio-taktile Navigation - **TERRAIN*** (*Independent mobility for blind and visually impaired persons in urban spaces via audio-tactile navigation*). The environment is analysed with the help of a camera and image processing. Digital map data is also used for navigation. This information is passed onto the user via acoustic and tactile signals with a view to facilitate autonomous mobility in urban areas. The human-machine interfaces of the TERRAIN system should be adaptable to the individual situation of the person concerned. This adaptability will allow the system to be attuned to any changes in the health of the user. A further objective is to integrate an innovative and mobile Braille terminal.

A system known as **CamRead** uses a camera and a joystick to stream print media and documents in enlarged and more legible form to any output device.[2] This means that some degree of residual sight is needed in order to use this particular technology.

RUFUS is an autonomous robot and running trainer that can also be used by blind and visually impaired people. RUFUS was developed at the University of Applied Sciences Bonn-Rhein-Sieg. While RUFUS is responsible for the sporting needs of its customers, the Finnish company GIM is also developing a robotic guide dog in the **ROBLIN** project, which shows its owner the way even in busy city centres.[3]

In overall terms, the summary presented in this chapter shows that persons with deafblindness already have access to a multitude of technical aids and items of equipment. The numerous research and development projects indicate that work on further technical solutions aimed at providing this target group with improved participation opportunities is ongoing. Even so, there are examples of communication between companies developing equipment and affected people like the *Joint Technical Committee for Information and Telecommunications Systems* of the *German Federation of the Blind and Partially Sighted*.[4] Predominantly, equipment is developed without the involvement of future users.[5] Those developing the products are not usually

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[1] https://www.rehacare.de/de/Archiv/Themen_des_Monats/Themen_des_Monats_2015/Oktober_2015_Praktische_Alltagshelfer/Mit_dem_Lorm_Glove_erhalten_taubblinde_Menschen_einen_unabhängigen_Zugang_zu_Informationen accessed on 2nd of July 2020.

[2] https://el4.org/camread/ accessed on 2nd of July 2020.

[3] https://www.h-brs.de/de/inf/news/der-roboter-als-lauftrainer-fuer-sehbehinderte accessed on 2nd of July 2020.

[4] The voluntary members of the technical committee advise manufacturers of information and telecommunication systems and publish recommendations on various topics. They also draw attention to deficits and the threat of exclusion through new technologies. https://www.dbsv.org/gemeinsamer-fachausschuss-fuer-informations-und-telekommunikationssysteme-fit.html accessed on 2nd of July 2020.

[5] Respondent 3 believes that people with deafblindness are less involved in the development of equipment as for example people with blindness because the communication with them is more difficult as it required more time and a budget for e.g. interpreters (Respondent 3 2020).

affected by deafblindness themselves. This means that they are not fully able to understand and empathise with the wishes and needs of the target group. As a consequence, prototypes are being developed that subsequently need to be adapted in order to meet special requirements. This process is in turn associated with a high level of cost. All of this is exacerbated by the fact that such items are niche products, which do not have a large sales market anyway. When new types of assistive technologies possibly deploying artificial intelligence are involved then there is the additional issue of the need for legal regulation in respect of aspects such as the use of cameras. Chapter 4 of the present report addresses this problem in greater detail. The ultimate outcome may be that prototypes are not pursued to the point of market maturity. This is a regrettable state of affairs because products and technologies, which have been well adapted to the requirements of users, are able to make a significant contribution towards improving participation and can thus have an impact on quality of life.[1]

7. Accessibility measures in the built environment

For people with disabilities and in particular for people with deafblindness, accessibility is of great importance. Article 9 of the UN CRDP obliges state parties to provide persons with disabilities with barrier-free access to the physical environment, to public facilities and services and to information and communication, including the necessary information and communication technologies. Barrier-free means that people with disabilities are able to access all this without assistance or special impediment. According to the ***Bundesfachstelle Barrierefreiheit*[2]** (*Federal Agency for Accessibility*), accessibility is about designing the living environment in such a way that it can be used equally by all people and excludes no one (*universal design*). Concerning people with deafblindness, the requirements for accessibility are obviously difficult to reach. In most cases, people with deafblindness do not move around on their own outside their homes. Even at home, they may need household assistance (see chapter 5 of this report). Therefore, it makes sense to look at accessibility at home (smart homes) and outside (public places, buildings, services and transport). Also if one looks at Article 19 of the UN CRDP, which deals with the independent living of

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[1] See respondent 2 2020.

[2] In Germany, *the Bundesfachstelle Barrierefreiheit* (*Federal Agency for Accessibility*) is the central agency that collects knowledge on the topic of accessibility and makes it available to the public. The Agency advises above all those institutions in Germany that are obliged to provide accessibility under the Equal Opportunities for Disabled Persons Act. For example, the agency helps to improve accessibility in public administration, both in terms of structural access and barrier-free information and communication. In doing so, it works in a participatory manner and across all disabilities. For more information see https://www.bundesfachstelle-barrierefreiheit.de/DE/Ueber-Uns/ueber-uns_node.html;jsessionid=BB4A3CD9E81B6B3B17436526F66D3CC2 accessed on 2nd of July 2020; https://www.bundesfachstelle-barrierefreiheit.de/DE/Ueber-Uns/Wer-wir-sind/wer-wir-sind_node.html accessed on 2nd of July 2020.

people with disabilities and their inclusion in the community it becomes clear that it is about self-determined housing and living in an inclusive social space.

This chapter focusses on accessibility of the built environment. First, it looks at two studies on physical buildings and transportation on the housing preferences of people with blindness and deafblindness. In the second part of this chapter smart cities and smart homes are considered and additional interesting projects are described.

The **GKV-Spitzenverband** (*association of statutory health insurances*) funded the **project "*Innovative forms of housing for deaf and deaf-blind people in need of care and assistance - A multidimensional participatory research approach to the development of culturally sensitive housing models*"**.[1] As part of the project, a quantitative study was conducted and people deafness and deafblindness were interviewed about their housing preferences.[2] With regard to housing preferences, the following was observed: The respondents with deafness and deafblindness were most likely to wish to be cared for or looked after at home, provided that the care service could communicate with them (37 per cent of the respondents with deafness; 56 per cent of the respondents with deafblindness).[3] If caregivers could not communicate with respondents when providing care at home, significantly fewer respondents wished to live and be cared for at home (18 percent of deaf people; 25 percent of the deafblind respondents). Instead, they would prefer to live in a care home for people with disabilities where caregivers and doctors could communicate with them (preferred by 56 percent of deaf and 60 percent of the deafblind respondents).[4] If family and friends were no longer there, only 20 percent of the deaf and 34 percent of the deafblind respondents wanted to be cared for at home. In this case, 59 percent of the deaf and 47 percent of the deafblind participants preferred to live in an home with other deaf or deafblind people.[5]

Various national reports discuss accessible housing. One of these is the ***Zweiter Teilhabebericht der Bundesregierung über die Lebenslagen von Menschen mit Beeinträchtigungen Teilhabe – Beeinträchtigung – Behinderung***[6] (*Second Federal Government Report on Participation with regard to the circumstances of persons with impairments. Participation – Impairment – Disability*) commissioned by the *Federal Ministry of Labour and Social Affairs*.[7] According to the report, nationwide surveys on the accessibility status of households of people with impairments do not exist. In order to live at home with an impairment or a disability, the home itself and also the nearby surroundings need to be barrier-free and access to basic supplies e. g.

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[1] Glatz, A. and Zelle, U. (2017).

[2] Out of 1087 participants, 67 were deafblind and 1020 blind.

[3] Ibid., p.37.

[4] Ibid.

[5] Ibid., p.38.

[6] Bundesministerium für Arbeit und Soziales (BMAS) (2016a).

[7] For construction and housing see chapter 4.1 (pp.256) and for accessibility see chapter 4.2 (pp.267).

health services and shopping must be possible. However, studies on age-appropriate housing show a deficit of barrier-free buildings in Germany.[1] Different types of assisted living (i.e. a residence for people with disabilities or living at home with assistance in a private apartment) are discussed in the report. Living with assistance is on trend with figures rising over the past year. Particularly, younger people prefer to be more self-determined.[2] Concerning accessibility, Article 9 of the UN CRPD, on Accessibility, public space, mobility, information & communication are discussed in the report. According to the German Railway, 76 % of the German train stations are barrier-free and 50 % of the train tracks are equipped with a tactile guidance system embedded in the floor. Braille on the stair railings and tactile site plans exist only in few train stations.[3]

The ***Nationaler Aktionsplan 2.0 - „Unser Weg in eine inklusive Gesellschaft"[4]*** (*National Action Plan 2.0 - Our path to an inclusive society*) of the German Federal Government for the implementation of the UN CRPD contains chapters on construction and housing as well as mobility.[5] For both fields measures are described that are undertaken to implement the targets of the UN CRPD. Concerning accessibility, these include a KfW[6] funding programme for age-appropriate conversion of houses[7], social housing promotion by the German states and implementation of the pilot project vario apartments (small modular units, which can be first used be students and later changed to age-appropriate living).

The UN CRPD does not discuss the specific context of smart cities and the digital transformation of city development for people with disabilities. However, the UN CRPD includes the right to technology in Article 9: Accessibility and in many other articles[8] and smart cities could be seen as a means through which rights are realised. Respondent 3 stated that people with disabilities and their organisations should become more involved in smart city initiatives and help shaping them in their interests.[9]

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[1] Ibid., p.259.

[2] Ibid., p.Bundesministerium für Arbeit und Soziales (BMAS) (2016a)Bundesministerium für Arbeit und Soziales (BMAS) (2016a)Bundesministerium für Arbeit und Soziales (BMAS) (2016a)Bundesministerium für Arbeit und Soziales (BMAS) (2016a)Bundesministerium für Arbeit und Soziales (BMAS) (2016a)Bundesministerium für Arbeit und Soziales (BMAS) (2016a)Bundesministerium für Arbeit und Soziales (BMAS) (2016a)Bundesministerium für Arbeit und Soziales (BMAS) (2016a)Bundesministerium für Arbeit und Soziales (BMAS) (2016a)Bundesministerium für Arbeit und Soziales (BMAS) (2016a)Bundesministerium für Arbeit und Soziales (BMAS) (2016a)260.

[3] Ibid., p.269.

[4] Bundesministerium für Arbeit und Soziales (BMAS) (2016b).

[5] Ibid. For construction and housing see chapter 3.7 (pp.116) and for mobility see chapter 3.8 (pp.130).

[6] Kreditanstalt für Wiederaufbau (KfW); https://www.kfw.de/kfw.de.html accessed on 2nd of July 2020.

[7] https://www.kfw.de/inlandsfoerderung/Privatpersonen/Bestandsimmobilien/Finanzierungsangebote/Altersgerecht-umbauen-(159)/index-2.html accessed on 2nd of July 2020; https://www.kfw.de/inlandsfoerderung/Privatpersonen/Bestandsimmobilie/Förderprodukte/Altersgerecht-Umbauen-Investitionszuschuss-(455)/ accessed on 2nd of July 2020.

[8] see also Articles 4, 20, 21, 24, 26, 27, 29 and 32.

[9] Respondent 3 2020, from 1 hour and 01:02 minutes until 1 hour and 02:45 minutes.

In this section, the *Smart City Charta* and the *German Standardization Roadmap Smart Cities,* **as well as** other **relevant projects and programmes** will be described, with a focus on accessibility measures in the built environment for people with disabilities.

The *Smart City Charta*[1] was developed in 2016 by the Dialogue Platform Smart Cities consisting of 70 experts from communities and cities, federal government departments, departments of the German states responsible for city development, scientists, civil society representatives as well as experts from economic and social associations. It appears that no representatives of people with disabilities participated in this dialogue process.[2] The overall goal of the Smart City Charta is to use and shape the digital transformation in such a way that city planning and development is sustainable, citizens as well as economy and politicians are involved in the process, better governance and better access to services including public transportation as well as more equal access to education is reached.[3] Smart Cities aim to achieve an effective interaction between its citizen and its city administration in order to meet citizen's needs effectively and efficiently. Depending on how it is implemented, digitalisation bears the potential for integration, inclusion, equal opportunities and participation but at the same time the risk to limit access and participation of certain groups of people such as the elderly or people with disabilities. Therefore, education (in the sense of school education), but also training and further education of adults is of particular importance. On the one hand, education should contribute as a key to the digital empowerment of disadvantaged persons / groups. On the other hand, it should contribute to reduce the division of the society into 'onliners' and 'offliners'.[4] Moreover, *Design for All* and *co-creation*[5] are concepts suggested by the Charta to ensure that products and services are designed according to the needs of users with special attention to people with special needs.[6]

The *Standardization Roadmap Smart City*[7] aims to identify the need for norms and standards for Smart Cities. Therefore, the *Deutsche Institut für Normungen e.V. - DIN* (German Institute for Standardization) and the *Deutsche Kommission Elektrotechnik Elektronik Informationstechnik - DKE* (German Commission for Electrical, Electronic & Information Technologies)[8] are working together with experts

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[1] Bundesinstitut für Bau-, Stadt- und Raumordnung (BBSR), (2017).
[2] Ibid., p.19.
[3] Ibid., p.5.

[5] Co-creation in the Smart City Charta is described as local citizens design together (e.g. processes and services) and in cooperation with those responsible in municipalities, business, research and civil society. (BBSR (2017), p.15.).
[6] Ibid., p.12.
[7] VDE (2014).
[8] For more on DIN and DKE check also chapter 3 of this report.

from politics, society, industry, the research community and German Cities.[1] As smart cities are complex systems, the roadmap presents the currently existing standards in connection with smart cities in various subject areas such as ambient assisted living (AAL), e-mobility, e-energy/smart grids, smart home and building, industry 4.0 and IT security.[2] Some of these areas are particularly relevant for people with disabilities. In the AAL field, technical assistance systems are developed to support and facilitate everyday activities. These include sensor systems that measure vital and environmental data.[3] Standards of the DIN 18040 series on barrier-free construction concern the accessibility of the built environment (like public buildings - DIN 18040-1, apartments - DIN 18040-2 and public transport and open spaces - DIN 18040-3) and implement § 4 of the **Behindertengleichstellungsgesetzes - BGG** (*Disability Equality Act*) as well as the UN CRPD. For example standard 18040-2 (Construction of accessible buildings - Design principles - Part 2: Dwellings) takes into account the needs of people with various impairments such as hearing impairment, visual impairment or mobility impairment. People with disabilities were involved in the development of the standard. Their experiences were incorporated into the redesign of the building requirements.[4] Wherever means of physical access is replaced by electronic means, they must be designed to be equally barrier-free. According to the **Barrierefreie Informationstechnik-Verordnung - BITV-II** (*Barrier-free Information Technology Regulation*) electronically published information from government institutions must be structured in such a way that access is possible regardless of physical limitations. In order to ensure equal treatment of inhabitants smart cities have to take these requirements into account.[5]

In the following, relevant projects and programmes contributing to the implementation of smart cities will be presented. As part of the **programme "*Social housing*"**[6] of the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth the **competition "*Technology-supported living - self-determined living at home*"**[7] is

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[1] DIN e. V. and Deutsche Kommission Elektrotechnik Elektronik Informationstechnik (DKE) (2015), p.7.

[2] Ibid.DIN e. V. and Deutsche Kommission Elektrotechnik Elektronik Informationstechnik (DKE) (2015)DIN e. V. and Deutsche Kommission Elektrotechnik Elektronik Informationstechnik (DKE) (2015)DIN e. V. and Deutsche Kommission Elektrotechnik Elektronik Informationstechnik (DKE) (2015)DIN e. V. and Deutsche Kommission Elektrotechnik Elektronik Informationstechnik (DKE) (2015)DIN e. V. and Deutsche Kommission Elektrotechnik Elektronik Informationstechnik (DKE) (2015)DIN e. V. and Deutsche Kommission Elektrotechnik Elektronik Informationstechnik (DKE) (2015) p.10.

[3] Ibid., pp.25.

[4] https://www.din.de/de/mitwirken/normenausschuesse/nabau/normen/wdc-beuth:din21:142706210 accessed on 2nd of July 2020; Bundesministerium für Arbeit und Soziales (BMAS) (2016c), p.258.

[5] DIN e. V. and Deutsche Kommission Elektrotechnik Elektronik Informationstechnik (DKE) (2015), p.27.

[6] https://www.serviceportal-zuhause-im-alter.de/programme/dachprogramm-soziales-wohnen-im-alter.html accessed on 2nd of July 2020.

[7] https://www.serviceportal-zuhause-im-alter.de/en/programme/dachprogramm-soziales-wohnen-im-alter/wettbewerb-technikunterstuetztes-wohnen.html accessed on 2nd of July 2020.

funding projects developing technologies that help older people to manage their everyday lives more independently and to stay at home longer despite the need for help and care. Although the target group is primarily older people, people with disabilities can also benefit from the technical solutions developed, such as household appliances that switch themselves off when needed, central electronic control of lighting, heating and electricity, home emergency call systems or touch and vision aids for disabled people.[1]

Another interesting project (***assistance systems for a self-determined life in old age***) using artificial intelligence was developed jointly by the Technical University of Wildau, the health insurance AOK and the housing construction company GESOBAU AG, together with residents. Using sensors installed in the apartment, the resident's activities are monitored and accidents, such a person falling or a bath overflowing are registered. In such a case, a previously identified contact is automatically informed with the aim of ensuring that help arrives in time. The sensors can also automatically carry out certain activities, such as switching on the light when the flat is entered or airing the room if too much carbon dioxide is measured in the flat. The volume of the doorbell can also be intensified and visually displayed.[2] Another example is technology like the ***intelligent socket***, which can be switched on and off remotely. The aim is to further develop this socket so that the times when certain devices switch on and off, for example, let the bath water in or open the blinds can also be programmed.[3]

Concerning the mobility of people with visual impairment and blindness, the project ***m4guide - mobile multi-modal mobility guide***[4] supported by the funding programme ***Von Tür zu Tür - Eine Mobilitätsinitiative für den Öffentlichen Personenverkehr der Zukunft*** (*From door to door - a mobility initiative for public transport of the future*) is an interesting example.[5] With this programme, the *Federal Ministry of Economics* is funding research and development projects on information and navigation systems for public transport.[6] The focus is on projects that improve the mobility of elderly people and people with impairments (people with visual impairments are mentioned specifically). The aim of the ***m4guide*** project was to develop a smartphone App that would enable blind and visually impaired people to move around independently and safely on foot, on public transport and in train stations and public buildings. The

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[1] Ibid.

[2] https://www.gesobau.de/pressemitteilung/gesobau-ag-stellt-assistenzsysteme-fuer-ein-selbstbestimmtes-leben-im-alter-vor-2017-05-05.html accessed on 2nd of July 2020.

[3] https://el4.org/intelligente-steckdose/ accessed 2nd of July 2020.

[4] http://www.tuvpt.de/index.php?id=foerderung0001000000000000 accessed on 2nd of July 2020; https://www.sichtweisen-archiv.dbsv.org/archiv/gegenwart-ausgabe-10-2016.html#Them1016.2.2 accessed on 2nd of July 2020.

[5] Bundesministerium für Wirtschaft und Technologie (BMWi) (2011).

[6] List of funded projects http://www.tuvpt.de/index.php?id=foerderung000101 accessed on 2nd of July 2020; Some of the funded projects aim to provide passengers with up-to-date information on their transport connections during their journey such as AMPER. https://www.nasa.de/projekte/forschungsprojekte/amper/ accessed on 2nd of July 2020.

smartphone user enters a starting point and a destination. The system then calculates the exact route and guides acoustically or optically, depending on the vision of the user. The interesting aspect of m4guide is that people with visual impairment and blindness were involved in design and development (including testing) of the product.[1] As a user group with the highest requirements for exact guidance, the App was developed based on their needs. However, the App is intended to serve all user groups (blind, visually impaired and sighted). Routes offered to blind users take into account their particular requirements. Another interesting feature is that blind and visually impaired users can inform bus conductors via the App if they want to get on or off the bus. According to Respondent 3, WLAN Access Points and iBeacons were tested for navigation. It was found that iBeacons did not work well for the indoor navigations because they radiated into the whole room and did not allow the user's line of sight to be determined. The Fraunhofer Institute then attached QR Codes to the ceiling of the rooms. The user had to point their mobile phone camera upwards to the ceiling to scan the QR Code. This enabled the localisation of the user in the building, including determining the user's line of sight and allowed better navigation instructions to be given.[2]

Overall, there seem to be hardly any examples of the use of sensor technology in the built environment or infrastructure in German cities to help to improve the mobility of people with disabilities. This however does not mean that people with disabilities cannot profit to some extent from solutions that have been developed for the public, in most cases without having this particular target group in mind. Smartphone Apps that make using the public transport easier, help navigating in the city or finding a free parking spot[3] and help to access services of cities (e-government solutions)[4] might also be helpful for people with disabilities. Projects like *m4guide* implemented in Berlin and Soest are best practice examples. Depending on the type of disability, the usefulness of these Apps and technologies might of course vary. However, it seems that aids that do not communicate with the built environment such as personal assistance and partly the long stick for people with blindness as well as to some extent obstacle detectors with vibration[5] are commonly used to facilitate mobility.[6] As the vast majority of people with deafblindness due to barriers in the environment are not

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[1] The Deutscher Blinden- und Sehbehindertenverband e. V. (The German Federation of the Blind and Partially Sighted) was one of the project partners.
http://www.tuvpt.de/index.php?id=foerderung0001000000000000 accessed on 2nd of July 2020.
[2] Respondent 3 2020, from minute 54:45 until minute 59:51.
[3] Park and Joy App https://www.parkandjoy.de/ accessed on 6th of July 2020.
[4] https://www.t-systems.com/de/en/about-t-systems/news/smart-city-app accessed on 6th of July 2020.
[5] REHADAT lists electronic equipment and aids that can help to improve orientation. This includes obstacle detectors and apps currently available. https://www.rehadat-hilfsmittel.de/de/produkte/?infobox=/infobox1.html&serviceCounter=1&wsdb=TEC&suchbegriffe=&hersteller=&gkv_nr=&modell=&iso_nr=12%2039%2006*&GIX=&from=1&connectdb=hilfsmittel_result&anzahl=17&iso_nr=12+39+06* accessed on 2nd of July 2020.
[6] Gemeinsamer Fachausschuss hörsehbehindert / taubblind (GFTB) (2010), p.7.

capable to move around outside their home on their own,[1] it would require other solutions in order to improve their mobility effectively.

8. Skill Development and Work Opportunities

Article 27 of the UN Convention on the Rights of Persons with Disabilities stresses that states need to safeguard and promote the right to work. Numerous changes to disability policy aimed at improving participation in working life by disabled persons have taken place in Germany over the past few years (including the General Act on Equal Treatment AGG, Social Security Code (SGB) Volume IX and the Participation Act BTHG , see also Chapter 2). As legislation now stands, companies with at least 20 staff members are subject to a mandatory requirement to employ disabled persons (Chapter 2 §§ 71–79 German Social Security Code (SGB) IX).[2] Employers are also provided with an incentive to take on disabled workers in the form of advisory services, grants, cost subsidies and compensatory payments for any losses in output that may occur. At the same time, persons with a disability enjoy numerous rights vis-à-vis their employer. These include special protection against dismissal (§§ 85–German Social Security Code (SGB) IX), the right to have their workplace set up and maintained in a way that takes their needs into account, the right to have their workplace equipped with the necessary technical aids (§ 81 Section 4 German Social Security Code (SGB) IX) and additional paid leave of one week (§ 125 German Social Security Code (SGB) IX).[3]

Despite the large number of state regulations aimed at achieving better participation in working life, labour market integration for the disabled numerous remains capable of improvement.[4] [5] Persons with a disability are still less likely to be employed in the primary labour market. Their employment rate is lower, and the incidence of part-time work is greater. Their hourly wages are lower, and they are also more likely to be over

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[1] Haralampidis, T. F. (2019), p.16; Deutscher Blinden- und Sehbehindertenverband e. V. (DBSV) (2010), p.14.

[2] All private and public sector employers with an annual average of at least 20 FTEs per month are required to employ persons with a disability in 5% of these jobs (§ 73 German Security Code (SGB) IX). Employers who fail to meet the mandatory requirement to employ disabled persons are liable for payment of a monthly compensatory levy of between €125 and €260. The amount payable is dependent on the degree of fulfilment of the requirement (§ 77 Section 2 German Social Security Code (SGB) IX). The notification procedure conducted by the Federal Employment Agency (BA) indicated that the employment ratio for 2017 was 4.6% (BA 2019: Statistics of the Federal Employment Agency. "Tables, Disabled persons in employment (notification procedures German Security Code (SGB) IX)", Nuremberg. Available at: https://statistik.arbeitsagentur.de/Navigation/Statistik/Statistik-nach-Themen/Beschaeftigung/Beschaeftigung-schwerbehinderter-Menschen/Beschaeftigung-schwerbehinderter-Menschen-Nav.html) accessed on 2nd of July 2020.

[3] For a detailed summary of the rights of disabled employees and of duties towards disabled employers, see Weller, S. I. (2017).

[4] Metzler, C. and Werner, D. (2017); Aktion Mensch (2019).

[5] An evaluation of the services provided for the participation of disabled people in working life can be found in the following report by the Federal Ministry of Labour and Social Affairs: Tisch, A. et al. (2017).

qualified for the employment they are in.[1] Persons with a disability also face major recruitment difficulties.[2] The assumption is that the use of AI in application processes creates further disadvantages for the disabled. Respondent 1 reported:

"I certainly believe that AI brings considerable potential for discrimination, because persons with disabilities are probably not included in the training data in an appropriate way. But then, when these systems are applied, they are also not properly mapped. Let's consider a pool of applicants. This is the way in which a system is worked out. People with disabilities whose data are entered because they have made an application somewhere are then thrown out of the system. They don't get a chance. This means that system design needs to make sure that these people are actually taken into account in the applicant selection process. These are the types of risks I am thinking about"

Official data indicates that persons with a disability are more likely to be affected by unemployment. They also tend to be out of work for longer.[3] Even highly qualified disabled persons find that there are considerable barriers to labour market inclusion[4] and the higher the degree of disability, the lower the likelihood of being in employment will be.[5]

Under normal conditions employment on the general labour market in Germany requires the ability to perform a job for more than three hours per day.[6] This means that persons with a multiple disability are deemed to be particularly hard to place.[7] People with deafblindness and persons affected by type 1 Usher Syndrome are often unemployed and underemployed in relation to work in the general labour market on the basis of their considerable sensory impairment.[8] Specially equipped workshops[9] (such as the Werkstatt für behinderte Menschen [*Disabled Persons' Workshop*], WfbM)

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[1] Bundesministerium für Arbeit und Soziales (BMAS) (2013b).

[2] Trost, R. and Schüler, S. (1992).

[3] Statistik der Bundesagentur für Arbeit (2019).

[4] Bach, H. W. (2015).
   Niehaus, M. and Bauer, J. (2013).

[5] Metzler, C. and Werner, D. (2017).

[6] cf. § 8 Section 1 German Social Security Code (SGB) II.

[7] Stiftung Taubblind Leben (2009).

[8] In principle, all possibilities of professional integration and rehabilitation are also available to people with deaf-blindness. Although there are a few deafblind people, who are working with work assistance. However, there is no institution that offers recognised vocational rehabilitation measures for people with acquired deaf-blindness. For example, the rehabilitation department of the German Deafblind Association can only provide basic rehabilitation. Vocational rehabilitation measures must therefore - if at all - always be put together individually. This usually does not happen, but those affected go into disability pension if their disability increases too much.

[9] "A disabled persons' workshop (WfbM) is an institution that allows disabled persons to participate in working life. It provides appropriate vocational education and training and employment to those who are not able/not yet able to access or re-enter the general labour market. The workshops allow them to develop, increase or regain their performance capacity whilst receiving a wage." https://www.rehadat-wfbm.de/de/lexikon/Lex-Werkstatt-fuer-behinderte-Menschen-WfbM/ accessed on 2nd of July 2020.

at the German Deafblind Training and Support Centre in Fischbeck) frequently represent the sole available employment opportunity.[1] One central objective of disabled persons' workshops is to support transfer to the general labour market for suitable persons.[2] However, various studies show that only between one and three in every 1,000 WfbM employees successfully make the transition from the WfbM to the general labour market.[3]

In order to make good practice examples in the employment and training of employees with disabilities visible and to share knowledge about the success and opportunities of inclusion, the **Inklusionspreis für die Wirtschaft** (Inclusion Award for Business) was launched in 2012.[4] The prize is awarded by the Federal Employment Agency, the Confederation of German Employers' Associations, the Business Forum and the Charter of Diversity. In 2019, the initiative **"Hiring counts - winning employers"** was launched as part of the Inclusion Award.[5] The core concern is to make employers aware of the potential of severely disabled people through information and education and thus to win them over for employment. The target group of the initiative are companies that do not yet employ or train people with disabilities.

In addition to the general question of the employment of people with disabilities, there is a growing debate among politicians, academics and practitioners about the extent to which increasing digitisation offers opportunities for the employment of people with disabilities.[6] Numerous technologies permitting workplaces to be adapted to the l needs of disabled people are now available (see Chapter 6).[7] Assistive technologies are able to compensate for sensory impairments and open up new fields of activity for persons affected. For some disability groups, digitalisation may thus represent a labour market-relevant area of potential that has not previously been recognised. Digital media may also make an important contribution in the area of initial and continuing vocational education and training towards meeting the needs of persons with a mental/sensory impairment and thus take on a significant role in the teaching and learning process.

On this basis, the Federal Ministry of Education and Research (BMBF) is contributing to the modernisation of Vocational Education and Training (VET) via its funding guideline **Inclusion in vocational education and training via digital media**, which forms part of the programme **Digital media in vocational education and training**

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[1] Haralampidis, T. F. (2019).
[2] cf. § 136 Section 2 German Social Security Code (SGB) XI.
[3] Gesellschaft für Integration, Sozialforschung und Betriebspädagogik (ISB) (2002); Autorengemeinschaft (2003); Consens Hamburg (2003).
[4] https://www.inklusionspreis.de/ accessed on 2nd of July 2020.
[5] Initiators are the Federal Employment Agency (BA), the Confederation of German Employers' Associations (BDA), the Federal Working Group of Integration Offices and Main Welfare Offices (BIH) and the Federal Ministry of Labour and Social Affairs (BMAS).
[6] Engels, D. (2016).
[7] Metzler, C., Jansen, A. and Kurtenacker, A. (2020); Revermann, C. and Gerlinger, K. (2009).

(funding phase 13.02.2017–31.12.2022). The BMBF is thus supporting implementation of the goals of the UN Convention on the Rights of Persons with Disabilities, of the National Action Plan (NAP), of the National Action Plan for the UN Convention on the Rights of Persons with Disabilities (NAP 2.0) and of the Federal Participation Act. Projects which adapt education and training provision to the particular visual, auditory and tactile needs of persons with a disability are able to receive financing within the scope of the funding guideline.[1] A total of 18 projects are being funded. These are allocated to the fields of activity of "Digital information and support systems" (e.g. in the form of an app) (1), "New occupational perspectives via digitally aided learning" (2) and "Joint learning concepts for persons with and without disabilities" (3).[2]

The "**Digital Work Society Think Tank**" (Denkfabrik Digitale Arbeitsgesellschaft), instigated in 2018 and run by the Federal Ministry of Labour and Social Affairs (BMAS), represents a further Federal Government initiative. Its aims are to act in a timely manner to identify new fields of activity within the context of digitalisation, to bind the world of work more closely to society and to develop new possible solutions for the work society of the future.[3] Within the framework of this think tank, the ministry is supporting the establishment of company-based **learning and experimentation spaces**.[4] The intention is to encourage companies and government bodies to arrive at and pilot innovative work concepts via the deployment of modern technologies and then to adapt and further develop these over a longer period of time. A further aim is to investigate the question of how digitalisation can help lead to better participation by older employees or by workers with a disability. The learning and experimentation spaces are being supported via funding and consultancy provision from the ministry under the umbrella of an initiative entitled "New quality of work". This is in turn being financed via the "Sustainable companies and government bodies in the digital shift" guideline.[5]

Some training providers have also recognised the opportunities afforded by increasing digitalisation and by the better digital equipment available to persons with a visual impairment in particular and have gone on to develop new and attractive training provision accordingly.[6] The **blista Centre of Excellence for Vocational Education**

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[1] https://www.qualifizierungdigital.de/de/inklusion-durch-digitalisierung-3353.php accessed on 2nd of July 2020.

[2] https://www.bmbf.de/foerderungen/bekanntmachung-1317.html accessed on 2nd of July 2020.

[3] https://www.denkfabrik-bmas.de/ accessed on 2nd of July 2020.

[4] https://www.experimentierraeume.de/die-idee/was-sind-experimentierraeume/ accessed on 2nd of July 2020.

[5] Two programmes supported by the European Social Fund (ESF) are also dedicated to providing specific implementation within companies (a programme entitled "unternehmensWert: Mensch plus" (roughly translated "company value: human advantage") and the project "Fachkräfte sichern: weiterbilden und Gleichstellung fördern [*Securing skilled workers: train and promote equality*]").

[6] Riazy, S., Weller, S. I. and Simbeck, K. (2020).

and Training (Kompetenzzentrum für berufliche Bildung) [1], for example, now offers six training and retraining programmes in the field of information technology to persons who are affected by a visual impairment or blindness.[2] The occupations in which qualifications can be achieved are: digitalisation management clerk, office manager, management assistant in e-commerce and information technology specialist in the areas of data and process analysis, application development and system integration. These are three-year dual training courses which are financed by the Federal Employment Agency. Trainees undertake a 16-week or 12-week practical placement at a company of their choice, and training concludes with a state-recognised final examination conducted by a chamber of commerce and industry (IHK). Those completing the programmes enjoy very good chances of employment because of the existing shortage of skilled IT workers and the good quality of the training.

Support programmes are now also in place within the field of higher education. These offer pedagogical and technical aids to prospective and current students with a visual impairment in order to provide assistance at the transition to study, during the course of the programme of study and at the point of entry to working life. One example here is the **Study Centre for the Visually Impaired** (Studienzentrum für Sehgeschädigte, **SZS**) at the **Karlsruhe Institute of Technology (KIT)**.[3] The main focuses of the SZS include the development of accessible learning materials, the realisation and implementation of tests and examinations and the provision of access to graphics and mathematics. The SZS is also one of the co-organisers of an annual summer school, which offers access to the topics of mathematics, science and statistics for persons with a visual impairment.[4]

The importance of IT as a major topic for persons with a hearing impediment is also reflected in the **DeafIT Conference**[5], which is scheduled to take place for the 6th time in 2020. The DeafIT Conference is (uniquely within the German speaking countries) an accessible educational and information event which concentrates on information technology for skilled IT workers with and without a hearing impairment. Numerous current specialist papers focusing on the needs of hearing-impaired persons are given within the scope of the conference programme. The primary aim of the conference is "to create an inclusive network programme for the deaf, the hard of hearing, cochlear implant users, the post-lingually deaf and hearing persons in order to expand and

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[1] blista is a national centre of excellence for the blind and visually impaired. It also acts as an open and lively education and training venue and meeting place https://www.blista.de/startseite accessed on 2nd of July 2020.

[2] https://www.blista.de/ausbildungen-und-umschulungen accessed on 2nd of July 2020.

[3] https://www.szs.kit.edu/index.php accessed on 2nd of July 2020.

[4] https://www.icchp.org/content/icchp-summer-university accessed on 2nd of July 2020.

[5] www.deafit.org accessed on 2nd of July 2020.

promote networking in the IT sector by focusing on continuing training and on an active exchange of professional experiences and competencies".[1]

Alongside the initiatives listed here, the multitude of current projects receiving funding which are aimed at the development and piloting of digital technologies for persons with a disability also indicate that digitalisation will assume an increasingly significant role for the employability of vulnerable groups in the coming years.[2]

9. Cybersecurity and Safeguards against hate crime and abuse

Two of the main objectives of the UN Convention on the Rights of Persons with Disabilities are to reduce discrimination and to foster and secure self-determination and participation for persons with disabilities.[3] Nevertheless, persons with a disability or impairment in Germany are more likely to be affected by physical and psychological violence than those without a disability or impairment.[4]

Increasing digital networking is closely linked to emerging problems with **Cybersecurity**. Respondent 1 stated:

I believe cybersecurity to be a HUGE problem. Especially in the area of networking, where everything is combined and there are these enormous scaling effects. These are unleashed in the same way as the risk. Yes. If the lights fail in a part of town or on a street, they can be repaired and then everything is all right again. But it's not so funny when the lights go out across a whole city or federal state. So yes, I see considerable risks. Or let's think about stock exchange trading, which is largely driven by algorithms, when a security attack suddenly takes hold. Look at the attacks that take place on ministries, Parliament, companies, hospitals and so forth. These are unbelievable risks"

The question that arises is the extent to which particularly vulnerable population groups (e.g. persons with disabilities) are increasingly falling victim of **cyber criminality** and whether security is being taken into account in the development of new technology.

Respondent 1 stated that smart clothing for people with disabilities may be networked in some form or another and can be hacked from outside. "This means that these

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[1] www.deafit.org accessed on 2nd of July 2020.
[2] Some project examples: Piloting of digital assistance services in occupational rehabilitation: https://www.bagbbw.de/innovationen/kiassist/ accessed on 2nd of July 2020; Next Generation – using flexible robot solutions to develop inclusive work: https://www.nextgeneration-mrk.de/ accessed on 2nd of July 2020; miTAS multimedia individual assistance and training system: http://tip.tu-dortmund.de/cms/de/Forschung/Arbeit/miTAS/index.html accessed on 2nd of July 2020.
[3] "States Parties shall take all appropriate legislative, administrative, social, educational and other measures to protect persons with disabilities, both within and outside the home, from all forms of exploitation, violence and abuse, including their gender-based aspects" (UN Convention on the Rights of Persons with Disabilities).
[4] Bundesministerium für Arbeit und Soziales (BMAS) (2013a); Schröttle, M. et al. (2012).

people are once again exposed to risk in a particular way…... If you have a pacemaker that can be hacked, then you are highly vulnerable." (Respondent 1 2020,).

People with disabilities may also become victims of so-called "**hate crime**". Criminal offences are allocated to the category of "hate crime" if the circumstances surrounding the deed or the attitude of the culprit give rise to the conclusion that the act committed was directed against a person because of a characteristic of the victim. Example s are political views, nationality, ethnic origin, race, skin colour, faith, ideology, sexual orientation, disability, external appearance and societal status. Offences can also be classified as "hate crime" if they are intended to impart fear to the whole group, within the above-mentioned context rather than against a single person. Criminal acts inspired by xenophobia are a subset of "hate crime". Hate crime may involve intimidatory actions, threats, damage to property, actual physical assault, murder or any other offence."[1] The German Federal Criminal Investigation Office (BKA) recorded 8,113 cases of hate crime in 2018.[2] 1,472 of these comprised hateful posts on social media were deemed to be criminal.[3]

In order to investigate what experiences citizens have had with **hate speech** and what their attitudes towards hate speech on the Internet are like, the largest German representative online survey to date with 7,349 participants between the ages of 18 and 95 was carried out in April and May 2019 on behalf of Campact e.V..[4] According to the survey, 8% of the respondents had already been personally affected by hate speech on the net, with younger people (18 to 24 year-olds) and people from immigrant families more often the recipients of hate speech online.

Hate crime is pursued in accordance with the duties incumbent on the state to protect its citizens as set out in German Basic Law.[5] Nevertheless, hate speech on the Internet was not prosecuted and punished for a long time. It is often difficult to identify the authors of the hate postings. Moreover, many victims of hate speech do not report the incident. Because of the need to combat hate crime, criminal fake news and other punishable contents posted to social media networks in a more effective way, the German parliament (Deutscher Bundestag) passed the **Network Enforcement Act** (Netzwerkdurchsetzungsgesetz, **NetzDG**) in June 2017. This law entered into force on 1 October 2017. It requires operators of profit-oriented social media networks to delete "obviously criminal content" within 24 hours of receipt of a complaint (examples include defamation, slander, libel, public provocation to commit criminal acts, incitement,

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[1] OSZE/BDIMR (2011).
[2] OSZE/ODIHR (2020).
[3] Statistica (2019); According to the Bundesamt für Verfassungsschutz (BfV), the domestic intelligence service of the Federal Republic of Germany, hate posts are: "Internet posts of all kinds relating to current debates which are emotional and pointed to a degree that extends beyond normal freedom of speech of emotionality and which in some cases clearly cross the threshold of criminal liability"; Deutscher Bundestag (2019a).
[4] Geschke, D. et al. (2019).
[5] Protection of human dignity (Article 1 Section 1 Basic Law for the Federal Republic of Germany, GG), Personal freedoms (Article 2 Section 1 GG) and Equality before the law (Article 3 Section 1 GG).

violent images and threats). Companies which fail to comply are liable to fines of up to €50 million.

The following further requirements have been placed on operators of social media networks:

- Offer users an easily identifiable, directly accessible and constantly available procedure for the transmission of complaints about criminal contents.
- Address user complaints straightaway and assess whether any element of criminality is involved.
- Delete or block obviously criminal content within 24 hours of receipt of a complaint.
- Aim to delete or block any other criminal content within a maximum of 7 days after receipt of a complaint or else refer the matter to a recognised self-regulation body[1] and abide by any decision made by such an organisation (the recognised body is also required to arrive at a decision regarding the illegality of content reported within a period of 7 days).
- Users must be notified of every decision made following a complaint, and reasons for the decision must be stated.

According to the Network Enforcement Act, networks should release so-called inventory data (e.g. IP address) if ordered by a court. The aim is to identify offenders. In reality, this has proven to be difficult to implement: most offenders could not be identified so far and get away with it.

Two draft laws are currently being debated that are intended to remedy weaknesses in the Network Enforcement Act and facilitate the prosecution of hate speech perpetrators. In addition to the platforms, the state itself is also to assume more responsibility in the prosecution of offenders. A draft law of the Federal Ministry of Justice provides that platforms should make it easier for their users to display illegal content (status: February 2020). In the draft Bill the definition of criminal hate speech extends to include threats of rape or of damage to property and consent to serious criminal acts. The aim of this draft "hate speech" legislation is to step up the action that can be taken if posts of this nature appear on social media websites such as Facebook and Twitter. If the law enters into force, social media networks will be required to notify the German Federal Criminal Investigation Office (BKA) of the occurrence of any hate

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[1] The prerequisites whereby a body is accorded recognition are independence and competence of assessors and proper resources that facilitate a decision regarding the illegality of contents reported within 7 days. Internal procedural regulations governing the investigatory process must also be in place. Further to this, a complaints centre must be set up in order to allow users to protest against contents which have been wrongly removed. This ensures that contents which turn out to be permissible can be restored quickly and easily if they have been unfairly taken down. The self-regulation body needs to be funded by several social media network providers so as to ensure that facilities are appropriate. It also needs to be open to membership by other providers and by social media network operators in particular. Example: Verein Freiwillige Selbstkontrolle Multimedia-Diensteanbieter e.V. *[German Association for Voluntary Self-Regulation of Digital Media Service Providers]* (FSM).

crimes. Hate speech within this context is deemed to include extremist right-wing propaganda, graphic representations of threats of violence, murder or rape, posts that indicate preparation of a terrorist attack and the dissemination of images of sexual abuse involving children. The intention is for the law to triple the penalties that are applicable. Users threatening rape, for example, can receive a prison sentence of up to three years.

However, the law against right-wing extremism and hate crime is to take a bigger step than this **"hate-speech" bill**. According to this bill, networks will be obliged to hand over the perpetrators' passwords to law enforcement agencies in the case of particularly serious crimes and will be obliged to report criminal content to the authorities. The opposition has criticised this draft law mainly because the issuing of passwords is a problem under data protection law. In addition, such a law would lead to very many charges. There are not enough personnel capacities in the judiciary to deal with this issue.

A parliamentary conference entitled "**Strategies against Hate Speech**", which took place in Berlin in October 2019, provided further proof of the willingness of policy makers to come together in order to tackle the issue of hate crime. This event was organised by the "No Hate Parliamentary Alliance", a body established by the Equality and Non-Discrimination Committee of the Parliamentary Assembly of the Council of Europe. It comprises a grouping of members of national parliaments who seek to take an active stance against racism, hatred and intolerance.[1]

Non-profit organisations are increasingly taking action against hate speech. In 2017 **HateAid** was founded by the non-governmental organisations Campact and Fearless Democracy to advise and support victims of digital violence. HateAid helps victims of hate speech to develop a protection and communication strategy, assists the saving of evidence and post-processing and finally - if the victim institutes a civil lawsuit with respect to insults, threats or aspersions - bears the expenses for lawyerly advice and representation and the costs for the court proceedings.[2] HateAid holds the opinion that the law enforcement authorities like the police and the public prosecution departments are overwhelmed with the digital violence or rather do not taken the problem seriously enough. Therefore, it also starts to operate if there exists a criminal statement of facts.

Journalists and citizens' movements are also increasingly committed to fight against hate crime. An organisation called "New German Media Makers", an independent national consortium of journalists, has been coordinating the Council of Europe's **No Hate Speech Movement** in Germany since February 2016.[3] The objective is to combat

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[1] Deutscher Bundestag (2019b).

[2] https://hateaid.org/ accessed on 2nd of July 2020.

[3] https://no-hate-speech.de/de/ accessed on 2nd of July 2020. The Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ) funded the movement as part of a federal programme entitled "Living Democracy" until the end of 2017. In 2018 and 2019, the project also received support from the Federal Government Commissioner for Migration, Refugees and Integration, the ZEIT

malicious behaviour online. The No Hate Speech Movement is supported and advised by a National Committee.

A remarkable initiative is the **"NETTZ"** Networking Centre against Hate Speech. [1] The network has the aim to build up and strengthen the community of digital civil courage by creating the supporting framework for it (e.g. through initiatives and projects.[2] Another interesting initiative is a **fundraising campaign** against hate speech established by **Campact**- a citizens' movement with which over 2 million people fight for progressive politics.[3] In this campaign, funds are raised for actions to persuade the justice ministers of the German states to take action against hate speech.

Overall, the initiatives of the policy and civil society show that the issue of hate speech is being taken seriously at various levels and that there is a strong desire in the society to actively combat it.

10. Examples of good practice in inclusion of disabled people in developing policy on new technologies

This section presents a number of best practice examples, in which the development of new technologies with and for persons with a disability has taken place. The projects set out below have secured awards or funding via national or regional competitions and calls for proposals, and our research indicates that they are using digital technologies to implement excellent approaches to participation by persons with disabilities.

Particular emphasis should be given to the competition **Light Cares – photonic technologies for persons with disabilities** (Light Cares - Photonische Technologien für Menschen mit Behinderungen), which was instigated by the Federal Ministry of Research in January 2016.[4] The ministry is funding a total of ten research and development projects in which photonic tools and components are being developed with the aims of improving the everyday lives of persons with a disability and of helping them to enjoy more opportunities for activity. The ministry has made one million euros of funding available for the scheme. The particular characteristic of the projects is that disabled persons, researchers and manufacturers work together to develop the products in publicly accessible workshops. Use of modern technologies in the projects

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Foundation, Facebook, Twitter and the FAZIT Foundation. Since 2020, financial assistance has been forthcoming from the BMFSFJ via its national programme "Living Democracy", from the FAZIT Foundation and from Twitter.

[1] https://www.das-nettz.de/das-nettz-networking-initiative-against-hate-speech accessed on 2nd of July 2020.

[2] NETTZ is independent, but supported operationally and organisationally by the betterplace lab, the social-digital think- and-do-tank of the non-profit social enterprise gut.org, which also operates Germany's largest online donation platform betterplace.org. The networking office is located in Berlin. Activities are concentrated in Germany.

[3] https://www.campact.de/hate-speech/ accessed on 2nd of July 2020.

[4] https://www.photonikforschung.de/projekte/open-innovation/foerdermassnahme/wettbewerb-light-cares.html accessed on 2nd of July 2020.

allows the development of tools and equipment that are adapted to the special needs of persons with a disability. The projects pursue an open innovation process, and materials have been made available on the Internet in order to invite interested parties and persons affected to recreate the models for themselves. Two of the projects worth mentioning within the scope of the present report are **HAPTIVEST** and **LIDARSEE**, and more details of these are provided below.

Haptivest is a wide belt which can be worn around the waist. It is equipped with an object recognition camera pointing forwards and with 128 small vibrating motors, which detect the presence of obstacles. The closer an object comes, the stronger the vibration will be. Haptivest is being developed at the Aachen University of Applied Sciences.[1]

The **LIDARSEE** project is being conducted at the Research Centre for Information Technology in Karlsruhe and involves a hat with a laser radar capacity. LiDAR (light detection and ranging) is a type of radar which uses laser beams to measure distances. Sensors are used to scan the environment and recognise obstacles. This information can be passed on to a belt or glove via vibration and thus warn the user of hazards.[2]

The **Digital Prize** of the **German Caritas Association for Disability Assistance and Psychiatry (CBP)** (Bundesfachverband Caritas Behindertenhilfe und Psychiatrie e. V.)[3] was awarded for the first time in November 2019 and reflects a commitment that digital participation should be facilitated for everyone.[4] The aim of this award is to use digital innovations as a vehicle to foster participation by persons with disabilities and mental health conditions. The prize recognises institutions and services in the field of disability assistance and psychiatry which are successfully implementing digital projects or measures, or which have already put such projects and measures in place. Projects may be solo undertakings or may equally involve cooperation with start-ups, service providers, self-help associations or other providers within the field of digital and assistive technologies. They can also be carried out together with persons with a disability or mental illness. All institutions and services involved in the areas of disability assistance and psychiatry may apply for the prize if they are implementing or have implemented relevant projects or measures. A project should also form part of an overall strategy or of a comprehensive concept within the organisation. Social and ethical perspectives should also be taken into account.

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[1] https://hci.rwth-aachen.de/haptivest accessed on 2nd of July 2020; https://www.bmbf.de/files/Photonik-für-Menschen-mit-Behinderung-2017.pdf accessed on 2nd of July 2020.

[2] https://lidarsee.de/ accessed on 6 March 2020; https://www.bmbf.de/files/Photonik-für-Menschen-mit-Behinderung-2017.pdf accessed on 2nd of July 2020.

[3] The German Caritas Association for Disability Assistance and Psychiatry (CBP) is a recognised association within Caritas Germany, the social welfare organisation of the Catholic Church. More than 1,100 member institutions and around 94,000 staff support approximately 200,000 persons with a disability or mental illness in achieving self-determined participation in society.

[4] https://www.cbp.caritas.de/digital-preis/digital-preis accessed on 2nd of July 2020.

First place for the 2019 Digital Prize went to Sozialwerk St. Georg Westfalen-Süd gGmbH, which is using an initiative entitled **"Digital dabei!"** (roughly translated, "Digitally involved!") to enable persons requiring assistance to access electronic media in their everyday lives.[1] Part of the project is focusing on strengthening media competence and on training media advisors to provide a peer-to-peer approach. The main driving force behind the project is the concept of empowerment. The media advisors are themselves active bloggers, Twitter users and Internet posters and are thus able to raise digital awareness for the needs of persons with a disability or mental illness. This overall concept is being transferred to further locations within a national network.

Second prize was awarded to CAB Ulrichswerkstätten, a workshop based in Schwabmünchen, for developing an accessible **information system** called **CABito**.[2] CABito was originally created as an internal communication system at the behest of the Workshop Council. However, it has now become established as a separate line of business, and around 1,000 systems have now been sold nationally. Persons with a disability can use CABito to access information in an accessible way and thus become more independent of the personal assistance which may be necessary in order for contents to be imparted. The system includes some features for people with visual impairments.[3]

The German Federation of the Blind and Partially Sighted (DBSV) was awarded third place for its **inclusive museum app**.[4] The DBSV joined forces with the Berlinische Galerie Museum of Modern Art to make the museum's permanent exhibition accessible to the blind and visually impaired. The museum has been equipped with a tactile signage system and with touch models of seven of the works of art on display. A museum app, which uses Bluetooth transmitters to convey information to the right place and helps guide users, forms the basis of this inclusive art experience.

The **2018 Bridge Prize**, which was awarded by the Baden-Württemberg State Association for the Counselling of Persons with a Disability, recognised four

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[1] https://www.cbp.caritas.de/digital-preis/preistraeger-2019/sozialwerk-st.-georg/sozialwerk-st.-georg accessed on 2nd of July 2020.

[2] https://www.cbp.caritas.de/digital-preis/preistraeger-2019/cab-ulrichswerkstaetten/cab-ulrichswerkstaetten accessed on 2nd of July 2020.

[3] The CABitos has some functions especially for the visually impaired, e.g. entered texts or PDFs can be read aloud automatically by a computer voice, users are assisted in navigation and font sizes and design elements can be adjusted for better readability. Through tactile markings on the edge of the display and the "double click" function, even blind people can use the CABito. Menu items are first read aloud in the form of stick dots and the user can then feel their way through the menu, double-clicking to access the actual content. Moreover, the setting of information was designed as barrier-free as possible, the administration interface contains only the most necessary buttons, these are provided with particularly large pictograms and here too, font sizes, colour scheme, contrasts, etc. can be adapted.

[4] https://www.cbp.caritas.de/digital-preis/preistraeger-2019/deutscher-blinden-und-sehbehindertenverband/deutscher-blinden-und-sehbehindertenverband accessed on 11 March 2020.

outstanding examples of how technical support can help disabled persons lead self-determined lives within their social environment. Applicants needed to offer a particular form of technical assistance which enables or makes it easier for individual persons with a mental or physical disability to participate in community life in a self-directed way. This technical support could be provided via any means (e.g. digital or analogue). The main criterion was that the item should make users independent of having to be accompanied and supervised. The 2018 Bridge Prize Special Award went to the company **HomeBrace Germany UG**[1] for its "endeavours to use digitalisation to create individual technical support for inclusion". HomeBrace Germany is located in southern Germany and is one of the country's most innovative firms within the area of technical aids and equipment. It received the prize for commitment to the development and manufacture of assistive technologies in general rather than for one product in particular.

The numerous awards and funding mechanisms that are in place show that policy makers, the research sector, companies and associations all recognise that the topic of digital technologies represents an opportunity for persons with disabilities to participate to a greater extent. In many projects people with disabilities were involved in the design teams. Nevertheless, there was no project found where the design team was led by people with disabilities themselves.

11. Conclusions

This report has described how developments in new technology are impacting accessibility and wider risks and opportunities for people with deafblindness in particular and for disabled people in general in Germany, with a view to supporting improved structures and policies within a human rights framework.

In Germany, deafblindness was recognised as a disability of its own kind at the end of 2016. Since then it has been possible for the label "TBl" (deafblind) to be entered in the handicapped pass / disabled pass / identity card for people with disability. At the moment, there is no reliable data on the number of people in Germany who are affected by deafblindness. It is usually estimated that 2,500 to 10,000 people are affected. Various civil society organisations throughout Germany stand up for the interests of people with deafblindness and many of these have networked with each other (**chapter 1**). State support for people with deafblindness in Germany is partly based on federal laws and partly based on state laws.

The Federal Government of Germany has published the National Action Plan (NAP) as a central instrument for the implementation of the UN Convention on the Rights of Persons with Disabilities,allowing for sponsorship of research, development and application of new technologies for people with disabilities (**chapter 2**). At present there is particular debate about the regulation of new technologies in the field of image processing and face recognition, with questions focused on data privacy (**chapter 3**).

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[1] https://homebrace.com/ accessed on 2nd of July 2020.

In the field of artificial intelligence in particular, new technologies are being specifically promoted in Germany against the background of EU law to support people with disabilities. The funding is largely provided at the federal level.

As assistive technologies for people with disabilities, especially those using artificial intelligence, are a young field of research, legal regulations and the ethical framework are still part of social discussions and political negotiation processes (**chapter 4**). New technologies offer opportunities and risks, which need to be considered particularly if they affect people with disabilities. New technologies are the subject of controversial discussion in Germany and are by no means intended solely to increase efficiency and effectiveness of care, but rather to give those concerned additional opportunities and choices that can either be consciously used or rejected.

There are many ways in Germany to find out about new technologies for people with disabilities (**chapter 5**). Web-based information platforms and low-threshold advisory services are particularly worth mentioning here, but also trade fairs and NGOs that provide information on this topic.

In Germany, a number of state actors are involved in the financing of aids (**chapter 6**). This is a complex, overlapping system and there is a lack of clarity regarding responsibilities. Although health insurance funds have a register of aids and there is a comprehensive independent portal for aids, a study carried out in 2010 concluded that those affected are not well informed about possible aids and access to them. This seems to be confirmed by a study from 2015, according to which half of the respondents with a hearing and seeing impairment do not use any aids at all. However, a number of recent research projects indicate that new technical aids are being developed.

When national reports discuss accessibility issues, they usually deal with the accessibility of public places and buildings as well as public transport. Barrier-free access to digital information and public services is also considered. In the context of Smart Cities, the digital transformation should contribute to an improvement in living conditions (**chapter 7**). The needs of vulnerable groups should be taken into account. However, the participation of people with disabilities and their representatives in Smart City initiatives seems to be low in Germany. In recent years, primarily smartphone apps have been developed that are intended to improve navigation for people outside the home. In contrast, sensor technology is more likely to be used in (smart) homes.

Numerous federal initiatives aim to offer people with disabilities new opportunities for participation in the general labour market through digitalisiation (**chapter 8**). Hence, the Federal Ministry of Education and Research is funding projects, which adapt educational offers to the special needs of people with disabilities through new technologies. In addition, the Federal Ministry of Labour and Social Affairs provides funds to identify new fields of action in the context of digitalisation (and thus also in relation to people with disabilities) at an early stage. New educational offers in the IT-sector designed for people with special needs do encourage more disabled people to take up employment in the technology industries.

Increasing digital networking has given rise to new forms of crime, such as hate crime (**chapter 9**). It can be assumed that people with disabilities and impairments face a higher risk of becoming victims of cybercrime. Due to the need to combat cybercrime on social network platforms more effectively, new legal regulations have been made part of German law. Moreover, numerous non-profit organisations and campaigns are taking action against hate speech. It is also important for designers of personal technology to ensure the safety of potential users to the greatest degree possible. Numerous awards and funding mechanisms support research and implementation of digital technologies for disabled people in Germany with the aim to give them better opportunities of participation (**chapter 10**).

12. Recommendations

The results of this report show that future initiatives by the Federal Government to implement the UN Convention on the Rights of Persons with Disabilities should consistently take the issue of digitisation into account in all fields of action.

A **nationwide collection of official or representative data on deafblind people** (if possible in the form of a panel study) is essential in this context. Participation in the areas of education, labour market and housing should be explicitly taken into account. The use of digital technologies should also be covered. In addition, deafblind people should be recorded as a separate category in the Federal Statistical Office's statistics on severely disabled people.

Information presentation on available aids and assistance as well as **counselling services** should be improved and e**xpanded** in quality and quantity. Therefore, a commented, qualitatively described inventory for assistive devices for people with disabilities should be introduced, which also contains information on cost factors. The overlaps and ambiguities that exist with regard to the **responsibilities of state actors involved in the financing of aid** must be further reduced. The provision of aids at the workplace must be accelerated so that they are available as soon as possible when the new job starts. In the private sector, the provision of visual and hearing aids seem to works well, while the provision of long sticks for the blind, reading devices and Braille displays should be improved in order to better compensate for indirect disadvantages caused by the disability.

There are many new developments in Germany when it comes to **regulating new technologies**. Regulations to limit the use of new technologies are discussed, for example for data protection reasons or in the area of Big Data. However, data **protection regulations** should not hinder or prevent the development of assistive technology for people with disabilities. Accordingly, regulations should differentiate whether a technology is used as an assistive technology or for economic purposes. In the former case, regulations should be less restrictive.

Legal regulation concerning the **application of new technologies**, including AI, needs to be developed and put in place for German society as a whole but also with particular consideration of vulnerable groups including people with disabilities. These legal regulations need for example to clarify responsibilities in case of misconduct of AI systems, admission requirements of new technologies (if this shall be based on the criticality pyramid and the risk adopted regulatory system suggested by the Data Ethics Commission they need to be further developed), rules for the use of robotic systems in care.

New technologies, **information systems and AI applications** should not exclude certain user groups from productive work because a sensory disability makes it difficult or impossible to operate the systems. To ensure that the use of new technologies does not lead to the **exclusion of digital participation** by certain groups, **accessibility** should be taken into account already at the development stage. However, training in disability is still not part of the education of engineers and ICT specialists in Germany. Therefore, it is necessary to include techniques and principles of developing **barrier-free IT systems in the curricula** of IT professions.

People with disabilities and in particular people with blindness or deafblindness and their representatives should get more involved in **Smart Citiy Initiatives** to ensure that needs of affected people concerning city planning with regard to access to information and public services are met. Currently available aids (from conventional aids like long stick to digital aids like smartphone apps for navigation) mainly improve the mobility of people with blindness. In order to enable people with deafblindness to move around more independently further solutions need to be developed.

Future users should be consulted and involved from the beginning in research and product and related service design so that they meet their needs and wishes (**participatory approach**). Innovative formats in technology development are not yet or only hardly used in Germany and should therefore be taken into account (e.g. Sociotechnical thinking, Domain Driven Design).[1] [2] [3] This prevents high costs for later adaptation of the prototypes, which can lead to the products not being developed to marketability. In addition, ethical questions shall be considered right from the beginning of the development process of a technology and related services (**ethics by design approach**).

As the number of **hate crimes** that are perpetrated via the internet is growing, the need for personal safety should be recognised in corresponding policies and plans. Victims need simplified civil law action options so that they no longer have to pay in advance in court. **Nationwide victim counselling centres on hate speech** should be set up. **Laws on hate crime** should include binding rules on the qualification of the police,

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[1] Kendall, E. et al. (2019).
[2] Thorstensen, E. (2019).
[3] Steel, E. J. (2019).

prosecutors and courts. The treatment of victims in criminal proceedings and the cooperation with victim support organisations should also be taken into account. Regulation of data security should recognise the problem of hate crime and need for redress.

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