



Current Analysis Of Digital Accessibility In Public Service Systems, Legal Regulation, And The Necessity Of Developing Ai-Based Sign Language Virtual Interpreters

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Abstract— As the digitization of public services rapidly accelerates, ensuring digital accessibility for persons with disabilities (PWDs) has emerged as a critical human rights and social inclusion challenge. This paper presents the results of an official accessibility audit of the "E-Mongolia" public service platform's website conducted in accordance with the Web Content Accessibility Guidelines (WCAG) 2.2 (Level AA) standards, and discusses the associated legal and technological challenges. The audit identified a total of 503 accessibility violations within the system, revealing a weak monitoring and enforcement framework for digital governance accessibility. Currently, the Communications Regulatory Commission of Mongolia (CRC) monitors sign language compliance only for traditional television broadcasting, while no monitoring, auditing, or enforcement mechanism exists for digital platforms, websites, and mobile applications. Furthermore, because human resources (professional sign language interpreters) are severely insufficient to guarantee the right to information for the hearing-impaired, this study argues that an Artificial Intelligence (AI)-based Mongolian Sign Language Virtual Avatar Interpreter merits urgent research and development as a conceptual, human-in-the-loop complement to human interpreters—not a replacement for them—pending empirical validation and safeguards for privacy and community participation. To compile the large-scale video dataset of sign language that such a model would require, this study proposes a national implementation model. The model involves a joint initiative by the Ministry of Digital Development, Innovation and Communications (MDDIC) and the Ministry of Labour and Social Protection (MLSP) to equip national public call centers with video-based sign language translation capabilities, leveraging crowdsourcing methods for data collection.

Keywords - Artificial Intelligence, CRC Oversight, Crowdsourcing, Digital Accessibility, Digital Legal Regulation, WCAG 2.2

I. INTRODUCTION

In recent years, Mongolia has rapidly advanced its digital governance initiatives, achieving significant progress in reducing administrative time and costs for citizens through the deployment of the unified public service platform, "E-Mongolia." However, whether the benefits of this digital transition are being equitably shared with all social groups, particularly persons with disabilities (PWDs), remains highly questionable.

The rights of PWDs to access information and receive public services without barriers are guaranteed by the Constitution of Mongolia (1992) [1], the Law on the Rights of Persons with Disabilities (2016) [2], and the United Nations Convention on the Rights of Persons with Disabilities (CRPD, 2006) [3]. If websites and digital systems fail to conform to specialized design and coding standards tailored to visual, hearing, motor, and cognitive impairments, a "digital divide" deepens, further isolating these citizens from active social participation [10], [12].

For hearing-impaired citizens, receiving information solely through written text presents profound cognitive hurdles because written text does not mirror their native language (sign language) [9]. Sign language is an independent linguistic system with its own distinct grammar, syntax, and structural rules; consequently, written Mongolian serves essentially as a second language for deaf individuals. Thus, establishing sign language accessibility in the digital space is the only viable pathway to securing their fundamental right to information. This study analyzes the current state of digital accessibility, exposes gaps in the legal regulatory framework, and defines a strategy for developing an innovative technology solution: an AI-based sign language virtual interpreter.

Specifically, this study pursues three objectives: (1) to empirically audit the accessibility of Mongolia's flagship

digital public-service platform against the WCAG 2.2 (Level AA) standard; (2) to identify gaps in the domestic legal and regulatory framework governing digital accessibility; and (3) to outline a conceptual, human-in-the-loop framework for an AI-based Mongolian Sign Language virtual interpreter capable of supporting equitable access to public information. To meet these objectives, the study combines three methods: a WCAG 2.2 conformance audit of the E-Mongolia platform (automated scanning cross-checked with manual expert verification, detailed in Section IV), a doctrinal review of national disability and information-transparency legislation, and a comparative policy analysis drawing on international accessibility frameworks. The principal findings are that the E-Mongolia platform contains 503 WCAG 2.2 violations concentrated in keyboard accessibility and missing alternative text; that no monitoring or enforcement mechanism currently extends regulatory oversight from broadcast television to digital platforms; and that the acute shortage of certified sign-language interpreters motivates further research into AI-assisted interpretation as a conceptual, not yet validated, complement to human interpreters. Because written text remains a persistent barrier to learning and information access for deaf citizens, the study also situates its recommendations within a learner-centered perspective: an accessible, sign-language-first interface is treated as a precondition for inclusive digital literacy and lifelong learning, not solely as a public-service convenience.

II. CURRENT STATUS AND DIGITAL SKILLS OF PERSONS WITH DISABILITIES IN MONGOLIA

To evaluate the true necessity of making Mongolia's digital governance accessible, it is essential to analyze the demographic profile, socio-economic conditions, and digital literacy levels of PWDs.

A. Demographics and Educational Challenges

According to 2022 data from the National Statistical Office of Mongolia (NSO), there are 115,115 registered persons with disabilities in Mongolia, representing approximately 3.3% of the total population [22]. Among them, working-age individuals (aged 15 and older) account for 90.7% (98,033 citizens).

For children with disabilities, the school enrollment rate stands at only 64%, highlighting a severe deficiency in educational access. Furthermore, specialized schools are located exclusively in Ulaanbaatar, serving only 20% of all children with disabilities. Although certain measures have been initiated to integrate children with disabilities into general education schools, approximately 70% of those enrolled encounter systematic barriers on their commute due to a lack of physical, transport, and informational accessibility [8].

B. Employment Levels

Employment is the primary vehicle for PWDs to participate actively in social and economic life. In reality, however, their employment rate remains exceedingly low. Out of 46,760 officially registered citizens with hearing, visual, physical, or speech impairments in Mongolia, only 13.7% (6,390 citizens) are actively employed [22].

The employment rate broken down by disability type reveals:

- Visually Impaired: Out of 12,696 citizens, only 15.3% (1,947 citizens) are employed.
- Hearing Impaired: Out of 8,780 citizens, only 15.4% (1,350 citizens) are employed.
- Physically Impaired: Out of 21,064 citizens, only 12.3% (2,597 citizens) are employed.
- Speech Impaired: Out of 4,220 citizens, only 11.8% (496 citizens) are employed.

This low employment level is directly correlated with the restricted options for obtaining information and teleworking within the digital space.

C. Digital skills assessment results

The "Qualitative Digital Skills Assessment of Targeted Vulnerable Groups" study [13] conducted by the United Nations Development Programme (UNDP) Accelerator Lab confirmed that PWDs exhibit the lowest digital literacy compared to other socio-economic groups.

Key findings of the study indicate:

- Deficiency in Advanced Usage: While PWDs possess basic skills to create and share simple content (such as taking photos or recording videos), they lack the advanced competencies required to edit, modify, or integrate digital media to create new content.
- Digital Safety Risks: The vast majority of participants are unable to change their passwords independently and lack knowledge of cyber hygiene or personal data protection practices.
- Weak Information Filtering: Participants struggle to distinguish reliable online sources from fraudulent ones, exposing them to high risks of falling victim to fake news and online misinformation.

These metrics confirm that despite the rapid digital transition in our country, the "digital divide" is systematically excluding visually and hearing-impaired citizens. Therefore, alongside bringing public websites into compliance with WCAG standards, there is an immediate need to develop virtual AI sign language interpreters to allow hearing-impaired individuals to access digital information in their primary language.

III. GAPS IN CURRENT DIGITAL ACCESSIBILITY LEGAL FRAMEWORK AND ENFORCEMENT MECHANISMS

Article 11, Paragraph 11.1 of the Mongolian Law on the Rights of Persons with Disabilities (2016) states: "Legal entities providing information services shall ensure the right of persons with disabilities to obtain information, and establish technical, technological, and communication conditions to support them," and Paragraph 11.2.1 mandates "ensuring that public sector websites establish conditions for persons with disabilities to freely access information" [2]. Similarly, the Law on Public Information Transparency (2021) contains provisions requiring the accessibility of public information systems [6].

In practice, however, a concrete mechanism to implement these legal clauses, conduct compliance monitoring, or enforce administrative sanctions for non-compliance is entirely absent in Mongolia.

A. Current Regulatory Imbalance

- **Oversight of Traditional Media:** Today, the Communications Regulatory Commission (CRC) actively monitors whether multi-channel and broadcast television channels include sign language translation in their programs [5]. If television stations fail to comply with their legal obligations, the CRC can enforce administrative measures or sanctions tied to their broadcasting licenses.
- **Unregulated Digital Space:** In contrast, there is zero oversight of public and private sector websites, information systems, and mobile applications that citizens interact with daily. Because online public portals, banking applications, e-commerce sites, healthcare platforms, and educational portals do not comply with basic accessibility standards, visually and hearing-impaired citizens remain locked out of essential digital services [8].

B. Required Legal Reforms

To rectify these digital accessibility gaps, a centralized oversight and compliance framework must be legislated:

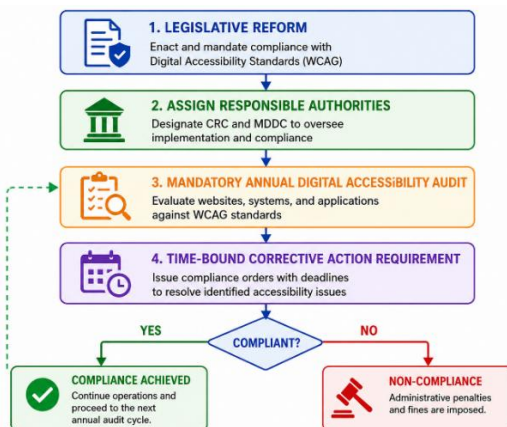


Fig. 1. Integrated Governance Framework for Digital Accessibility Compliance, Monitoring, and Improvement

1) *Legislating WCAG Standards:* The Law on Communications, the Law on the Rights of Persons with Disabilities, and the Law on Public Information Transparency must be amended to explicitly mandate adherence to the Web Content Accessibility Guidelines (WCAG). International precedents include the Americans with Disabilities Act (ADA) in the United States [14] and the EN 301 549 standard in the European Union [15], which legally protect accessibility in digital public spaces.

2) *Assigning Regulatory Mandates:* The mandate to audit and enforce digital accessibility compliance must be formally assigned to either the CRC or MDDIC. Expanding the current organizational structure of the CRC to establish a specialized "Digital Accessibility Supervision Division" represents a highly viable solution.

3) *Establishing Liability and Penalties:* Legal entities that violate accessibility standards—thereby restricting a disabled person's right to information and services—must be subject to administrative fines under the Law on Infractions [21], along with orders to restrict system operations until the violations are remediated.

IV. DIGITAL ACCESSIBILITY ON "E-MONGOLIA" SYSTEM: AUDIT AND ANALYSIS

To diagnose the current state of digital accessibility in Mongolia, an official accessibility audit of the unified public service website e-mongolia.mn was conducted on February 24, 2026, based on WCAG 2.2 Level AA standards (Document Reference: DPAR-A11Y-2026-01) [7]. The audit analyzed DOM (Document Object Model) snapshots across 80 representative pages of the portal, combining automated scanning with manual expert verification.

The 80 pages were purposively selected to cover the platform's highest-traffic service categories (civil registration, land and property services, social welfare, and business licensing) together with shared navigational components (the homepage, login flow, search results, and service-request forms), so that the sample reflects both the paths most citizens follow and the interface elements repeated across the site. Automated scanning was performed with an axe-core-based WCAG 2.2 conformance checker, which flags programmatically detectable issues such as missing alternative text, insufficient color contrast, and absent form labels. Because automated tools cannot reliably assess criteria that require human judgment—keyboard operability, focus order, meaningful reading sequence, and the presence or absence of sign-language alternatives for time-based media—each flagged page was subsequently reviewed manually by an accessibility auditor using keyboard-only navigation and a screen reader (NVDA), and discrepancies between automated and manual findings were resolved by a second reviewer. This mixed-method procedure is documented in full in the underlying audit report [7]; the summary presented here is limited to the metrics and violation categories most relevant to this study's scope.

A. Comprehensive Audit Metrics

- Total Violation Instances: 503
- Unique Rule Violations: 23
- Affected HTML Nodes: 1,484

The analysis demonstrated that the detected violations directly hinder PWDs from navigating the portal. Key issues are summarized below:

TABLE I. SUMMARY OF CRITICAL WCAG 2.2 VIOLATIONS ON E-MONGOLIA PORTAL

No	WCAG 2.2 Success Criteria	Detected Violation Patterns	User Impact
1	Non-Text Content [WCAG 1.1.1]	Missing alternative (alt) text attributes on multiple icons, decorative assets, and service cards.	Screen Readers cannot interpret the purpose of the graphical elements for visually impaired users [17].
2	Contrast (Minimum) [WCAG 1.4.3]	Contrast ratio between text elements and their background falls below the required 4.5:1 threshold.	Users with low vision or color blindness are unable to read critical information or navigate interface labels [23].
3	Keyboard Accessibility [WCAG 2.1.1]	Interactive dropdowns, login options, and modal windows are non-navigable using the Tab key, requiring mouse inputs.	Users with physical, motor, or visual impairments who rely solely on keyboard navigation cannot complete transactions [11].

No	WCAG 2.2 Success Criteria	Detected Violation Patterns	User Impact
4	Sign Language Lack [WCAG 1.2.6]	Instructions, warnings, and public service descriptions are presented solely in written text with no sign language alternatives.	Hearing-impaired users experience extreme cognitive fatigue and difficulty completing services [9].

B. Violation Category Breakdown

A breakdown of the 503 violation instances shows that over 45% of all errors are related to keyboard navigation and missing alternative text—the two most critical categories for blind and motor-impaired individuals. Furthermore, there is a widespread absence or incorrect implementation of WAI-ARIA (Accessible Rich Internet Applications) attributes, which are vital for notifying screen reader users of dynamic state changes (e.g., AJAX updates, modal pop-ups, and error alerts). These findings highlight that even the nation's flagship digital governance portal fails to meet essential digital accessibility criteria, indicating that conditions on average public and private sector websites are likely even worse.

V. AI-POWERED SIGN LANGUAGE VIRTUAL INTERPRETER SOLUTION FOR THE HEARING IMPAIRED

A. Human Resource Challenges in Sign Language Translation

The primary barrier to scaling up digital accessibility for the deaf is the acute shortage of professional sign language interpreters. In Mongolia, the number of active, certified sign language interpreters is extremely small, numbered only in the dozens [9]. These professionals are already overburdened, split between live news broadcasts, legal proceedings, medical appointments, and physical public service encounters.

Relying solely on human interpreters to translate content across thousands of public and private websites, mobile applications, and customer touchpoints is financially prohibitive and operationally difficult to scale. For this reason, the development of an AI-powered Mongolian Sign Language Virtual Avatar Interpreter is proposed here as a promising, potentially scalable and cost-effective complement to human interpreters [20]; it is presented as a conceptual framework whose translation accuracy, usability, and acceptance by the deaf community would need to be empirically validated before any operational deployment, and it is not intended to displace human interpreters for contexts—such as legal, medical, or emotionally sensitive communication—where nuance and trust are paramount.

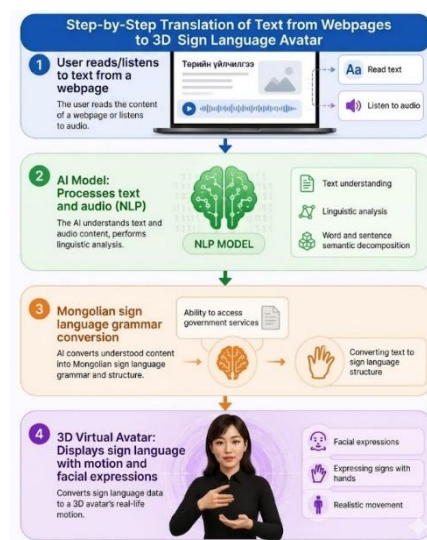


Fig. 2. Framework of an AI-Based Mongolian Sign Language Virtual Interpreter

B. The Primary Bottleneck: Dataset Acquisition

The bottleneck in training sign language translation models is the availability of high-quality video datasets (Sign Language Video Datasets). Because Mongolian Sign Language possesses its own grammatical structure, regional variations, and cultural nuances, international sign language datasets cannot be adapted [16].

This R&D initiative cannot be successfully completed by an isolated startup or a small research group. The primary obstacles are:

- 1) The complete absence of any structured, digitized, or standardized Mongolian Sign Language datasets.
- 2) The extreme difficulty of capturing natural conversational sign language (conversational dataset) in real-world environments.
- 3) The labor-intensive nature of annotating and labeling facial expressions, body gestures, and hand movements at high frame rates [17].

C. Technical Architecture of the Virtual Interpreter

The AI virtual interpreter operates via the following processing pipeline:

- **Natural Language Processing (NLP):** Translates written or spoken Mongolian text into the unique syntax of Mongolian Sign Language. While spoken Mongolian follows a Subject-Object-Verb (SOV) structure, sign language places temporal and spatial indicators at the very beginning of the sentence to establish context.
- **Bi-directional Translation Model:** Uses a Transformer-based deep neural network designed to map semantic text representations directly into temporal motion coordinates.
- **3D Rigged Avatar Control:** A motion vector generator that controls joint skeletal transformations (joints) and facial blendshapes. This drives a 3D virtual avatar in real-time, executing precise finger spellings, body postures, and facial expressions [20].

D. Data, Computational, and Human Resource Requirements

Translating the implementation model above into an executable research plan requires explicit estimates of dataset scale, computational infrastructure, and personnel, since the feasibility of an AI-based interpreter depends as much on these operational parameters as on the underlying model architecture.

- **Required Dataset Scale:** Based on comparable sign-language corpora (e.g., the 79-hour How2Sign and the approximately 1,400-hour BOBSL datasets), a pilot Mongolian Sign Language model would require an estimated 150–200 hours of annotated video covering 3,000–5,000 unique glosses to reach a minimally viable translation range; production-grade fluency and dialect coverage would require scaling this to 800–1,000+ hours in later phases.
- **Data Collection and Annotation Throughput:** At an estimated 20–40 consented video calls per day across national call centers (averaging 4 minutes each), supplemented by crowdsourced submissions, the pilot corpus could plausibly be accumulated within 12–18 months. However, only an estimated 40–60% of raw footage is expected to remain usable after quality and consent filtering, and detailed linguistic annotation typically requires 10–15 minutes of expert annotator time per minute of video—implying roughly 5,000–7,500 person-hours of annotation for the pilot dataset alone.
- **Algorithm Selection Rationale:** Rule-based gloss-to-animation lookup tables and classical HMM/DTW-based gesture classifiers were considered and rejected: the former cannot generalize beyond pre-scripted phrases, and the latter supports isolated-sign recognition but not fluent, context-sensitive generation. A two-stage Transformer-based pipeline (text-to-gloss sequence translation followed by gloss-to-3D-motion synthesis) is proposed instead, since it can (a) leverage transfer learning from existing pretrained Mongolian language models on the text side, reducing the sign-language-specific data burden, and (b) model long-range temporal dependencies in continuous signing more effectively than RNN/LSTM seq2seq baselines, consistent with recent sign-language translation literature [16].
- **Computational (GPU) Requirements:** As a narrow, domain-specific model rather than a large pretrained language model, training compute needs are modest by contemporary standards: an estimated 4–8 GPUs (A100-class or equivalent) running for several weeks per training cycle (approximately 2,000–5,000 cumulative GPU-hours) should suffice for initial development and periodic retraining as the dataset grows. Real-time avatar inference is comparatively lightweight, requiring only a single GPU per concurrent user session at deployment.
- **Team Composition and Timeline:** A core multidisciplinary team of approximately 12–18 specialists—machine learning engineers (2–3), data/infrastructure engineers (2), sign-language linguists and annotation leads (2–3), a project

manager, deaf-community liaisons (2–3), and call-center integration engineers (1–2)—supplemented by a contracted pool of 10–20 annotators scaling with data volume, would be required across an estimated 24–36-month program: infrastructure and pilot collection (months 0–6), scaled collection and first-model training (months 6–18), iterative refinement and community validation (months 18–30), and pilot deployment and evaluation (months 30–36).

- **Most Resource-Constrained Stage:** Unlike typical machine learning projects where model training dominates cost, data collection and expert annotation constitute the primary bottleneck here: annotation throughput is capped by the small pool of certified Mongolian Sign Language linguists available to validate submissions, making this stage the least parallelizable and most schedule-critical component of the entire program—a constraint that budget alone cannot relax.

These figures should be treated as planning assumptions to be refined once pilot data collection begins, rather than fixed specifications.

VI. JOINT NATIONAL PROJECT AND IMPLEMENTATION MODEL

To overcome dataset bottlenecks and accelerate the deployment of the virtual interpreter, the Ministry of Digital Development, Innovation and Communications (MDDIC) and the Ministry of Labour and Social Protection (MLSP) must launch an integrated national initiative [18], [19].

The proposed national project is structured across three core pillars:

A. Textual Data Flow Diagram

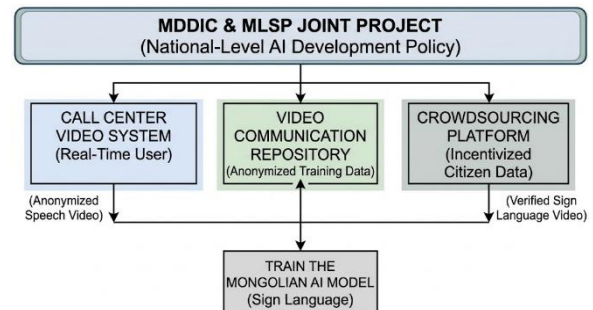


Fig. 3. Project Implementation Process Flow Diagram

B. System Architecture

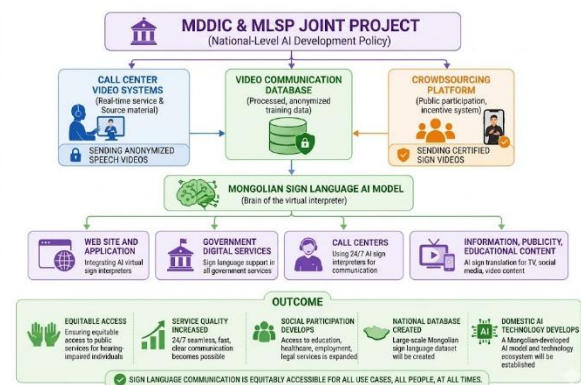


Fig. 4. National System Architecture for Mongolian Sign Language AI.

C. Call Center Video Infrastructure

All government and public utility call centers (including the E-Mongolia support desk, the 1111 Government petition line, and emergency services such as 101, 102, 103, and 105) must be equipped with video calling capabilities for deaf citizens.

- When a deaf citizen places a call, they will connect directly to a trained, human sign language interpreter via video.
- While immediately resolving the daily communication challenges of deaf citizens, this system serves as the primary engine for harvesting real-world, natural conversational sign language data.

D. Anonymization and Video Dataset Construction

Conversational videos captured through public call centers will be logged, stored, and compiled with user consent.

- To protect user privacy, the video feeds will undergo anonymization, converting face structures into generalized 3D face meshes while preserving facial expressions (blendshapes) and skeletal gestures.
- This process compiles a large-scale, real-world conversational dataset, which is necessary to train robust AI models to recognize natural signing variations.

E. Incentivized Crowdsourcing Platform

A public web and mobile crowdsourcing platform will be launched to supplement call center data collection [17].

- Deaf citizens and professional interpreters can log onto the platform, read text prompts, and upload video clips of themselves translating those prompts into sign language.
- The MLSP will implement incentive mechanisms (such as micro-payments or mobile data rewards) to encourage widespread participation among the deaf community.
- Submissions will undergo validation by a board of professional interpreters, yielding high-quality, annotated training datasets.

F. Ethical Safeguards and Community Participation

Because this project would collect video and biometric data (facial and skeletal motion) from a community that has historically been under-represented in technology design, its ethical foundations require the same rigor as its technical architecture. The proposed implementation model must therefore be conditioned on the following safeguards:

- **Informed Consent:** Participants must receive a clear, sign-language-accessible explanation of how their video data will be used, stored, and shared before any recording begins, with the ability to withdraw consent and have their data deleted at any time.
- **Biometric Data Governance:** Facial mesh and skeletal motion data constitute sensitive biometric information; their collection, retention, and secondary use should be governed by a dedicated data-protection protocol, subject to independent oversight, rather than by the general terms of service of a public call center.

- **Representativeness:** The dataset must deliberately include regional dialect variation, age groups, and signing styles within Mongolian Sign Language, since a model trained on a narrow demographic slice would risk misrepresenting or excluding parts of the deaf community it is meant to serve.
- **Deaf Community Participation:** Deaf associations and professional interpreters should be involved as co-designers, not only as data sources—including in decisions about avatar design, translation accuracy benchmarks, and the interpretation-quality review board—so that the system reflects the linguistic norms and priorities of the community it serves.

Absent these safeguards, a well-intentioned technical initiative risks repeating the extractive data practices that have drawn criticism in other AI-for-accessibility projects; with them, the initiative can plausibly serve as a model for community-governed assistive AI development.

CONCLUSION AND RECOMMENDATIONS

Digital transformation must serve as an equalizer that opens opportunities for all, rather than a barrier that isolates vulnerable citizens. The WCAG 2.2 audit of the "E-Mongolia" platform, combined with the low socio-economic metrics of PWDs in Mongolia, demonstrates that our current digital accessibility infrastructure is highly inadequate. Resolving this requires comprehensive legislative, structural, and technological reforms.

We present the following recommendations:

- **Amending the Legal Framework:** Expand the CRC's regulatory mandate beyond television broadcasts to encompass websites, public systems, and mobile applications. Legislate WCAG standards and incorporate administrative fines into the Law on Infractions for non-compliance.
- **Implementing Mandatory Audits:** Conduct independent, annual digital accessibility audits of all public sector portals and publish compliance metrics to the public.
- **Initiating the Joint National Project:** Launch a collaborative initiative between MDDIC and MLSP to compile a standardized Mongolian Sign Language dataset and develop a virtual avatar interpreter [18], [19].
- **Deploying Video Call Infrastructure:** Standardize real-time video communication channels across all state emergency and public service call centers, leveraging these channels as consented data collection nodes.
- **Fostering Crowdsourcing Ecosystems:** Support non-governmental organizations (NGOs) and deaf associations to lead crowdsourcing campaigns, utilizing financial and connectivity incentives to scale up data labeling efforts [17].
- **Establishing Ethical Governance:** Create an independent data-protection and community-oversight board, with deaf-association representation, to approve consent procedures, biometric data

handling, and translation-accuracy benchmarks before any pilot deployment.

By developing an AI-powered Mongolian Sign Language Virtual Avatar Interpreter, Mongolia can make its public and private digital ecosystems accessible to deaf citizens 24/7, ensuring true digital inclusion.

REFERENCES

- [1] The Constitution of Mongolia, Ulaanbaatar, 1992.
- [2] Law on the Rights of Persons with Disabilities, Law of Mongolia, 2016.
- [3] United Nations, Convention on the Rights of Persons with Disabilities, UN General Assembly, 2006.
- [4] W3C, "Web Content Accessibility Guidelines (WCAG) 2.2," W3C Recommendation, Oct. 2023. [Online]. Available: <https://www.w3.org/TR/WCAG22/>
- [5] Communications Regulatory Commission of Mongolia (CRC), Regulation on Broadcasting Coordination, Ulaanbaatar, 2020.
- [6] Law on Public Information Transparency, Law of Mongolia, 2021.
- [7] E-Mongolia Academy SOE, "Official Audit Report Evaluating the Accessibility of the E-Mongolia Website," Document No: DPAR-A11Y-2026-01, Feb. 24, 2026.
- [8] Asian Development Bank, "Ensuring Social Inclusion of Persons with Disabilities in Mongolia," ADB Report, Feb. 2019.
- [9] National Association of the Deaf of Mongolia (NADM), "Study on the Right to Information of Hearing-Impaired Citizens and the Sufficiency of Sign Language Interpreters," Ulaanbaatar, 2025.
- [10] Australian Bureau of Statistics (ABS), "Disability, Ageing and Carers, Australia: Summary of Findings," ABS, Canberra, 2023. [Online]. Available: <https://www.abs.gov.au/>
- [11] Vision Australia, "Digital Accessibility in Public Sector Systems: Best Practices and Auditing," Melbourne, 2024. [Online]. Available: <https://www.visionaustralia.org/>
- [12] National Disability Insurance Scheme (NDIS), "Digital Inclusion and Assistive Technologies Framework," Australian Government, 2022. [Online]. Available: <https://www.ndis.gov.au/>
- [13] UNDP, "Qualitative Study Assessing the Digital Skills of Targeted Vulnerable Groups," Ulaanbaatar, 2021.
- [14] U.S. Department of Justice, "Guidance on Web Accessibility and the Americans with Disabilities Act (ADA)," Washington D.C., 2022. [Online]. Available: <https://www.ada.gov/>
- [15] European Parliament, "Directive (EU) 2016/2102 on the accessibility of the websites and mobile applications of public sector bodies," Official Journal of the EU, 2016.
- [16] J. Sanders and H. Schmidhuber, "AI-based Sign Language Translation: Current Advances and Dataset Bottlenecks," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 45, no. 3, pp. 3120-3135, 2023.
- [17] T. S. Kim, Y. J. Lee, and S. H. Park, "Crowdsourcing Labeled Data for Low-Resource Sign Languages," in Proc. IEEE International Conference on Computer Vision (ICCV), 2024, pp. 4501-4510.
- [18] Ministry of Digital Development, Innovation and Communications (MDDIC), National Strategy for Digital Governance Development (2024-2030), Ulaanbaatar, 2024.
- [19] Ministry of Labour and Social Protection (MLSP), National Program for Ensuring the Participation of Persons with Disabilities, Ulaanbaatar, 2023.
- [20] M. Cooper, "The Role of Virtual Avatars in Sign Language Accessibility," ACM Transactions on Accessible Computing, vol. 15, no. 2, pp. 102-118, 2022.
- [21] Law on Infractions, Law of Mongolia, 2017.
- [22] National Statistical Office of Mongolia (NSO), "Statistical Indicators of Persons with Disabilities, 2021-2022," Integrated Database of Statistics (1212.mn), 2022.
- [23] British Dyslexia Association, "Web Accessibility for Neurodiverse Users: Standards and Guidelines," London, 2023. [Online]. Available: <https://www.bdadyslexia.org.uk/>