ICT for Empowering Accessibility/Inclusion: The Impact of Digital Integration on the Lives of Persons with Disabilities (PwDs)

POLICY BRIEF

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BROADBAND INDIA FORUM
"Think Tank for Digital Transformation"

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DIGITAL EMPOWERMENT foundation
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Introduction

Departing from earlier medicalised views of disability as an inherent aspect of the human condition that arises from the interplay of various health conditions with environmental and personal factors, the human rights approach to disability addresses it as an evolving concept affected by social and institutional factors whereby Persons with Disabilities (PwDs) may "have long term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others" (Convention on the Rights of Persons with Disabilities, United Nations).

The disabled populations are diverse, with experiences shaped by different disabilities, social, economic, and regional factors, including age, caste, class, gender identity, sexuality, religion, race, ethnicity, nationalities, and region. These factors heavily influence their social, economic, and political life, and pose numerous challenges, with the question of access being the core concern. According to the projection by the World Health Organisation (WHO) in 2023, an estimate of 1.3 billion people, constituting 16% of the global population or approximately 1 in 6 individuals, live with significant disabilities.

Owing to the dominant ableist social systems and the persisting apathy, PwDs often face adverse systemic barriers and socioeconomic outcomes, including poverty, physiological stress, and disparities in accessing vital resources such as infrastructure, mobility, education, healthcare, employment opportunities, and social and community engagement. Their severe experiences of socio-economic exclusion underscore the pressing need for inclusive policies and support systems to address inequality and enhance their overall well-being. To address the same, the role of Information and Communication Technologies (ICTs) or digitalisation becomes crucial in advancing the socio-economic inclusion and empowerment of persons with disabilities. One of the most effective ways has been to break down these barriers by providing accessibility tools, communication aids, and assistive technologies, empowering PwDs to fully participate in social, economic, and cultural aspects of life. The proliferation of digital platforms and the emergence of tech-driven sectors, including the IT sector, edtech, healthtech, etc., transcends

the limitations of physical and manual settings thus digitally enabling PwDs to access the same from any location with internet connectivity and necessary accessibility features. This flexibility represents a significant step in breaking down a few barriers that hinder their physical participation in the workforce.

Although ICTs have been lauded for its potential to foster social and economic inclusion by enabling real-time services that facilitate learning, work, entrepreneurship, travel, social interaction, shopping, and community engagement, the full integration of ICTs in promoting socio-economic integration of PwDs has yet to be fully achieved owing to the rapidly growing and deepening digital divide. As a result, technology-based applications and initiatives have not been widely utilised as universal tools to facilitate social and economic inclusion among this demographic. At the core of all these initiatives lies the crucial question of access and the urgent need for an inclusive digital design that enables PwDs to avail the opportunities created by the ICTs.

Digital enablement, therefore, tailored to the needs of diverse disabled populations, play a crucial role in their social integration and empowerment. By providing them with the necessary infrastructure, tools and resources to navigate the digital landscape independently, PwDs will get enabled to participate fully in the workforce and the broader society. Moreover, digital inclusion initiatives that address the persisting digital divide and the systemic barriers to access and opportunity can create an environment where PwDs can thrive, contributing their talents and expertise to diverse industries and country's overall financial growth and development (World Economic Forum, 2022).

Data Speaks

The situation of PwDs in India has been illuminated through data sourced from the Census of 2011, as well as the 76th round of the National Sample Survey (NSS). This data indicates that the disability rate in India was reported at 2.2%. Over a decade, there was a modest rise in the population of PwDs, increasing from 21.9 million in 2001 to 26.8 million in 2011. However, a recent secondary analysis of the NFHS-5 survey (2019–21) suggests a higher prevalence, estimating a rate of 4.52% across the country (Pattnaik et al., 2023).

The Census of 2011 further provides insights into the gender distribution among the disabled populations in India, with 1.5 crore males and 1.18 crore females constituting 56% and 44%, respectively. This contrasts with the gender distribution in the general population, where males represent 51% and females 49%. Majority of disabled persons, around 69%, reside in rural areas, totalling 1.86 crores, while 0.81 crores live in urban regions. Census data from 2011 also reveals that 8.3% of households, comprising 207.8 lakh households, have disabled members, with 71% of these households located in rural regions.

Educational attainment among the disabled populations varies significantly. There is an overall illiteracy rate of 45%, while 13% have completed secondary education, and 5% hold graduate degrees or higher. Notably, within the disabled population, 38% of males are illiterate, compared to 55% of females. Rural areas exhibit lower literacy rates among disabled persons, with 49% being literate, compared to 67% in urban areas.

Regarding employment, the overall workforce participation rate among PwDs is 36.3%, with males having a higher participation rate (47.2%) compared to females (22.6%). There is a notable variation in workforce participation rates across different types of disabilities. Those with disabilities related to speech (42%) and movement (37.4%) have relatively higher participation rates. Across all disability types, males consistently have higher participation rates compared to females. This gap is particularly significant in disabilities related to hearing, speech, and movement.

Additionally, there are approximately 1.7 crore non-working disabled persons, with females comprising 54% and males 46%. Dependency on family support is common among disabled

non-workers, with 50% relying on their families for support. Additionally, a significant portion of male non-workers (around 33%) are students, while 22% of females fall into the same category.

A few visual representation charts from the 2011 census data are presented below. **It is important to note that some of the terms used to describe certain cognitive disabilities in the census data are insensitive and derogatory. We do not endorse the use of these terms, but they have been reproduced in the report as is, for accuracy.**

Literacy Rate among Disabled Population, India: 2011

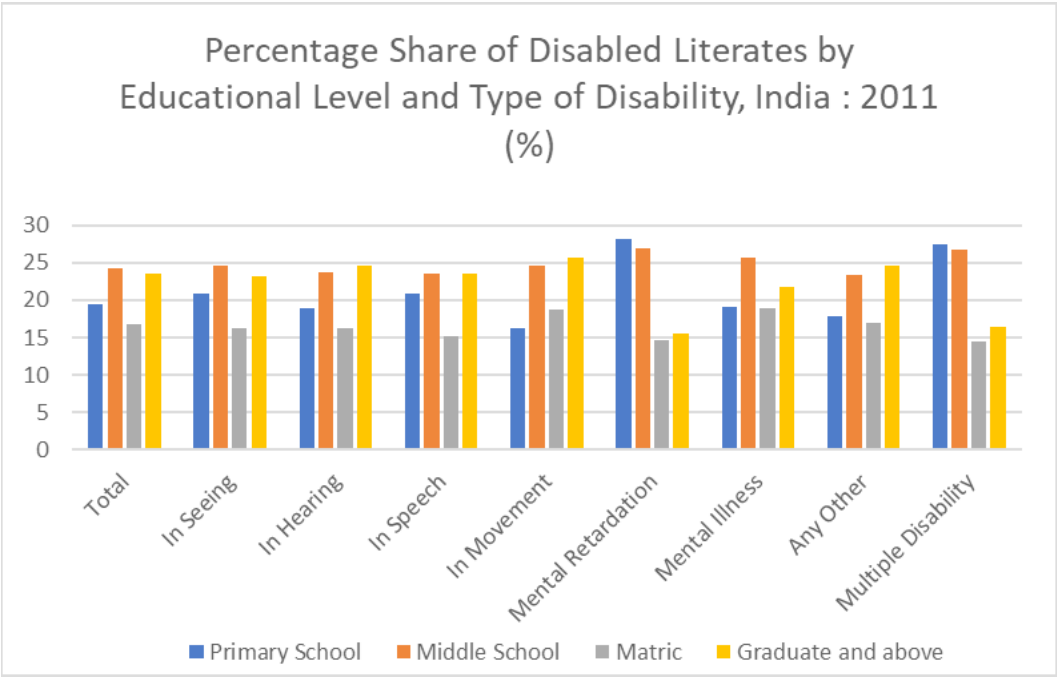
Type of Disability	Literacy among Population	In Males	In Females
In Seeing	2.7	1.6	1
In Hearing	2.9	1.8	1.1
In Speech	1.2	0.7	0.5
In Movement	3.3	2.3	0.9
Mental Retardation	0.6	0.4	0.2
Mental Illness	0.4	0.2	0.1
Any Other	3	1.8	1.1
Multiple Disability	0.7	0.5	0.2

Source: 2011 Census Data

Percentage Share of Disabled Literates by Educational Level and Type of Disability, India: 2011 (%)

Type of Disability	Type of Disability	Primary School	Middle School	Matric	Graduate and above
Total	Total	19.4	24.3	16.7	23.6
In Seeing	In Seeing	20.8	24.6	16.3	23.1
In Hearing	In Hearing	18.9	23.7	16.2	24.5
In Speech	In Speech	20.8	23.6	15.1	23.6
In Movement	In Movement	16.3	24.6	18.8	25.6
Mental Retardation	Mental Retardation	28.1	26.9	14.7	15.6
Mental Illness	Mental Illness	19	25.6	18.9	21.8
Any Other	Any Other	17.9	23.3	16.9	24.6
Multiple Disability	Multiple Disability	27.4	26.7	14.5	16.4

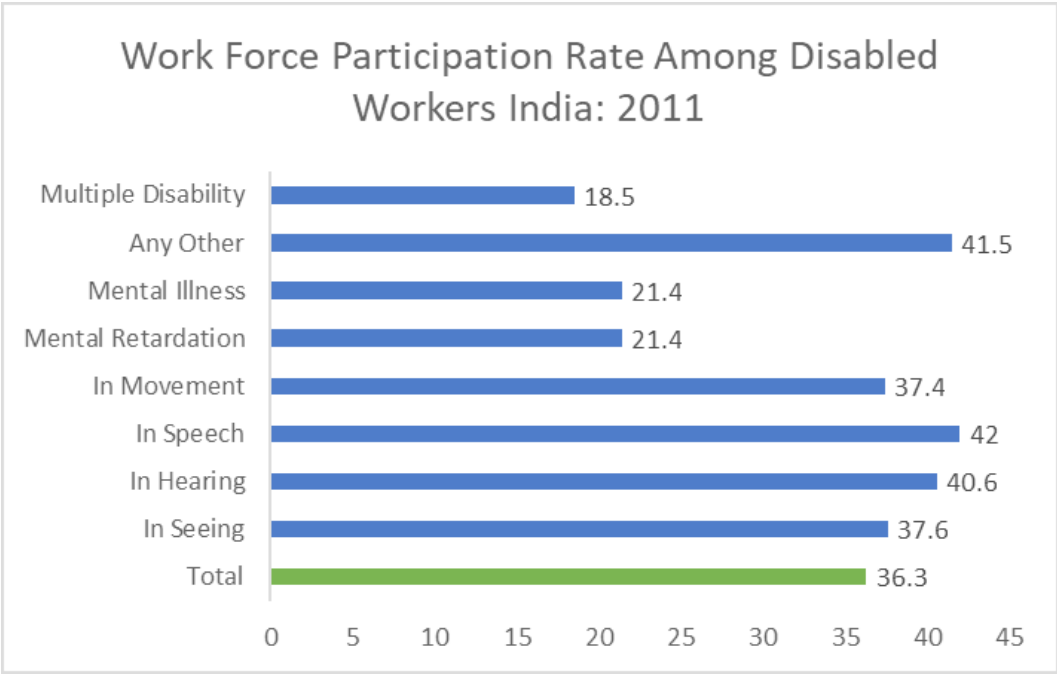
Source: 2011 Census Data



Workforce Participation Rate among Disabled Workers, India, 2011

Type of Disability	Persons	Males	Females
Total	36.3	47.2	22.6
In Seeing	37.6	51	22.8
In Hearing	40.6	53.9	25.8
In Speech	42	53.4	27.3
In Movement	37.4	47.5	21
Mental Retardation	21.4	26.7	14.2
Mental Illness	21.4	26.9	13.9
Any Other	41.5	53.4	26.8
Multiple Disability	18.5	24.1	11.7

Source: 2011 Census Data



Disabled Workers by Age and Category of Work, India, 2011

Age Group	Disabled Workers (WPR)	Main Workers	Marginal Workers
Total	36.3	26	10.3
0-14	4.1	1.8	2.3
15-59	50.5	36.9	13.6
60+	28.3	19.3	9
Age not stated	37.5	26.2	11.3

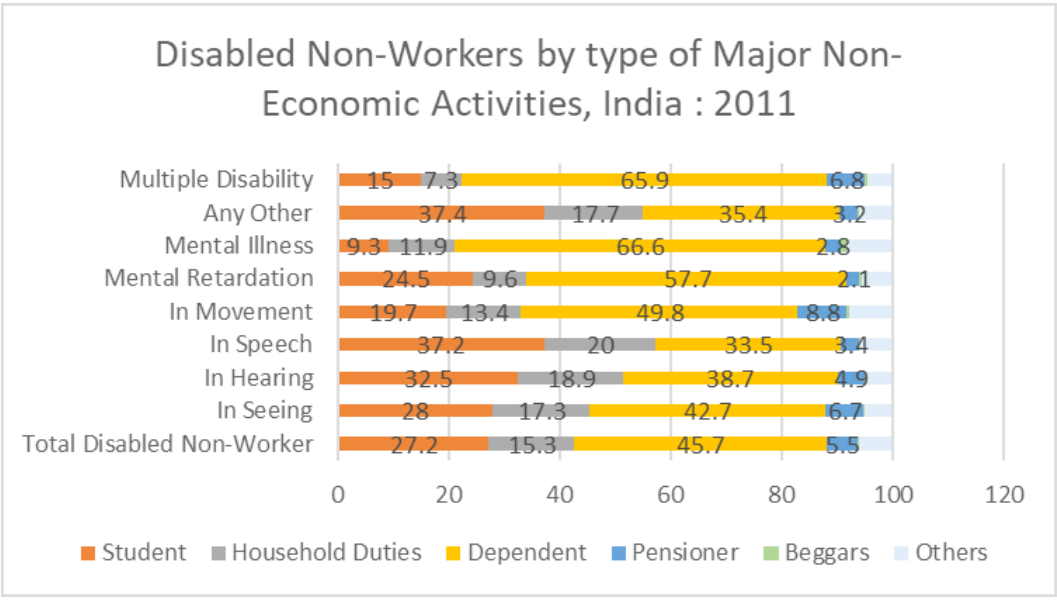
Source: 2011 Census Data

Note: The term "main workers" refers to individuals who are engaged in gainful employment for a major part of the reference period, while "marginal workers" are those who work for a shorter duration or intermittently.

Disabled Non-Workers by Type of Major Non-Economic Activities, India, 2011

Type of Disability	Student	Household Duties	Dependent	Pensioner	Beggars	Others
Total Disabled Non-Worker	27.2	15.3	45.7	5.5	0.4	5.6
In Seeing	28	17.3	42.7	6.7	0.4	4.7
In Hearing	32.5	18.9	38.7	4.9	0.2	4.6
In Speech	37.2	20	33.5	3.4	0.2	5.4
In Movement	19.7	13.4	49.8	8.8	0.6	7.4
Mental Retardation	24.5	9.6	57.7	2.1	0.5	5.4
Mental Illness	9.3	11.9	66.6	2.8	1	8.2
Any Other	37.4	17.7	35.4	3.2	0.3	5.8
Multiple Disability	15	7.3	65.9	6.8	0.6	4.3

Source: 2011 Census Data


Disabled Non-Workers by type of Major Non-Economic Activities, India : 2011
Multiple Disability
Any Other
Mental Illness
Mental Retardation
In Movement
In Speech
In Hearing
In Seeing
Total Disabled Non-Worker
15
7.3
65.9
6.8
37.4
17.7
35.4
3.2
9.3
11.9
66.6
2.8
24.5
9.6
57.7
2.1
19.7
13.4
49.8
8.8
37.2
20
33.5
3.4
32.5
18.9
38.7
4.9
28
17.3
42.7
6.7
27.2
15.3
45.7
5.5
0
20
40
60
80
100
120
Student
Household Duties
Dependent
Pensioner
Beggars
Others

A Call for Action

Although the 2011 Indian census marked a significant step in recognising India's 2.68 crore Persons with Disabilities (PwDs), a substantial portion of PwDs still endure social and economic marginalisation, alongside neglect from both government and society. This pervasive stigma, societal apathy, and systemic exclusion continue to shape the experiences of PwDs in modern India.

Given the concerning socio-economic status of PwDs, urgent tailored policies are needed to bridge structural gaps hindering their development. Globally, efforts are underway to foster inclusivity, with advancements in digital technology offering promising opportunities. At the same time, India boasts a large smartphone user base, but disparities persist, particularly in rural and marginalised areas. Collaborative efforts between government, civil society, and the private sector are vital in addressing the digital divide, enabling access to crucial resources for PwDs.

Though ICTs have shown promise in enhancing the lives of PwDs, comprehensive policy interventions still need to be improved. Hence, this policy brief, centred on the study "Empowering Abilities: The Impact of Digital Integration on the Lives of Persons with Disabilities," aims to provide a few policy recommendations to take forward the initiative of socio-economic integration of PwDs in India.

About the Report and Research Design

The study investigated the impact of digital integration on the lives of Persons with Disabilities (PwDs). It explored:

The role and impact of use of Information & Communication Technologies (ICTs) on PwDs' personal and socio-economic growth.

Socio-economic changes and the changing familial and societal attitudes experienced by PwDs through digital integration.

The role of digital service providers in enabling digital empowerment of PwDs and addressing challenges in accessing ICTs.

Through these inquiries, the study aimed to understand the effectiveness and implications of digital integration for PwDs, informing the development of inclusive policies in India.

The research design involved two phases assessing the impact of digital integration on PwDs in India. The initial phase surveyed 243 PwDs across 17 states, while the subsequent phase focused on 112 PwDs who consistently had access to ICTs and digital services. A comprehensive approach combining quantitative and qualitative methods was employed to pursue the two-phase study. Bilingual questionnaires, interviews, the Rapid Impact Assessment Matrix (RIAM) tool, and Focus Group Discussions (FGDs) captured diverse perspectives.

Data collection utilised the Digital Empowerment Foundation (DEF)'s KoBo Collect Survey App for efficiency. The research team, including District Coordinators (DCs) from DEF's Communication Information Resource Centres (CIRCs), received extensive training. Accessibility measures were implemented for participants with disabilities, and pilot surveys refined data collection processes. A dedicated team monitored data collection, ensuring quality and accuracy with feedback mechanisms in place. Rigorous backchecks maintained high data quality throughout the study.

Findings

In the first phase of the study, the focus was on evaluating this impact by surveying 243 PwDs across 17 states. ICT tools have emerged as powerful enablers, addressing prevalent challenges and exclusion faced by PwDs in accessing essential services like education, health, and employment. The study highlighted promising outcomes, including improved internet access, engagement with social welfare schemes, enhanced employment prospects, and increased community involvement. Notably, digital integration has transformed perceptions of PwDs within families and communities, shifting from notions of pity or sympathy to a life of dignity with recognition of their capabilities and potential contributions to society. This change fostered greater inclusion and empowerment for persons with disabilities, promoting their personal, financial, and social growth. Moreover, digital platforms facilitated social connections, allowing PwDs to participate in community activities and contribute meaningfully to society. The study clearly showed that as digital integration continues to evolve, and requires systematic tailored tangible policies and solutions to make the digital ecosystem inclusive of the needs of PwDs, ensuring accessibility and inclusivity remains paramount.

In the second phase of the study, the role of localised digital service providers in promoting the socio-economic inclusion of Persons with Disabilities (PwDs) was examined. Through capacity-building efforts and facilitating access to infrastructure and information, these providers empower PwDs by offering diverse services such as sustained access to ICT tools, stable internet connectivity, and digital literacy programs. They serve as catalysts for change by bringing PwDs together, fostering mutual support, and enabling the collective pursuit of learning and opportunities. This collaborative approach marks a significant departure from previous perceptions of PwDs as solution seekers who were seen as dependent recipients of aid to now as problem solvers among their peers and local communities. The digital integration transformed societal perceptions, treating PwDs as respected stakeholders within their families, communities, and society.

Despite notable progress, scrutiny is needed to address gaps and challenges in building an inclusive digital ecosystem. Suggestions for improvement include enhancing accessibility features, providing

tailored training, and increasing staff awareness of disability issues. Despite some mixed feedback on the overall impact, the majority reported positive changes in their ability to access government schemes, with their digital empowerment inspiring other PwDs to pursue similar opportunities.

Policy Recommendations

Need for Data and Recognition

Updating census data from 2011 is crucial in gaining an accurate understanding of the demographic and socio-economic status of PwDs. This updated data should encompass various factors such as demographics, social dynamics, economic conditions, and the diverse range of disabilities prevalent in society.

Collecting detailed data on the types of disabilities among Persons with Disabilities (PwDs) is a crucial step in formulating effective policies that leverage ICT to improve their lives. Understanding the specific disabilities individuals face allows policymakers to tailor ICT solutions to their unique needs, ensuring that interventions are both relevant and impactful.

Different types of disabilities present distinct challenges and require specific accommodations. For example, persons with visual disabilities may benefit from screen reader software, while those with mobility disabilities may require adaptive input devices or voice recognition technology. By collecting data on the types of disabilities prevalent among PwDs, policymakers can identify the most pressing needs and prioritise the development of ICT solutions that address them directly.

Gathering information on the types of disabilities also enables policymakers to recognise and address intersectionality within the disabled community placed differently in the ladder of socio-economic, regional and demographic hierarchies. Many PwDs may experience multiple disabilities simultaneously, compounding their challenges. A crucial and concerning point to note there is that the dominant and traditional definitions of disabilities have largely not encompassing the cognitive and neurological disabilities. By understanding the various intersectionalities of disabilities, policymakers can develop holistic ICT solutions that cater to the diverse needs of all PwDs.

Additionally, collecting data on the types of disabilities facilitates targeted resource allocation and intervention strategies. Policymakers can allocate funding and resources more effectively by focusing on the specific needs of different disability populations. This ensures that limited resources are utilised efficiently and that ICT initiatives have the greatest

possible impact on improving the lives of PwDs.

Furthermore, initiatives like the issuance of unique disability identity cards (UDID) by the Department of Empowerment of Persons with Disabilities (DEPwD) are steps in the right direction. However, challenges such as a shortage of skilled personnel, inadequate funding for awareness campaigns and IT infrastructure, and relatively lower demand for UDID cards compared to Disability Certificates need to be addressed.

To overcome these challenges, grassroots-level engagement can be utilised. Involving local personnel for data collection and verification can significantly improve comprehensive data collection and outreach efforts. This grassroots approach ensures that the needs and realities of PwDs at the local level are accurately reflected in policy decisions. Hence, by collecting accurate and updated demographic data, policymakers can tailor interventions and allocate resources more effectively to improve the lives of PwDs and promote their socio-economic inclusion.

Enhancing ICT/Digital Accessibility and Bridging Digital Divide

Efforts to improve access for Persons with Disabilities (PwDs) are multifaceted, encompassing connectivity, effortless digital platform accessibility, and provision of affordable technologies.

Enhancing internet connectivity in remote regions is crucial to ensuring that PwDs in marginalised communities can effectively access online resources. Additionally, the enforcement of accessibility standards plays a pivotal role in ensuring that websites and applications are user-friendly for diverse needs of PwDs, thus fostering inclusivity in the digital sphere.

Moreover, while there is already a plethora of technologies designed to cater to the diverse needs of Persons with Disabilities (PwDs), the government's pivotal responsibility lies in ensuring that these technologies are not only accessible but also financially viable for all members of society. Therefore, it becomes imperative for the government to conduct a comprehensive inventory of available solutions and tailor them to suit the specific requirements of PwDs in India.

This also entails implementing initiatives such as subsidies and forging partnerships with private entities to collaboratively develop

affordable digital solutions that cater to the socioeconomic realities of individuals. By strategically aligning these efforts with the unique needs and circumstances of PwDs, the government can play a proactive role in fostering greater accessibility and inclusivity within the technological landscape. By making existing technologies more affordable and widely known, the government can significantly enhance accessibility and inclusivity for PwDs. Subsidies and financial assistance programs can offset the costs of assistive devices and technologies, making them more attainable for those with limited financial resources. Moreover, partnering with private entities allows for the development of innovative yet affordable solutions tailored to the diverse socio-economic backgrounds of PwDs.

Strengthen the Local Digital Ecosystem

The Digital Service Centers,[1] ICTs and digital services, which are currently largely limited to physical locations, should be made accessible to PwDs, making it flexible for them to access services, trainings, and support from a remote location with stable internet connectivity. The collaborative efforts of the Government, private sector, civil society and the Tech-for-Good must ensure that the digital service providers are equipped with necessary assistive technologies and accessibility features to cater to the diverse needs of different categories of disabilities, including physical, cognitive and neurological disabilities. To achieve the same, large-scale surveys need to be conducted in respective communities and regions to get a quantitative assessment of the technological needs. Efforts should be directed towards strengthening the digital ecosystem especially in underserved and unconnected regions.

Through collaborative efforts of the government, private sector, and civil society, tailored digital literacy and skill development training programs and capacity building initiatives should be implemented so PwDs can leverage their ICT accessibility for their socio-economic empowerment. The curriculums and programs should particularly cater to the diverse needs of the PwD population along with adequate infrastructural support, and the knowledge required to use them meaningfully.

[1] The digital service providers are either Common Service Centers (CSCs) [https://csc.gov.in/] that are access points created by the Government of India for delivery of Government-to-Citizen (G2C) e-Services, or the Communication Information Resource Centers (CIRCs) [https://circindia.org/] run by Digital Empowerment Foundation in more than 2000 locations across the country.

Focusing on Education, Skills, and Work

Supporting Persons with Disabilities (PwDs) through education, skill training, and transition to work opportunities is crucial for their independence and quality of life. Inclusive education ensures that educational institutions are accessible and equipped with necessary accommodations, fostering academic and social growth.

Skill training programs, tailored to individual abilities, offer vocational and life skills training. Collaboration with the private sector and tech-based civil society initiatives should provide diverse skill development opportunities. Transitioning from education to employment requires comprehensive support, including career counselling and workplace accommodations.

Furthermore, community engagement and awareness initiatives should aim to remove the stigma and indifference surrounding disabilities, fostering a more inclusive society. Fostering partnerships between stakeholders is necessary to create an environment where persons with disabilities are valued for their contributions to the society.

Research, Impact Evaluation, and Feedback Mechanism

Accurately measuring the impact of current and future interventions on both the economy and society, particularly regarding the integration of PwDs is crucial. Despite the inherent challenges in quantifying the well-being of PwDs, it is essential to continue exploring methodologies for assessing the diverse benefits and challenges associated with the policies. These methodologies should consider various factors, such as changes in employment opportunities for PwDs and the subsequent effects of reliance on government assistance programs. Through a thorough evaluation of the outcomes of inclusion initiatives, policymakers can make well-informed decisions, allocate resources effectively, and create an environment where PwDs can actively participate in and benefit from economic progress and societal development.

In addition to quantifying the impact of interventions on the economy and society, it is crucial to regularly evaluate the influence of ICTs and digital integration on the experiences of PwDs. Feedback from PwDs and other relevant

stakeholders should inform the development of legislation and policies that govern their lives. Hence, establishing an efficient, adaptable, and inclusive mechanism for addressing the grievances of PwDs is imperative. By incorporating the voices and experiences of PwDs into policy-making processes, policymakers can ensure that interventions are responsive to their needs and promote genuine inclusion and empowerment. This holistic approach to evaluation and policy development will help in fostering a more equitable society.

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ANNEXURE 1

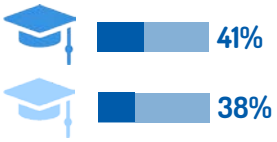
The Role of ICT in the lives of PwDs: Insights from the Ground

In search of PwDs across under -developed districts across 17 states of India, who have transformed themselves to become change makers, this survey could manage to find 78 percent males and 22 percent female

In the first phase of the survey, a total of 243 PwDs were surveyed to evaluate the impact of the digital integration in enhancing their social and economic standing in society. The findings provide insights into their demographic characteristics, geographical distribution, types of physical disabilities, educational attainment, participation in pension schemes. The respondents in the study, aged 18 to 55 years, consisted of 189 males and 54 females, reflecting a gender distribution of 77.8% males and 22.22% females. Geographically, the survey covered a total of 17 states across India, including West Bengal, Bihar, Jharkhand, Uttar Pradesh, Odisha, Assam, Rajasthan, Delhi, Madhya Pradesh, Telangana, Haryana, Maharashtra, Chhattisgarh, Jammu and Kashmir, Andhra Pradesh, Uttarakhand, and Karnataka. Mobility issues were predominant among the respondents, with 84.36% reporting such disabilities, followed by 13.58% with visual disabilities and 2.06% with hearing disabilities. In terms of educational attainment, 41.15% had obtained a Bachelor's degree, while 38.27% had completed high school or obtained lower qualifications, and 16.46% had attended college. Additionally, a significant portion reported diverse educational journeys, including post-graduate programs and specialized degrees. Regarding government pension schemes, 85.6% of respondents reported receiving pension benefits, while 14.4% stated that they did not receive any government pension.

To evaluate the impact of digital integration in terms of their socio-economic growth, the status of educational attainment,

Almost 85 percent of surveyed PwDs found to be mobility challenged.



Only 41 percent of PwDs could manage to be graduates; while 38 percent were high school or lower qualification.

54 percent of the surveyed PwDs found to have not been enrolled in any educational program, blaming lack of awareness, knowledge and access.

Almost 86 percent of the PwDs surveyed and talked found to be availing government pension benefits, clearly indicating that their extreme poor economic condition to be dependent on as meagre amount as government pension meant for disables.

employment condition, monthly income, sector of employment, and access to necessary digital infrastructure for the PwDs prior to little or no access to the ICT tools was surveyed among the respondents. It was observed that a considerable portion of respondents, 54.32%, were not enrolled in any educational program, indicating limited access to educational opportunities. In terms of monthly income, 11.11% of respondents had no stable monthly income, while 36.63% earned less than `1000 per month. Only a small fraction, 10.29%, earned more than `5000 per month. Employment opportunities were scarce, with only 11.93% of respondents reporting employment.

The Primary sector, particularly agriculture, dominated employment opportunities, followed by sectors such as education, healthcare, and entertainment. Access to necessary infrastructure and support was also limited, with 81.07% of respondents lacking access to basic facilities like PwD vehicles, wheelchairs, and family support. Moreover, a majority, 73.25%, did not have access to a personal vehicle for transportation, and 82.3% reported insufficient access to health funds for necessary treatment. These findings underscore the challenges faced by PwDs prior to accessing the digital

infrastructure.

The study further evaluated the status of their access to ICT tools/digital devices, proficiency in operating devices, internet access, using online modes of payment and social media. While a majority, 96.71%, had access to smartphones, they primarily utilized digital devices for entertainment and online services rather than education or business purposes. Concerning online payment, 78.6% used online modes, and 62.55% were aware of and used internet banking services. However, 46.5% had no access to any other digital devices, and 30.86% faced challenges, including physical disabilities (43.21%) and difficulties in learning to use digital devices (43.21%). Social media was widely used for entertainment (79.01%) and education (76.54%), but awareness of social welfare schemes through digital media was low, with only 37.45% aware of them. Additionally, respondents encountered various social barriers and challenges, including physical disabilities (43.21%), mental challenges (37.86%), and social barriers (36.63%).

About 96 percent of the PwDs agreed that they have had access to smartphones but they used the access for either entertainment or online services but not for education or for doing business.

78 percent of the PwDs found to have had experience of online transactions or knowledge of internet banking. This clearly indicates that the disabilities of the PwDs like inability to travel and transport, essentially needed the support of the Internet's mobility functionality through the smartphones.

36%

37%

37%

36 percent of the PwDs explicitly said they suffered mental health challenges; while another 37 percent complained of social stigma

Unfortunately only 37 percent of the PwDs were found to have any knowledge of welfare schemes provided by the governments.

Digital Adoption and Meaningful Connectivity

The process of digital integration among Persons with Disabilities (PwDs) reveals the transformative journey of PwD respondents, empowering them with necessary digital access and skillset thus enabling them to use internet meaningfully and avail employment opportunities or a career in entrepreneurship. Initially, respondents encountered various challenges in adapting to digital technology, including hesitancy to learn, lack of understanding, limited access to necessary devices and internet connectivity, and competing daily priorities. A substantial 77.37% expressed hesitancy toward learning and adopting new technology, while 64.2% faced challenges in understanding it. Furthermore, 47.33% lacked access to computers or laptops necessary for mastering digital skills, and 38.68% lacked internet connectivity. Additionally, 22.63% cited competing daily challenges as a barrier to engaging with new technology. These findings underscore the multifaceted obstacles faced by individuals with disabilities in accessing and utilizing digital tools for empowerment and inclusion. However, driven by diverse motivations such as interactions with fellow PwDs who share a similar journey, social work aspirations, intrinsic drive for self-improvement, and the pursuit of financial independence, they embarked on the journey of digital empowerment.

The digital adoption proved instrumental in laying a strong foundation for respondents to acquire essential skills and knowledge. Respondents reported

significant gains in digital literacy, entrepreneurial skills, operation of ICT tools, and awareness of social welfare schemes. The findings show the need for equipping PwDs with essential digital infrastructure, including printers, laptops, computers, smartphones, and tablets, to enable respondents to acquire and hone their digital skills.

77%

77 percent expressed hesitancy in learning new tecH tools, said they are fearful of new technologies

64%

64 percent faced serious challenges in understanding digital skill or digital functional skills

47%

More than 47 percent PwDs found to have no access to any of the digital devices like computers or laptops in order to learn any possible digital courses

37%

Close to 39 percent of the PwDs found to have no means to access the Internet as they live in data dark conditions

Furthermore, the findings overwhelmingly demonstrated the effectiveness of digital integration, with 96.3% of respondents finding them helpful in acquiring new digital skills. A significant majority (88.48%) gained proficiency in operating various digital devices, including computers, printers, laptops, and tablets, enhancing their technological literacy. Additionally, a substantial portion (76.13%) acquired proficiency in utilizing online meeting platforms such as Zoom and Google Meet, facilitating virtual communication and collaboration. Furthermore, over two-thirds of respondents (66.26%) developed the ability to search for relevant information on the internet and leverage it to their advantage. Notably, a considerable number of respondents (62.55% and 53.91%, respectively) embraced online transactions and shopping, demonstrating increased comfort and confidence in conducting financial transactions digitally. Moreover, respondents demonstrated proficiency in utilizing Microsoft Office

applications and developed an understanding of digital marketing and Artificial Intelligence (AI). Additionally, a significant majority (78.6%) were able to access social welfare schemes and citizen entitlements.

The study shows that the digital adoption and increased use of ICT tools have not only played a crucial role in the lives of respondents but also among their peers and the community they reside in. This transformation at an individual level has in turn contributed to the broader goal of fostering digital inclusion and accessibility for wider community.

96 percent of the PwDs said acquiring digital skill was extremely helpful, and they adopted the skills to become digital entrepreneurs

88 percent of the PwDs who went through digital skills said the functional and contextual understanding of the digital tools and access to internet helped them to operate all kind of digital tools for a meaningful ways including earning through them

76 percent of the PwDs who went through rigorous digital skilling, adopted digital proficiency to the level of using communication tools like Zoom, Google Meet, and other digital collaboration systems including WhatsApp, especially through audio-visual functionalities of the tools

66%

66 percent of the PwDs, after digital adoption, claimed they could search the Internet meticulously so they could search anything that was relevant to the needs of the customers who came to ask them or needed.

76%

More than 54 percent of the PwDs excelled in online transactions, banking, and offering the online services to their village level customers

76%

78 percent of the PwDs went through digital adoption and skilling, learnt how to access and know about the welfare schemes, specially those directly relevant to PwDs so that they could offer them as a service and means to avail them for their fellow villagers.

81%

81 percent of the PwDs expressed that they did not have any of the basic facilities that a person with disabilities needed, such as vehicle or wheelchair, or a family member always available as a support system

82%

82 percent of the PwDs complained that they lack either free access to health facilities or resources to avail health support, considering that most of the PwDs always need essential health services.

11%

11 percent of the PwDs had no regular or stable monthly income

While 11 percent of the PwDs claimed to have sources of earning 5000 per month; 12 percents said they have regular employment

Almost 37 percent of the PwDs who were supposed to be breadwinner of the family claimed to have been earning less than Rs. 1000

Solution Seekers to Solution Providers: The Journey of Digital Empowerment

The journey of digital empowerment from being solution seekers to solution providers has significantly transformed the lives of the PwDs. By acquiring digital skills and engaging in entrepreneurship, PwDs have experienced various positive impacts. These include increased financial independence, enhanced self-esteem, confidence, expanded social networks, and improved access to livelihood opportunities. Additionally, their newfound abilities and roles as digital entrepreneurs have helped challenge societal perceptions and stereotypes about disability, fostering a more inclusive environment.

The digital empowerment further enabled the PwDs to play a crucial role in advancing digital inclusion and community development. The study shows that the respondents, with their knowledge of using ICT tools, are further assisting their family and community members in accessing essential digital services such as

90.95% of PwDs started using social media as a source of education.

83.54% of PwDs started using social media handles to gather information.

helping with filling government document applications, facilitating online transactions, and sharing information about educational and employment opportunities. With adequate access to ICT tools and meaningful connectivity, PwDs are serving as agents of change, leveraging technology to create more accessible and inclusive societies.

The digital integration has brought several changes in the lives of PwDs, profoundly impacting their lives in numerous ways. Firstly, it vastly improved accessibility and connectivity, with the majority of PwDs now having access to mobile phones, smartphones, and the internet. The data showed us that 97.94% had access to a smartphone. This increased connectivity has facilitated greater communication, access to information, and participation in various online activities. While 12.76% of PwDs still do not have access to digital devices, a significant majority of 87.24% of PwDs had access to either a tablet, a laptop or a computer. The findings further show that 93% of the PwDs reported that they were comfortable using a laptop or a computer during the survey. However, the remaining 7% faced challenges in using a laptop or computer and felt uncomfortable in operating digital devices.

Additionally, digital integration has empowered PwDs by providing opportunities for skill development and entrepreneurship. PwDs acquired new skills, including digital literacy, entrepreneurship, and proficiency in using digital tools and platforms. For instance, the findings reveal a huge shift in the purpose of social media use for PwDs. Before, social media was used for entertainment purposes by the majority of these respondents. However, after the digital integration, it shifted to education and 90.95% of PwDs started using social media as a source of education. Moreover, 83.54% of PwDs started using social media handles to gather information. Additionally, 46.09% and 45.27% of PwDs started using social media for online marketing and online business, respectively. One of the PwDs used YouTube to start a YouTube channel named to share her motivational story. As a result, PwDs have been able to explore new avenues for education, employment, and economic independence, contributing to their overall empowerment and socio-economic inclusion. Furthermore, social media engagement has emerged as a powerful tool for PwDs, enabling them to connect with others, share their experiences, and advocate for their rights and interests.

Personal Growth and Family Engagement

The digital integration of PwDs has not only impacted their individual lives but has also brought about positive changes within their families. Family support plays a crucial role in the journey of digital empowerment, with 41.15% of respondents acknowledging moral support from their families. Moreover, the socio-economic growth of PwDs following the digital adoption has had significant implications for their family's financial situation, with 66.67% reporting a positive impact on financial stability. This improvement in income has, in turn, contributed to enhanced overall well-being, as reported by 71.19% of respondents. Furthermore, families have expressed pride and support for the PwDs' efforts in assisting others in accessing government schemes and services, with 83.95% of respondents indicating familial support for their social work initiatives. The influence of ICT tools in the lives of PwDs extends beyond their immediate families,

41 percent say their families good will is back and moral support have increased

67 percent say their family's financial situation is improved

71 percent say significant improvement of their "overall wellbeing"

94 percent of the PwDs are spreading positive vibes to influence all kind of PwDs to adopt digital empowerment as a means to social empowerment

inspiring 93.83% of respondents to encourage other family members and close friends to pursue similar paths of digital empowerment. Additionally, the community at large has benefited from the digital enablement of PwDs, with 87.65% of respondents noting improved access to government schemes and services for various segments, including women, adolescent girls, children, men, and transgender individuals. Overall, the digital integration of PwDs has not only uplifted their own lives but has also brought about positive ripple effects within their families and communities.

Community Engagement

The positioning of PwDs within their communities has undergone significant transformation following digital adoption. The survey findings reveal a notable increase in social activity among digitally equipped PwDs, with 87.24% reporting heightened engagement compared to pre-digital adoption. This surge in social interaction has also extended to community events, with 84.36% of respondents actively participating in various local gatherings. Moreover, digital adoption has bolstered the self-confidence of PwDs, evidenced by 98.35% of respondents noting an improvement in their self-assurance. Importantly, there has been a perceptible shift in how PwDs are perceived by others, with all respondents acknowledging a positive change in people's attitudes towards them, reflecting increased respect and appreciation for their contributions to their communities. Additionally, 80% of respondents believe they have made a positive impact on their community, while 86% feel they have inspired other PwDs to embark on similar journeys of digital empowerment. Economically, digital enablement has translated into tangible benefits, with 93% of respondents reporting an improvement in their income. Furthermore, 60% of respondents have capitalized on new economic opportunities facilitated by their digital skills, highlighting the transformative impact of digital integration on their financial stability and independence. Overall, digital empowerment has not only enhanced the social standing and economic prospects of PwDs but has also empowered them to actively participate and contribute meaningfully to their communities.

87 percent of the PwDs express that there has been heightened social activities, and social engagements

84 percent report that they now participate in all kind of social gatherings freely and with proactive invitations and acceptance

80 percent felt they have been able to create huge social impact

Conclusion

The issue of disabilities affects millions of individuals worldwide, placing them at significant disadvantages across various aspects of life. In India, this challenge is particularly acute, with a vast number of people grappling with disabilities. The scale of this problem is immense, encompassing diverse disabilities ranging from physical impairments to cognitive and sensory limitations. Historically, the approach to addressing the plight of persons with disabilities has been conventional, focusing primarily on providing assistance and support. However, the most glaring observation from our study is that PwDs endure profound challenges stemming from stigma, societal indifference, and a pervasive lack of confidence. These obstacles, compounded by the diverse nature of disabilities, exacerbate their marginalisation and hinder their opportunities for socio-economic advancement.

Amidst these challenges, one notable initiative has emerged as a beacon of hope: the use of digital tools to empower PwDs. Mobile phones, in particular, have emerged as powerful enablers, offering audio-visual capabilities that cater to diverse needs. Leveraging these digital tools, an innovative initiative has identified PwDs with drive, willingness, and entrepreneurial spirit, assembling them into a cohesive cohort. Through comprehensive training, skills development, and a transformative mindset shift—from being seekers of assistance to providers of value - this initiative has yielded remarkable results. PwDs, equipped with digital skills and newfound confidence, have emerged as proactive contributors to society, defying stereotypes, and reshaping perceptions of disability.

In conclusion, while the challenges facing PwDs remain formidable, the transformative potential of digital empowerment offers a promising avenue for change. By harnessing the power of digital tools and fostering a culture of inclusivity and empowerment, we can create a more equitable society where every individual, regardless of disability, has the opportunity to thrive and contribute meaningfully.

To effectively address the multifaceted challenges faced by Persons with Disabilities (PwDs) in leveraging ICT tools, collaboration among the government, private sector, and civil society is paramount. Here's a revised version integrating their roles:

- **Enhanced Access to Digital Infrastructure:** The government can spearhead initiatives aimed at enhancing

access to essential digital infrastructure by providing subsidies or grants for digital devices such as smartphones, laptops, and tablets. Collaborating with the private sector, it can facilitate the production and distribution of accessible ICT devices at affordable prices. Civil society organizations can play a crucial role in advocating for the rights of PwDs and ensuring that government policies and programs prioritize their digital inclusion needs.

- **Tailored Digital Literacy Programs:** The government, in partnership with the private sector and civil society, should develop tailored digital literacy programs catering to the diverse educational backgrounds and needs of PwDs. These programs should encompass basic and advanced digital skills relevant to employment, entrepreneurship, and social integration. Civil society organizations can assist in the design and delivery of inclusive training modules, while the private sector can contribute expertise and resources to enhance program effectiveness.
- **Accessibility Standards and Guidelines:** Governments should enforce regulations mandating accessibility standards in ICT products and services, with active involvement from the private sector and civil society in their development and implementation. Private sector companies developing digital solutions should prioritize accessibility in their design and development processes, guided by established standards and guidelines. Civil society organizations can advocate for the adoption and enforcement of accessibility regulations, as well as provide training and support to ensure compliance.
- **Financial Support for Skill Development:** The government, private sector, and civil society should collaborate to provide financial support mechanisms for PwDs to access skill development programs related to digital technology. This can include scholarships, grants, and sponsorship opportunities for courses on digital marketing, e-commerce, programming, and other relevant areas. By pooling resources and expertise, stakeholders can maximize the impact of skill development initiatives and empower PwDs to succeed in the digital economy.
- **Promotion of Entrepreneurship:** Governments can incentivize

entrepreneurship among PwDs through tax incentives, grants, and preferential procurement policies, with support from the private sector and civil society in providing mentorship, training, and access to funding. Civil society organizations can facilitate networking opportunities and promote the visibility of PwD-owned businesses, while the private sector can collaborate on joint initiatives to create inclusive entrepreneurial ecosystems. By fostering an enabling environment for PwD entrepreneurship, stakeholders can drive economic empowerment and social inclusion.

- **Awareness Campaigns and Sensitization Programs:** The government, private sector, and civil society should collaborate on awareness campaigns and sensitization programs to combat stigma and misconceptions surrounding disability. These initiatives should highlight the capabilities and contributions of PwDs in the digital age, leveraging diverse communication channels and platforms. Civil society organizations can lead grassroots advocacy efforts, while the government and private sector can provide funding and logistical support. By working together, stakeholders can promote a culture of inclusivity and respect for diversity.
- **Collaborative Partnerships:** Collaboration among the government, private sector, and civil society is essential to address the complex challenges faced by PwDs in accessing and leveraging ICT tools. By pooling resources, expertise, and networks, stakeholders can develop holistic solutions that address the diverse needs of PwDs and promote their meaningful participation in the digital society. Public-private-civil society partnerships can leverage complementary strengths and perspectives to maximize impact and sustainability.
- **Continuous Monitoring and Evaluation:** Governments, private sector entities, and civil society organizations should collaborate on monitoring and evaluating the impact of ICT initiatives on the lives of PwDs. This involves collecting data on access, usage, and outcomes of digital interventions, as well as soliciting feedback from PwDs and relevant stakeholders. By conducting regular assessments and adapting interventions based on feedback, stakeholders

can ensure that their efforts are effective, responsive, and inclusive.

By integrating the roles of government, private sector, and civil society, stakeholders can leverage their respective strengths and resources to create a more inclusive and equitable digital society for PwDs. This collaborative approach is essential for addressing the complex challenges faced by PwDs and unlocking their full potential in the digital age.

ANNEXURE 2

Global Efforts

World Health Organisation

The **World Health Organisation (WHO)** has been actively involved in meeting the requirements of Persons with Disabilities (PwDs) by advocating for, and facilitating access to assistive technologies (Assistive Technology, 2024) to cater to different disabilities and demographics. Assistive technologies refer to a wide array of products and services designed to support and enhance one's cognitive abilities, communication skills, hearing, mobility, vision, and self-care. These encompass physical products like wheelchairs, glasses, and hearing aids, as well as digital solutions like captioning and speech recognition software. According to WHO, an estimate of 2.5 billion people across the globe needs assistive products, and an estimated 3.5 billion projected by 2050. Aligning with UN Sustainable Development Group's slogan - no one is left behind – WHO recognises the urgent need to bridge the gap in access to these essential tools (Leave No One Behind, n.d.).

Despite the evident benefits of flexibility, accessibility and upward social mobility, there exists a significant unmet need for assistive technologies across the world. The Global Report on Assistive Technology highlights the considerable inequity in access, with only 3% of people in low-income countries having access to necessary products in contrast to 90% in high-income countries. Barriers to access include low literacy, high costs, restricted mobility, lack of diversity of product range, and gaps in policies (World Health Organization & United Nations Children's Fund, 2022). As a response to these challenges, the World Health Organisation (WHO) has outlined ten priority recommendations, emphasising on the importance of improving access across all sectors of development, ensuring the safety and affordability of products, enhancing the capacity of the workforce, involving users and families in the access pathway, raising public awareness, investing in data-driven policies, promoting research and innovation, and strengthening international cooperation. To address the inequalities and the complexities at a global scale, WHO proposed the WHO-GATE 5P framework – policy, products, provisions, personnel, and people – and

formulated guidelines that offer technical support to the member states (World Health Organisation, 2018).

Europe is a prominent global leader in terms of Internet connectivity, with an impressive household penetration rate of 85% in 2019, which surpassed the global average of 57% (International Telecommunication Union, 2021). The strong and reliable internet connectivity has enabled substantial progress in digital transformation, particularly in the realm of accessibility to public services. Despite the advanced levels of e-government and digital infrastructure, digital inclusion continues to remain a pressing issue across the European Union (EU). Only slightly more than half of the population uses the Internet to interact with public authorities and access services (Eurostat, 2019). In the last decade, the European institutions have implemented several innovating strategies and digital inclusion programs to ensure equitable access to digital tools and services. An example of such an initiative is the Digital Inclusion Program implemented by the National Family Allowances Fund (CNAF) in France. Although the online service delivery mechanisms are widespread, a considerable section of the French population encountered challenges in fully leveraging digital tools. To bridge this disparity, the CNAF's initiative centered on identifying and assisting people who lack digital literacy, need help with navigating the internet, and referring them to appropriate tailored tutorials and training resources (Corbobesse, 2022). This comprehensive approach, guided by ISSA[1] guidelines, emphasised personalised support and accessibility, thereby facilitating greater participation in digital ecosystem.

The State Social Insurance Agency (SSIA) in **Latvia** has introduced an "e-assistant" feature to facilitate access to e-services for customers lacking digital literacy skills. This program enabled individuals to seek assistance from designated personnel at Service Centres, who would thereafter submit applications for required services on their behalf (State Social Insurance Agency, 2022). The SSIA successfully enhanced service accessibility while reducing administrative burdens by integrating digital and non-digital methods.

Germany's Social Insurance for Agriculture, Forestry, and Horticulture (SVLFG) focused on

[1] "The ISSA Guidelines offer social security managers access to concise and practical knowledge of international best practice in key areas of social security administration."

linguistic and cultural inclusivity in its digital initiatives. Recognizing the diverse backgrounds of seasonal workers, the SVLFG developed a web platform available in nine languages, accompanied by targeted outreach efforts to ensure widespread awareness and engagement (Social Insurance for Agriculture, Forestry, and Horticulture, 2022). This emphasis on clear communication and accessibility underscored the importance of catering to diverse user needs.

Finland's Social Insurance Institution (Kela) adopted an inclusive approach to digitalization, leveraging multi-channel service delivery strategies to accommodate varying levels of digital adoption among clients (Social Insurance Institution, 2021). The institution's commitment to continuous refinement and user-centric design, exemplified by the development of a chatbot with contextual capabilities, facilitated seamless interactions and enhanced accessibility.

Estonia's National Social Insurance Board (ENSIB) addressed digital disparities among distinct client segments, offering tailored solutions to accommodate varying levels of digital adoption and trust (Vaikmaa, 2021). ENSIB ensured equitable access to digital services across demographic groups by prioritising alternative authentication methods and proactive communication strategies.

These initiatives (Leaving No One Behind: Experiences in Digital Inclusion From Europe, 2022) underscore the critical success factors in promoting digital inclusion, including user-centered design, targeted outreach, and multi-channel service delivery. By prioritising inclusivity and accessibility, European institutions have demonstrated how digitalisation can truly benefit all members of society, paving the way for a more equitable and inclusive digital future. As Europe continues to lead in digital innovation, these lessons serve as invaluable guides for fostering meaningful digital inclusion initiatives worldwide.

The **United Nations (UN)** recognizes the challenges faced by persons with disabilities, particularly in humanitarian contexts such as displacement due to conflict, persecution, or climate-induced events. With an estimated 10.6 million displaced persons with disabilities worldwide[2], the UN acknowledges the critical need to address accessibility barriers, including digital exclusion, to

[2] https://www.unhcr.org/innovation/wp-content/uploads/2021/03/Digital-Access-and-Inclusion-of-People-with-Disabilities.pdf

ensure the full inclusion and participation of this vulnerable group in society. While technology has many advantages, the lack of affordability and adequate accessibility features in the digital ecosystem has deepened the digital divide for persons with disabilities.

In April 2020[3], a study by the UN Refugee Agency (UNHCR) and GSMA M4H program revealed the range of barriers in accessing ICTs, faced by refugee PwDs with hearing and visual disabilities. The barriers leading to their social exclusion included communication barriers, limited access to information and services due to lack of affordability, and little or no digital literacy. To tackle the same, UNHCR promoted "meaningful participation and leadership of people with disabilities through their engagement in the development and implementation of an inclusive and universally accessible response."

The COVID-19 pandemic further underscored the importance of ICTS and internet connectivity for accessing information and assistance. Digital inclusion became crucial for refugees with disabilities to "access vital protection services, participation in humanitarian programming, increasing livelihood opportunities, and facilitates integration." UNHCR's Innovation Service launched a Digital Inclusion Program to address specific challenges faced by persons with disabilities in displacement contexts. The program aims to tackle access and affordability roadblocks, ensure accessible information and engagement mechanisms, build digital skills, and enhance livelihood opportunities for persons with disabilities. Priority areas encompass tackling access and affordability roadblocks through partnerships with local service providers and manufacturers to facilitate access to connectivity. Additionally, efforts are directed towards developing accessible information and engagement mechanisms to ensure effective communication and participation among persons with disabilities, their families, and service providers. Furthermore, initiatives aim to enhance livelihood opportunities through online income generation activities and job opportunities in the digital labour market.

The UNCHR Innovation Service[4] invites proposals from operations aiming to address digital access and inclusion

[3] https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/04/M4H_Annual_Report_Spreads.pdf

[4] https://www.unhcr.org/innovation/digital-inclusion/

challenges for persons with disabilities in displacement contexts. While evidence around such interventions is limited, operations are encouraged to provide data demonstrating the potential success of their approach. This includes information on community needs, ongoing initiatives with local organisations, and support from third-party entities such as mobile operators and technology companies.

The UN's initiatives underscore its commitment to promoting digital inclusion for persons with disabilities, particularly in displacement contexts. By addressing barriers to access and affordability, ensuring accessible information and engagement, building digital skills, and enhancing livelihood opportunities, the UN aims to empower persons with disabilities to fully participate in society and realise their rights and potential. Through collaborative efforts and innovative approaches, the UN strives to create a more inclusive and equitable world for all (UNHCR Innovation, n.d.)

Best Practices from Developed and Developing Countries

This section delves into the best practices employed by both developed and developing countries to empower PwDs through digital inclusion and vocational training. Highlighting initiatives from different countries across the world, it showcases diverse approaches aimed at fostering inclusivity, independence, and economic participation for PwDs. Each country's efforts reflect a commitment to bridging the digital divide and providing tailored support to enhance the lives and opportunities of PwDs.

In the **United States,** efforts to empower PwDs through digital inclusion and vocational training have been central to fostering greater independence, economic opportunity, and social inclusion. With a commitment to equality and accessibility, initiatives aimed at bridging the digital divide and providing vocational training have not only transformed the lives of PwDs but have also enriched society. Digital inclusion initiatives in the USA have played a pivotal role in ensuring that PwDs have equal access to technology and online resources. Through various programs and partnerships, efforts have been made to provide assistive technologies, accessible websites, and digital literacy training tailored to the needs of PwDs (Reinkensmeyer et al., 2017).

One notable example is the Rehabilitation Engineering Research Center for Wireless Inclusive Technologies (Wireless RERC), funded by the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR). This centre focuses on developing accessible wireless technologies and promoting their adoption among PwDs, thus enabling greater participation in the digital realm. Moreover, federal laws such as the Americans with Disabilities Act (ADA) and the Rehabilitation Act have played a crucial role in promoting digital accessibility (Goldstein & Taylor, 2015). These laws require public entities and businesses to ensure that their digital content and services are accessible to PwDs, thereby fostering greater inclusivity in the digital sphere.

Vocational training programs tailored to the needs of PwDs have been instrumental in enhancing their employability and economic independence. Organisations such as the National Technical Institute for the Deaf (NTID) and

the American Foundation for the Blind (AFB) offer vocational training programs specifically designed to equip PwDs with the skills and knowledge needed to succeed in various industries (Rochester Institute of Technology, n.d.). Internet training programs targeted at PwDs have been instrumental in promoting digital literacy and enhancing access to online resources. Organisations such as the World Institute on Disability (WID) and the National Federation of the Blind (NFB) offer internet training courses and workshops designed to teach PwDs how to navigate the internet safely and effectively (Disnmore, 1966). These programs cover topics such as web browsing, email communication, online banking, and social media usage, thereby empowering PwDs to connect with others, access information, and engage in online activities independently. By equipping them with the necessary skills and knowledge, internet training initiatives enable PwDs to fully participate in the digital age and leverage technology to enhance their lives.

Digital inclusion and vocational training initiatives in the USA play a crucial role in empowering PwDs and promoting their full participation in society. By providing access to technology, skills development opportunities, and support services, society enables PwDs to achieve their goals, pursue meaningful careers, and make valuable contributions to their communities. As efforts to promote inclusion and equality continue, it is essential to recognize the importance of empowering PwDs and ensuring that they have equal opportunities to thrive in the digital age.

Australia, like many developed nations, recognizes the importance of empowering PwDs to actively participate in society. Through comprehensive initiatives focusing on digital inclusion, vocational training, and internet literacy, the country has made significant strides in enhancing opportunities for PwDs. By leveraging technology and skill-building programs, disabled individuals not only gain greater independence and self-sufficiency but also contribute meaningfully to society in various capacities. The Australian government has implemented various initiatives aimed at bridging the digital divide. These initiatives encompass accessibility standards for digital platforms, funding for assistive technology, and training programs tailored to the needs of PwDs (Olney & Dickinson, 2019). One such initiative is the National Disability Insurance Scheme (NDIS), which

Internet training programs targeted at PwDs have been instrumental in promoting digital literacy and enhancing access to online resources. Organisations such as the World Institute on Disability (WID) and the National Federation of the Blind (NFB) offer internet training courses and workshops designed to teach PwDs how to navigate the internet safely and effectively

provides funding for assistive technology devices and services to eligible participants. Through the NDIS, PwDs can access essential tools such as screen readers, speech recognition software, and alternative input devices, enabling them to navigate digital platforms with greater ease and independence.

Moreover, Australia's commitment to digital accessibility extends to public sector websites and services. The Web Content Accessibility Guidelines (WCAG) outline standards for web accessibility, ensuring that online content is perceivable, operable, and understandable for all users, including those with disabilities (Wan Mohd Isa et al., 2016). By prioritising accessibility in digital design and development, Australia aims to create an inclusive online environment where people of all abilities can participate fully. In addition to digital inclusion, vocational training plays a pivotal role in empowering PwDs to enter the workforce and pursue meaningful careers. Through targeted programs and initiatives, Australia provides vocational training opportunities that cater to the diverse needs and aspirations of PwDs.

The Disability Employment Services (DES) program, for example, offers job seekers with disabilities personalised support and assistance to find and maintain employment. This includes vocational assessments, skills development, job placement services, and ongoing support in the workplace. By equipping individuals with the necessary skills and support networks, DES enables them to overcome barriers to employment and achieve economic independence (Hayward et al., 2022). Furthermore, Australia's commitment to inclusive education and training extends to initiatives such as the National Disability Coordination Officer (NDCO) program. NDCOs work collaboratively with education and training providers to ensure that students with disabilities have equal access to educational opportunities and vocational training pathways. By

fostering partnerships between stakeholders and promoting inclusive practices, the NDCO program facilitates smoother transitions from education to employment for persons with disabilities (McInnis, 2011).

Internet training and digital literacy programs are essential components of Australia's efforts to empower PwDs in the digital age. Recognizing the importance of digital skills for social inclusion and economic participation, the government and various organisations offer training programs tailored to the diverse needs of PwDs. The Australian Digital Health Agency (Biggs et al., 2019), for instance, provides resources and training materials to help PwDs navigate digital health platforms and access online healthcare services. By promoting digital literacy and awareness, these initiatives empower individuals to take control of their health and well-being, regardless of their physical or cognitive abilities.

Empowering PwDs through digital inclusion and vocational training not only enhances their quality of life but also enables them to make valuable contributions to society. By gaining access to education, employment, and community participation opportunities, PwDs can leverage their skills, talents, and lived experiences to enrich their communities and drive positive social change.

In **Brazil**, efforts to empower PwDs through digital inclusion and vocational training have gained momentum in recent years, marking significant strides towards fostering inclusivity and enhancing opportunities for marginalised communities. Recognizing the importance of equitable access to digital resources and skills development, Brazil has embarked on initiatives aimed at bridging the digital divide and leveraging the unique talents and capabilities of PwDs to contribute meaningfully to society (Costin, 2015).

Digital inclusion serves as a cornerstone in Brazil's efforts to empower PwDs and promote their active participation in the digital economy. The government, in collaboration with Non-governmental Organisations (NGOs) and private sector partners, has implemented various programs to provide access to technology and digital literacy training for PwDs across the country. One notable initiative is the "Digital Inclusion for All" program, which focuses on providing accessible digital infrastructure and training resources tailored to the needs of PwDs. Through partnerships with community centres, schools, and disability advocacy organisations,

this program aims to ensure that PwDs have access to computers, assistive technologies, and comprehensive digital skills training. By equipping PwDs with the necessary digital competencies, Brazil seeks to empower them to navigate online platforms, access educational resources, and pursue employment opportunities in the digital age.

Additionally, the government has implemented policies to promote the development of accessible websites, software, and digital content, ensuring that PwDs can fully engage with online resources and services (De Souza Cruz Ravaglio, 2023). These efforts align with international standards of web accessibility, promoting a more inclusive digital environment where PwDs can participate actively in social, economic, and cultural spheres. In tandem with digital inclusion efforts, Brazil has prioritised vocational training programs designed to enhance the employability and economic independence of PwDs. These initiatives aim to equip individuals with practical skills and knowledge relevant to various industries, enabling them to pursue sustainable livelihoods and contribute to the workforce.

One such program is the "Skills for Inclusion" initiative, which offers vocational training courses specifically tailored to the needs and abilities of PwDs. Through partnerships with vocational schools, training centres, and employers, this program provides hands-on training in fields such as information technology, hospitality, healthcare, and manufacturing. By focusing on skill development and job readiness, Brazil seeks to empower PwDs to secure gainful employment and achieve financial stability. Moreover, vocational training programs often incorporate elements of entrepreneurship and self-employment, encouraging PwDs to explore alternative pathways to economic empowerment. By fostering a culture of innovation and creativity, Brazil aims to unleash the potential of PwDs as entrepreneurs and business owners, driving economic growth and social inclusion.

Recognizing the transformative power of the Internet in facilitating access to information, education, and employment opportunities, Brazil has launched targeted internet training initiatives for PwDs. These programs aim to build digital literacy skills and promote responsible online behaviour among PwDs, empowering them to harness the full potential of the digital landscape. One such initiative is the "Digital

Citizenship" program, which provides interactive workshops and online resources to educate PwDs about internet safety, privacy, and digital rights. Through practical exercises and real-world scenarios, participants learn how to navigate online platforms safely, discern credible information from misinformation, and protect their data online. By promoting digital citizenship and responsible online engagement, Brazil seeks to empower PwDs to fully participate in the digital society while safeguarding their rights and well-being.

The efforts to empower PwDs through digital inclusion and vocational training have yielded tangible benefits for both individuals and society at large. PwDs who have undergone training and gained digital skills are better equipped to pursue educational and employment opportunities, thereby enhancing their economic independence and quality of life. By fostering a more inclusive workforce, Brazil leverages the diverse talents and perspectives of PwDs to drive innovation, creativity, and productivity across various sectors.

Japan has been at the forefront of empowering PwDs through various initiatives focusing on digital inclusion, vocational training, and internet training. These efforts stem from both government policies and initiatives in collaboration with Non-Governmental Organisations (NGOs). By providing comprehensive support and opportunities, Japan aims to enhance the participation and contribution of PwDs to society. The legislation mandates companies in Japan to ensure a certain percentage of their workforce comprises PwDs (Manullang, 2023). To support the implementation of this law, the government provides subsidies and incentives to businesses that hire PwDs. Moreover, vocational training programs are funded to equip PwDs with the necessary skills to enter the workforce successfully.

Japan prioritises universal design principles, ensuring that products, services, and environments are accessible to everyone, including PwDs. From public transportation and infrastructure to digital platforms and buildings, Japan's commitment to universal design fosters inclusivity and accessibility for all citizens. The Japanese government invests in digital inclusion initiatives to ensure that PwDs have access to technology and online resources. This includes funding for assistive technologies, accessible websites, and digital literacy programs tailored to the

needs of PwDs. Special education and training centers are run across the country, providing specialised support and vocational training for PwDs. These centers offer a range of programs focusing on skill development, job readiness, and career advancement, empowering PwDs to pursue meaningful employment opportunities. The Japan Information Access Project for Persons with Disabilities (JIAP) is one such initiative that provides internet training and resources for PwDs. JIAP offers online tutorials, workshops, and training sessions on topics such as web accessibility, assistive technology usage, and online safety. Additionally, the government collaborates with NGOs and community organisations to offer internet training programs tailored to the specific needs and preferences of PwDs.

The Nippon Foundation is one of Japan's leading philanthropic organisations dedicated to promoting social inclusion and empowerment for PwDs. Through initiatives such as the Paralympic Support Center and the Zero Project Japan, the foundation advocates for the rights of PwDs, provides access to sports and recreation activities, and supports employment opportunities. Barrier-Free Japan is an advocacy group focused on promoting accessibility and inclusivity for PwDs. Through campaigns, awareness-raising activities, and policy advocacy, the organisation works to eliminate physical, communication, and digital barriers in Japanese society (The Nippon Foundation, 2022).

Through digital inclusion, vocational training, and internet training initiatives, PwDs in Japan are empowered to make significant contributions to society across various sectors. In the workforce, PwDs bring diverse skills, perspectives, and talents, enhancing innovation, productivity, and organisational performance. They contribute to economic growth and social development by participating in meaningful employment, entrepreneurship, and civic engagement activities.

The **South African** government has recognized the importance of digital inclusion for PwDs and has taken steps to ensure their access to digital technologies and online resources. Through initiatives such as the National Integrated ICT Policy White Paper (Senaji, 2019), the government aims to bridge the digital divide by providing affordable internet access and promoting the development of accessible digital content and services. Additionally, the Universal Service and Access

Obligation (USAO) ensures that telecommunication service providers extend their networks to underserved areas, including rural communities where many PwDs reside. By improving connectivity and expanding internet infrastructure, the government enhances PwDs' ability to access online education, employment opportunities, and essential services (Hanass-Hancock, 2017).

South Africa's Department of Social Development, in collaboration with other government agencies and stakeholders, implements vocational training programs tailored to the needs of PwDs. These programs focus on skill development, job readiness, and placement assistance to facilitate PwDs' integration into the workforce. Furthermore, the Employment Equity Act promotes the inclusion of PwDs in the labor market by requiring employers to adopt affirmative action measures and eliminate barriers to employment. This legislation encourages businesses to provide reasonable accommodations and create inclusive workplaces that accommodate the diverse needs of PwDs (Steenkamp, 2023).

The government, through the Department of Communications and Digital Technologies, supports internet training initiatives aimed at improving digital literacy among PwDs. Community-based training centres, public libraries, and disability organizations offer workshops and courses on basic computer skills, internet navigation, and assistive technology use. NGOs such as Disability Rights South Africa (DRSA) and Disabled People South Africa (DPSA) play a crucial role in advocating for the rights and inclusion of PwDs (Disability Info SA, n.d.). These organizations raise awareness about disability issues, challenge discrimination, and lobby for policy reforms to promote equal opportunities and accessibility.

DRSA and DPSA engage in community outreach programs, legal advocacy, and public education campaigns to empower PwDs and promote their participation in decision-making processes. Through their efforts, they strive to create a more inclusive society that values and respects the rights of all individuals, regardless of their abilities. NGOs collaborate with government agencies and corporate partners to offer skills development programs specifically designed for PwDs. For example, organizations like the Association for the Physically Disabled (APD) and the South African Disability Alliance (SADA) run vocational

JIAP offers online tutorials, workshops, and training sessions on topics such as web accessibility, assistive technology usage, and online safety. Additionally, the government collaborates with NGOs and community organisations to offer internet training programs tailored to the specific needs and preferences of PwDs.

training centres and workshops that cater to the unique needs and abilities of PwDs (SADA, n.d.). These initiatives not only enhance PwDs' employability but also promote their economic independence and social inclusion.

NGOs actively promote digital accessibility and assistive technology adoption among PwDs to ensure their full participation in the digital society. They collaborate with software developers, website designers, and policymakers to advocate for the development of accessible digital content and technologies. Initiatives such as the South African National Council for the Blind (SANCB, n.d.) Accessibility Program provide training and resources to enhance the accessibility of websites, mobile applications, and electronic documents. By advocating for inclusive design practices and raising awareness about digital accessibility standards, NGOs contribute to creating a more inclusive online environment for PwDs.

PwDs in South Africa make valuable contributions to society across various sectors, including education, healthcare, arts, and advocacy. Through their participation in the workforce, PwDs contribute to economic growth and diversity, bringing unique skills, perspectives, and talents to their respective fields.

Annexure 3

Accessibility Standards for the Persons with Disabilities (PwDs)

With slight update to current provision as below, Other Standards & Guides such as enclosed covering a) Accessibility in the built environment b) e-Accessibility c) Design for All Approach in products, goods and services - Extending the range of users d) Accessibility in Mobility/Transportation shall be considered for Study and possible adoption by Ministry of Social Justice & Empowerment through Bureau of Indian Standards (BIS) ICT ACCESSIBILITY Research, Standardization & Testing.

ICT Accessibility Guidelines in India

Guidelines for Indian Government Websites (GIGW), released by the National Informatics Centre (NIC) in three versions, to enhance accessibility of government websites:

1.	Web Content Accessibility Guidelines (WCAG) 1.0	GIGW 1.0 focuses on Web Content Accessibility Guidelines (WCAG) 1.0
2.	Guidelines for Indian Government Websites Version 2.0	GIGW 2.0 improves upon the same with WCAG 2.0 standards
3.	Guidelines for Indian Government Websites and Apps Version 3.0	GIGW 3.0 incorporates advanced features for improved user experience and mobile accessibility.

Bureau of Indian Standards 17802, released in two parts, specify accessibility requirements for ICT products and services:

1.	Accessibility for the ICT Products and Services Part 1	Part 1 covers a range of products like mobile phones and software applications.
2.	Accessibility for the ICT Products and Services Part 2	Part 2 outlines testing procedures and evaluation methodologies.

Knowledge & Resource Centre for Accessibility in ICT (KAI), funded by MeitY, develops procurement guidelines for accessible hardware and software, conducting accessibility testing for various products:

Accessibility (Knowledge & Resource Centre for Accessibility in ICT (KAI) List of Prevailing Policies and Standards	An initiative to prepare Standard for Accessibility requirements for ICT products and services and to carry out training and capacity building.

Other Standards & Guides

	ISO/IEC Guide 71: Guide for addressing accessibility in standards:	ISO/IEC Guide 71:2014 provides guidance to standards developers on addressing accessibility requirements and recommendations in standards that focus, whether directly or indirectly, on systems (i.e. products, services and built environments) used by people.
2	CEN/CENELEC Guide 6:	Guidelines for standards developers to address the needs of older persons and persons with disabilities. It contains guidance for the creation and revision of standards to ensure greater accessibility of products and services. The guide is identical to ISO/IEC Guide 71.

3	CEN-CENELEC Protocol for following a Design for all approach in accessibility standardization	Outlines the procedure (protocol) to help technical bodies to decide whether accessibility, with a Design for All approach, should be addressed when developing or revising a standardization deliverable.
4.	ETSI Guide 202 116 - Guidelines for products and services 'Design for All' (DfA)	The guidelines are intended to encourage a "Design for All" approach so as to make products and services accessible to as many people as possible, including elderly people and persons with disabilities, without the need for adaptation or specialized design.

Accessibility in the built environment:

1	CEN/TR 17621:2021 (WI=JT011002)	Accessibility and usability of the built environment - Technical performance criteria and specifications
2	CEN/TR 17622:2021 (WI=JT011003)	Accessibility and usability of the built environment - Conformity assessment
3	EN 17210:2021 (WI=JT011001)	Accessibility and usability of the built environment - Functional requirements

CEN/CLC/ETSI/JWG on e-Accessibility:

4.	CEN/CLC/ETSI TR 101550:2022 (WI=JWEAC009)	Documents relevant to EN 301 549 (V1.1.1) "Accessibility requirements suitable for public procurement of ICT products and services in Europe"
5.	CEN/CLC/ETSI TR 101551:2014 (WI=JWEAC003)	Guidelines on the use of accessibility award criteria suitable for public procurement of ICT products and services in Europe

6.	CEN/CLC/ETSI/TR 101 552:2014 (WI=JWEAC004)	Guidance for the application of conformity assessment to accessibility requirements for public procurement of ICT products and services in Europe
7.	EN 301549:2021 (WI=JWEAC008)	Accessibility requirements for ICT products and services (Already adopted by India as IS 17802: Part 1 & Part 2

CEN/CLC/JTC Design for All:

8.	EN 17161:2019 (WI=JT012001)	Design for All - Accessibility following a Design for All approach in products, goods and services - Extending the range of users

Standards published by ETSI on Human Factor:

1	ETSI TR 101 550 V1.1.3 (2021-07)	Documents relevant to EN 301 549 (V1.1.1) "Accessibility requirements suitable for public procurement of ICT products and services in Europe"
4	ETSI TR 103 455 V1.1.1 (2020-09)	Human Factors (HF); Smart cities and communities; Standardization for citizens and consumers
6	ETSI EG 203 499 V1.1.1 (2019-08)	Human Factors (HF); User-centred terminology for existing and upcoming ICT devices, services and applications
8	ETSI TR 103 349 V1.1.1 (2016-12)	Human Factors (HF); Functional needs of people with cognitive disabilities when using mobile ICT devices for an improved user experience in mobile ICT devices
9	ETSI EG 203 350 V1.1.1 (2016-11)	Human Factors (HF); Guidelines for the design of mobile ICT devices and their related applications for people with cognitive disabilities
10	ETSI TR 102 575 V1.2.1 (2016-03)	Human Factors (HF); An IP-based text telephony solution known as "Reliable RTT"

Accessibility in Mobility/Transportation

CEN/TC 10 'Lifts, escalators and moving walks':		
1	EN 81-70:2021	'Safety rules for the construction and installations of lifts - Particular applications for passenger and goods passenger lifts – Part 70: Accessibility to lifts for persons including persons with disability'.
2	EN 81-82:2013	‹Safety rules for construction and installation of lifts - Existing lifts - Part 82: Improvement of the accessibility of existing lifts for persons including persons with disability'.
CEN/TC 320: Transport – Logistics and services:		
3	EN 17478:2021	Transport Services - Customer communications for passenger transport services - A Universal Design approach.
4.	ISO 21542:2021	Building construction: Accessibility and usability of the built environment. This document is primarily written for adults with disabilities, but it includes some recommendations on specific accessibility needs of children.
5.	ITU-T Y.4211	"Accessibility requirements for smart public transportation services".
6.	DIN 13278 "Smart mobility for people with reduced mobility".	German Institute for Standardization (DIN) is preparing a national standard for people with disabilities can communicate in public spaces, e.g. with public transport or traffic lights. It is planned to submit the finished document as a national project proposal at European level.

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