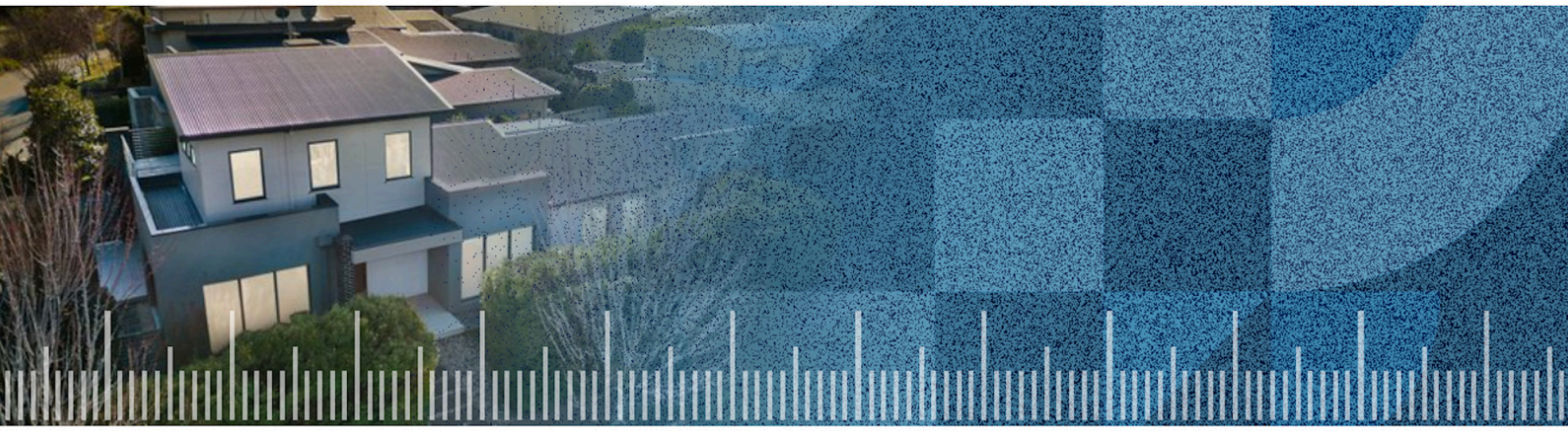
Measuring what matters

Residential accessibility assessment under fiscal pressure



Metrological Research Foundation

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Inaugural publication — May 2026

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About this paper

This is the Metrological Research Foundation's first contribution to a research programme on residential accessibility assessment in Australia. It is an open, evidence-informed starting point. Methodologies, assumptions and findings will be refined through industry engagement, pilot studies and peer review.

The Foundation originated from applied commercial practice in indoor spatial measurement. That practical experience informed both the issues identified in this paper and the technical approach proposed to address them. The paper does not advocate for a particular product or procurement pathway and does not prescribe a specific technology. It identifies the characteristics required of a measurement methodology that can operate at system scale, supporting a more rigorous, evidence-based and scalable approach to a problem that affects Australians who depend on the National Disability Insurance Scheme (NDIS).

The methodology described here is intended to ensure that NDIS supports are accurately matched to participant needs, based on verifiable environmental data. It is not intended to constrain participant supports or reduce funding allocations. Precision in assessment reduces error and improves outcomes for participants and for the scheme.

Profiles of the authors and further information about the Foundation are in Appendix A.

Acronyms and abbreviations

3D	3-dimensional
ABCB	Australian Building Codes Board
AHURI	Australian Housing and Urban Research Institute
AIHW	Australian Institute of Health and Welfare
ANAO	Australian National Audit Office
ANUHD	Australian Network for Universal Housing Design
AT	assistive technology
BIM	Building Information Modelling
CDS	Centre for Disability Studies
CHM	Complex Home Modifications (an NDIS funding category)
CIE	Centre for International Economics
DHA	Department of Health and Aged Care
I-CAN	Instrument for the Classification and Assessment of Support Needs
IDS	Indoor Survey (Auto-Measure proprietary software)
LHDG	Livable Housing Design Guidelines (voluntary, 2010)
LHDS	Livable Housing Design Standard (NCC, 2025)
LiDAR	Light Detection and Ranging
NCC	National Construction Code
NDIA	National Disability Insurance Agency
NDIS	National Disability Insurance Scheme
NHMRC	National Health and Medical Research Council
OT	occupational therapy / occupational therapist
OTA	Occupational Therapy Australia
SDA	Specialist Disability Accommodation

Executive summary

Australia's residential accessibility assessment system is under increasing pressure. Demand for Complex Home Modifications (CHM) is growing as the population ages, while assessment methods remain largely reliant on manual measurement and clinical judgement.

Between 78 and 81 per cent of Australians aged over 55 prefer to age in place (James et al. 2019). The feasibility of this preference depends on the accuracy of home modification assessment. Inaccessible housing is associated with a community cost of $3.0 billion to $6.7 billion per year, from falls, increased care needs and reduced workforce participation (CIE 2021).

The NDIS supported more than 760,000 participants at an annual cost of approximately $50 billion as of early 2026 (The Conversation 2026a). Scheme costs are projected to reach around $70 billion by 2030 (DHA 2026). Policy settings now focus on fiscal sustainability, consistency and value for money. Against that backdrop, the accuracy and reliability of home modification assessment are system-level concerns. Improving assessment accuracy reduces financial, clinical and administrative risk across the CHM pathway.

Current practice is characterised by variation between assessors, fragmented information handover, and limited ability to capture spatial conditions with the precision required to verify compliance with the National Construction Code (NCC) accessibility tolerances.

LiDAR-based spatial measurement, applied through a structured data methodology, provides a pathway to more consistent and verifiable assessment. The Foundation is progressively releasing its algorithms, validation datasets and performance benchmarks to support independent review and sector adoption.

This paper draws on demographic data and applied research in indoor spatial measurement. It examines current practice, identifies systemic limitations and presents 5 recommendations:

- establish a funded pilot programme
- revise the CHM assessment template
- develop assessor guidance
- engage the Australian Building Codes Board (ABCB)
- support independent validation research

1. Demographic and structural drivers of demand

Key points

- Between 78 and 81 per cent of Australians aged over 55 prefer to age in place rather than move into residential care (James et al. 2019). This preference reflects demographic, social and economic factors that are unlikely to change.
- Disability prevalence rises sharply with age. In 2018, around 4.4 million Australians (18 per cent of the population) were living with disability. Half were aged 65 or over (AIHW 2024).
- The NDIS participant base is projected to exceed 1 million by 2033 (ANAO 2025). The number of Australians with mobility limitations is projected to rise from about 3 million in 2018 to 5.75 million by 2060 (CIE 2021).
- Only 16 per cent of people with a mobility limitation live in dwellings modified for their condition. Renters with disabilities are about half as likely as owners to live in a modified home (CIE 2021).
- Inaccessible housing is associated with a community cost of $3.0 billion to $6.7 billion per year (CIE 2021).
- Home modification is not a temporary response. It has become the primary mechanism compensating for the undersupply of accessible housing.

1.1 Ageing in place: a dominant and structurally driven preference

Research consistently indicates a strong preference among older Australians to remain in their own homes as they age. AHURI research found that between 78 and 81 per cent of Australians aged over 55 prefer to age in place rather than move into residential aged care (James et al. 2019). This preference is evident across a wide range of functional and health circumstances.

Ageing in place is not simply a lifestyle preference. Its feasibility is shaped by 3 interdependent factors:

- the physical accessibility of the dwelling
- the ability to undertake timely and effective modifications
- the alignment between a person's functional needs and the spatial constraints of their environment.

Wellbeing is also a measurable dimension. People living in inaccessible housing are significantly more concerned about being forced into residential care than those living in accessible homes (Wiesel 2020). Access to appropriately designed or modified housing is associated with improved mental health, greater social participation, and a stronger sense of independence (Wiesel 2020).

Demand for home modification is therefore not discretionary. It is structurally driven by population-level preferences and broader trends that are expected to intensify in coming decades.

1.2 Population ageing and disability prevalence

The *People with disability in Australia 2024* report states that approximately 4 million Australians were living with disability in 2003. By 2018, this had increased to about 4.4 million people, or 18 per cent of the population (AIHW 2024). The report identified a clear relationship between age and disability prevalence. In 2018:

- 7.6 per cent of children aged 0–14 years had disability
- 13 per cent of people aged 15–64 years had disability
- 50 per cent of people aged 65 years and over had disability.

Population ageing is amplifying these trends. As of 30 June 2020, more than 1 in 6 Australians (16 per cent) were aged 65 and over. This proportion is expected to reach between 21 and 23 per cent by 2066 (AIHW 2026b). The number of older Australians living with disability rose from 1.72 million in 2012 to 1.94 million in 2018 (AIHW 2026b). Men and women aged 65 in 2018 could expect to live just over half of their remaining years with some level of disability—53 per cent for men and 54 per cent for women (AIHW 2026b). One in three people with disability (32 per cent) live with a severe or profound limitation requiring assistance with core activities such as mobility (AIHW 2026a).

These trends translate directly into greater demand for NDIS support, including home modifications. As of June 2023, the NDIS had approximately 610,500 active participants (AIHW 2024). By early 2026, this had grown to more than 760,000 (The Conversation 2026a). Projections indicate the participant base will exceed 1 million by 30 June 2033 (AIHW 2024). The number of Australians with mobility limitations is projected to grow from about 3 million in 2018 to 5.75 million by 2060, and the number of wheelchair users is projected to nearly double, from about 185,000 to 370,000 over the same period (CIE 2021).

These figures point to a structural shift, not a marginal increase. The strong relationship between age and disability, combined with population ageing, indicates that disability is becoming a mainstream life-stage condition. With more than half of later life likely to be lived with some level of disability, demand for accessible environments is expected to remain high.

Without a substantial shift towards embedding accessibility in mainstream housing supply, the system will face escalating costs, operational strain and increasing reliance on retrofit solutions.

1.3 Housing tenure and modification capacity

Housing tenure determines whether accessibility modifications can occur. In 2018, around 64 per cent of people with disability lived in owner-occupied housing (AIHW 2024). This cohort is the primary target for structural modification under the current CHM pathway.

Housing tenure patterns are shifting. Among households where the reference person is aged 65 and over, outright home ownership declined from 79 per cent in 2003–04 to 74 per cent in 2017–18 (James et al. 2019). A growing number of older Australians with disability are entering or remaining in private rental or social housing, where pathways for home modification are far more constrained.

Only 16 per cent of people with a mobility limitation live in dwellings that have been modified, about half the rate observed in owner-occupied households (CIE 2021). Private rental markets present particular challenges. Landlords are often reluctant to approve modifications, citing concerns about property value, requirements for tenants to fund installation and later restoration, and the limited enforceability of modification rights across jurisdictions (Wiesel 2020; CIE 2021). Home modification is therefore effectively inaccessible to many private renters with disability, regardless of clinical need.

Precise, non-invasive spatial assessment has a specific role here. Objective documentation of physical barriers within the home, produced to a verifiable standard, provides a stronger evidentiary basis for modification requests to reluctant landlords. Where disputes arise, it can also assist tribunal processes. Accurate spatial data can also support the design of less invasive solutions where structural changes are constrained.

The home modification system must therefore support increasing demand from homeowners while also addressing the needs of renters who face structural barriers. Accurate assessment of the home environment is essential in both situations.

1.4 Undersupply of accessible housing

Demand for home modification is intensified by the persistent undersupply of accessible housing. Since the release of the voluntary Livable Housing Design Guidelines (LHDG) in 2010, only between 5 and 10 per cent of new private homes have been built to those standards (ANUHD 2018). A survey conducted by the Australian Network for Universal Housing Design (ANUHD) found that 68 per cent of respondents had difficulty finding accessible housing (ANUHD 2018).

The scale of this voluntary policy failure is well established. The original aspirational target that was set by the National Dialogue on Universal Housing Design was for all new homes to meet universal design standards by 2020 (Wiesel 2020). By 2014 it was apparent that this would not be achieved, with industry transformation reaching less than 5 per cent of the intended target (ANUHD 2018). The subsequent inclusion of minimum accessibility standards in the NCC reflects the conclusion that voluntary mechanisms alone cannot deliver accessible housing at the required scale.

Voluntary supply is not solely a problem of builder reluctance. Even when builders are asked to include accessible features, they frequently lack the practical knowledge to execute them safely. Ramps are placed in unsafe locations and adequate manoeuvring space is not provided (Wiesel 2020). Purpose-built homes have been found to conflict with the 'well-entrenched ways' of conventional construction practice.

The challenge of finding accessible housing in the private market further compounds the problem. ANUHD describes the search for accessible private rental housing as 'virtually impossible'. Properties are frequently advertised as accessible while lacking key features in reality (ANUHD 2018). Verifying actual conditions often requires physical inspection of doorway clearances, ramp gradients and bathroom configurations. This places a burden of time and cost on people with disability that does not exist for other housing seekers (CIE 2021).

The Specialist Disability Accommodation (SDA) shortfall compounds this. Taking unmet demand and ageing stock into account, new housing is estimated to be required for 19,000 NDIS participants over the next decade (Morgan et al. 2024). As of late 2020, SDA funding was being paid to only about 54 per cent of the estimated 28,000 eligible NDIS participants (Morgan et al. 2024).

With mobility limitations expected to reach 5.75 million by 2060 and wheelchair users projected to nearly double (CIE 2021), the gap between demand and supply will widen. The private market has not demonstrated the capacity to address this shortfall, indicating a persistent structural deficit.

Home modification is not a temporary measure pending improved housing supply. It has become the primary response to a structural shortfall in accessible housing. In this context, the accuracy of assessment is a critical determinant of whether the system operates effectively.

1.5 Participation, safety and economic costs of inaccessible housing

Inaccessible housing has measurable impacts beyond the dwelling itself. These impacts are cumulative and cross-sectoral, affecting healthcare systems, informal care burden and workforce participation.

Workforce participation impacts are more specific than aggregate employment figures suggest. Wiesel (2020) identifies at least 2 distinct mechanisms by which inaccessible housing reduces productivity. First, people expend additional time and physical effort on self-care tasks in poorly designed environments, generating fatigue that reduces capacity for paid work. Second, inaccessible housing limits geographic mobility, constraining the ability of people with disability to relocate closer to employment opportunities. Nearly a third of people surveyed reported that inaccessible housing had led to job loss, missed work opportunities or reduced productivity. These are structural barriers created by the built environment.

Inaccessible housing also contributes to social isolation. Research by the University of Melbourne found that 80.8 per cent of people with disability report being unable to visit the inaccessible homes of family and friends. Approximately 85,800 people with limited mobility experience loneliness specifically because of these barriers (Wiesel 2020). Participants described a gradual withdrawal from family gatherings and social networks, resulting in what some called a 'hermit' existence and a progressive loss of connection. The broader community cost of inaccessible housing, primarily through falls and avoidable care needs, is estimated at $3.0 billion to $6.7 billion per year (CIE 2021).

Inaccessible housing also creates or intensifies reliance on informal carers. Where a person cannot perform basic self-care tasks because of the design of their home, the burden transfers to partners, parents or other family members. Research from the Centre for International Economics indicates that effective home modifications can reduce informal care requirements by an average of 6 hours per week (CIE 2021). This reduction represents both a quality-of-life improvement for the participant and a meaningful reduction in the unpaid care burden.

The psychological dimension is significant and should not be treated as separate from the economic costs. Living in an environment where basic tasks cannot be independently performed undermines self-worth, self-capacity and independence (Wiesel 2020). These impacts create downstream demand for mental health support and other services. They are partly consequences of inaccurate or delayed modification assessment.

Accessibility is therefore not simply a housing issue. It is a cross-sector economic and social policy challenge with system-wide consequences. The accuracy of residential accessibility assessment is not confined to individual outcomes. When assessments are inaccurate or delayed, they contribute to a broader pattern of inefficiency across public systems including avoidable healthcare costs, increased reliance on aged and community care services, and suboptimal allocation of resources.

Policy implications

- The NDIA and relevant research bodies should fund demographic modelling to project future CHM assessment volumes, taking account of ageing-in-place preferences, tenure trends and the accessible housing undersupply. This would support more accurate demand forecasting and workforce planning.
- Policy settings that constrain the home modification pathway including the rental modification barrier should be reviewed in light of the growing proportion of older Australians with disability in non-owner-occupied housing.
- Community cost estimates associated with inaccessible housing should be incorporated into the economic case for investment in assessment quality. The cost of inaccurate assessment extends well beyond the NDIS scheme boundary.

2. Regulatory context

Key points

- Residential accessibility in Australia is governed by a layered framework of national standards and codes that establish precise, measurable requirements for built environment design and modification.
- NCC accessibility requirements are expressed as enforceable dimensional tolerances, not general principles. Compliance verification therefore requires measurement data of similar precision.
- The Livable Housing Design Standard (LHDS) adds a tiered layer of accessibility requirements. Assessors must interpret as-built conditions against the Silver, Gold or Platinum tier appropriate to the participant's functional needs.
- The CHM assessment template is a clinical instrument, not a measurement tool. It does not prescribe measurement methodology or data format, creating a structural gap at the interface of clinical and construction documentation.

2.1 The National Construction Code

The NCC is Australia's primary regulatory instrument for building design and construction. It establishes minimum performance requirements across all building classifications, including the residential dwellings most commonly subject to NDIS home modification assessment. Accessibility requirements cover handrails, ramps, stairways, doorway widths, circulation spaces and sanitary facilities (ABCB 2025a).

NCC accessibility requirements are precise dimensional tolerances. To illustrate, the LHDS requires entrance doors to have a minimum clear opening width of 820 mm, measured under load with the door open and all hardware in place but not as a frame measurement (ABCB 2025c). Stair risers must fall within defined height ranges with minimal permitted variation. Ramp gradients must satisfy specific ratios. These are enforceable technical standards. Built outcomes are either compliant or non-compliant.

Manual measurement cannot reliably verify compliance at this precision. A tape measure applied to a door frame captures the nominal opening, not the actual clearance experienced by a wheelchair user accounting for the door's swing arc, threshold height, hardware protrusion and any wall-face irregularity. LiDAR-based capture records all of these factors simultaneously, in the spatial relationship they actually occupy. That is the measurement the NCC standard requires. Manual methods approximate it.

The Decision Regulation Impact Statement (CIE 2021) shows that builders frequently misinterpret 'clear opening' requirements, measuring door width rather than the usable space available under real-world conditions. This is not simply a training issue. It arises from the complexity of calculating functional clearance, which depends on the simultaneous interaction of door swing arc, hardware geometry, floor transition height and wall alignment. LiDAR-based measurement addresses this by directly capturing usable space, reducing reliance on interpretation and improving compliance accuracy.

2.2 The Livable Housing Design Standard

The LHDS complements the NCC by establishing minimum accessibility provisions for residential dwellings for Class 1a houses and Class 2 apartments. It focuses on features most directly relevant to activities of daily living, such as step-free access, doorway widths, corridor clearances and bathroom usability. The LHDS operates across 3 tiers: Silver, Gold and Platinum that represent progressively higher levels of accessibility provision.

For NDIS purposes, the relevant tier is typically determined by the participant's functional needs and the nature of the modifications sought. Assessors must verify current as-built conditions against NCC requirements and interpret those conditions against the appropriate LHDS tier. This places significant pressure on the accuracy and reliability of spatial data. Errors at this stage can lead to inappropriate recommendations, compliance issues or inefficient use of funding.

Voluntary uptake of LHDS in new housing has been very low. Most participants therefore continue to live in homes that were not designed to meet accessibility standards.

2.3 The NDIS assessment framework

Home modification assessments under the NDIS are governed by section 34 of the *National Disability Insurance Act 2013*, which requires that supports be reasonable and necessary. For Complex Home Modifications, this is put into practice through the CHM assessment template. The template requires assessors to document functional needs, environmental barriers and recommended interventions in sufficient detail to justify funding decisions.

The CHM template is a clinical instrument, not a measurement tool. It provides a structured framework for professional judgement but does not prescribe measurement methodology or data format. This is appropriate to its clinical purpose. However, it creates a structural gap when clinical documentation must be translated into construction specifications that comply with the NCC and LHDS. That gap is where assessment variability becomes construction risk and, ultimately, a source of scheme inefficiency.

2.4 The compliance verification problem

Together, these frameworks create a compliance verification challenge that current assessment methodology is not well equipped to meet. The NCC requires precision. The LHDS requires tiered interpretation (ABCB 2025a, 2025c). The CHM template requires clinical justification (NDIA n.d.). Each layer is coherent on its own terms.

The problem arises between these layers. A clinician's recommendation must become a builder's specification, requiring bi-directional legibility across clinical and construction languages. A builder's specification must then be verified against a physical reality that no architectural plan reliably captures.

In the context of NDIS reform, this misalignment has direct fiscal consequences. Modifications that do not meet functional needs require revision. Modifications that do not satisfy NCC requirements generate regulatory liability. Assessments that cannot withstand audit scrutiny undermine funding decisions. Each of these outcomes represents a cost that accurate upfront measurement could prevent.

Policy implications

- The ABCB should examine how spatially derived measurement data should be treated within NCC compliance verification, including whether verified LiDAR measurements should carry different evidentiary weight from manual measurements in disputes or audits.
- The NDIA should commission a review of the CHM template to identify how verified spatial data can be formally integrated into the assessment record. Spatial evidence should sit alongside clinical observation in a form legible to both clinicians and building professionals.
- The compliance gap between the NCC's dimensional precision and the CHM template's clinical focus should be acknowledged in NDIS guidance, with clear protocols for how the two standards interact.

2.5 Alignment with the NDIS Review and reform agenda

The Independent Review into the NDIS identifies a set of structural challenges in the current system, including inconsistent assessment processes, limited transparency in decision-making, fragmented service delivery and growing pressure on fiscal sustainability (Department of the Prime Minister and Cabinet 2023).

A central theme of the review is the need for more consistent, robust and evidence-based approaches to assessing participant need, supported by improved data quality and a stronger evidentiary foundation for decision-making. The review emphasises that accurate assessment is fundamental to a fair and sustainable scheme.

The review also calls for the NDIS to evolve into a learning system that measures what matters, builds an evidence base of what works, and supports continuous improvement across the disability ecosystem. It highlights the importance of digital infrastructure, system coordination and clear translation between different parts of the support pathway.

The methodology presented in this paper aligns with these reform directions. It addresses a specific but critical component of the assessment process: the measurement of the residential environment. Current reforms focus on improving the measurement of functional capacity. This paper identifies a corresponding gap in the measurement of environmental conditions.

By providing a structured, objective and verifiable approach to spatial measurement, the proposed methodology supports:

- more consistent and robust assessment processes
- improved transparency and auditability of decisions
- reduced variability between practitioners
- better alignment between assessment, design and delivery.

This paper should be understood not as a standalone proposal, but as a technical enabler of the NDIS Review's reform agenda.

Policy implications

- The NDIA should formally acknowledge the spatial measurement gap as a structural complement to the functional capacity assessment reforms underway. It should commission work to develop environmental assessment standards commensurate with the rigour now expected of functional capacity tools.
- The NDIS reform programme should incorporate residential spatial measurement into the learning system framework called for by the review. Evidence on assessment accuracy, rework rates and participant outcomes should be systematically collected, measured and used for continuous improvement.
- The ABCB and NDIA should jointly examine how spatially derived measurement data can support the digital infrastructure and inter-agency coordination improvements identified by the review.

3. Current assessment practice and its limitations

Key points

- A CHM assessment involves multiple sequential handover points at which spatial information is interpreted, summarised and partially lost.
- Inter-rater variability in manual measurement is a well-documented limitation. In a compliance context that demands millimetre-level accuracy, this variability represents a material governance and safety risk.
- The translation from clinical assessment language to construction specification language is a persistent source of misinterpretation, generating rework, repeated site visits and extended timelines.
- As NDIS participation grows and reform pressure intensifies, these inefficiencies are no longer peripheral. They directly affect scheme sustainability, participant outcomes and provider risk exposure.

3.1 How assessments currently work

A CHM assessment typically involves an occupational therapist conducting a site visit to evaluate the participant's functional needs and the physical characteristics of their dwelling. The assessor observes, measures, photographs and documents, producing a written report structured around the CHM template. The report identifies environmental barriers and recommends modifications to address them.

This report passes to a building works project manager, who interprets the clinical recommendations and translates them into construction specifications. Those specifications are used to obtain quotes, seek NDIA approval, engage contractors and deliver the physical modification. At each handover point, including the transition from participant to assessor, assessor to project manager, and project manager to builder, information is interpreted, summarised and partially lost. The process is sequential, document-dependent, and heavily reliant on consistent individual judgement at every stage.

3.2 Inter-rater reliability and measurement variability

Research in occupational therapy shows that consistency between assessors does not come from the assessment method alone. It depends on what is being measured, who is doing the assessment, and the conditions in which it is carried out (Abbott et al. 2024). Where assessments rely on judgement and manual measurement rather than objective instruments, differences between practitioners are expected, not exceptional.

Two assessors visiting the same dwelling may record different doorway widths, interpret the same ramp gradient differently, or reach different conclusions about corridor clearance adequacy. This is not because one is more skilled than the other. Manual measurement under real-world conditions is inherently imprecise. A tape measure held at a slight angle or misread, a spirit level read in poor light, or a gradient estimated rather than instrumented can introduce small errors. In a compliance framework that requires millimetre-level accuracy, those errors are not small. The CHM template provides structural consistency in what is documented but cannot provide measurement consistency in how the physical environment is captured.

Achieving high inter-rater agreement requires extensive training, calibration, and the use of clearly defined, observable criteria. Without these controls, measurement inconsistency and error are likely (Abbott et al. 2024). Even under such conditions, variability cannot be entirely eliminated where subjective judgement remains central to the process.

Research published in the *British Journal of Occupational Therapy* identifies a historically accepted 'margin of error' of up to 50 mm in home environment measurements, and significant discrepancies between practitioners in how those measurements are taken (Spiliotopoulou et al. 2018). Such tolerances may be acceptable in general clinical practice. They however introduce material risk in accessibility contexts, where small dimensional differences can determine whether a space is functionally usable or compliant.

In a compliance context such as the NCC and LHDS, these levels of variation are not acceptable. Manual measurement cannot consistently achieve the level of accuracy required, even with experienced assessors and careful practice. This is a limitation inherent in the measurement approach itself.

3.3 The handover gap and its cumulative effect

Measurement variability is compounded by a translation problem. Clinical assessment language and construction specification language are not interchangeable. The CHM pathway requires both elements. A clinician's recommendation must be translated into a builder's specification. That specification must then be verifiable against the as-built environment.

The Productivity Commission has described the NDIS service system as a 'maze' in which clinical intent is regularly lost in translation between stakeholders (Productivity Commission 2011:163). The home modification pathway illustrates this dynamic. Information degrades at each handover point. This occurs in transitions from clinical assessment to project management, from project management to construction, and from construction to compliance verification. Where the assessor's documentation is ambiguous, or where as-built conditions differ from what is recorded, clarification is required. Site visits may be repeated, timelines extend, and costs accumulate.

Despite the scale of demand documented in Section 1, the current home modification system relies heavily on manual, experience-based spatial estimation. This creates a mismatch between the increasing complexity of participant needs and the limited precision of the assessment methods available to meet them. Common consequences include design errors and non-compliant builds, iterative rework and cost escalation, disputes between participants, providers and funders, and inconsistent outcomes across assessors, providers and regions. In isolation, each is a quality problem. In the context of a scheme under fiscal pressure, they are efficiency problems with direct budgetary implications.

Verifying that completed modifications meet accessibility requirements is a recognised cost within the CHM process (CIE 2021). Manual measurement methods assess individual points in isolation and can miss how spaces function as a whole. Areas that appear compliant on paper may still create barriers in practice, particularly where small constraints combine to restrict movement. LiDAR-based spatial assessment addresses this by capturing the full layout of circulation paths, allowing combined constraints to be identified more reliably.

The Foundation's methodology is designed to act as a research-to-practice translation mechanism. It produces a single, objective spatial dataset usable by both clinicians and construction professionals. Verifiable spatial data does not resolve all challenges within the CHM pathway. It does, however, address the most critical issue. This is the lack of a common, reliable representation of the physical environment on which both assessment and construction decisions depend.

Policy implications

- Occupational Therapy Australia and equivalent professional bodies should develop guidance on integrating spatial measurement tools into accessibility assessment practice. This guidance should address data interpretation, documentation standards, and the relationship between spatial evidence and clinical judgement.
- The NDIA should establish consistent reporting requirements for measurement-related outcomes across CHM providers. These should include rework rates, variation orders and dispute frequency, to quantify the cost of the handover gap and track improvement over time.
- The systemic consequences of measurement variability should be measured and reported as part of scheme performance monitoring. These include rework rates, dispute rates and reassessment costs.

4. The case for spatial measurement technology

Key points

- The transition from manual measurement to LiDAR-enabled spatial capture is not a marginal technical improvement. It represents a foundational shift from subjective approximation to verifiable, standardised measurement.
- LiDAR captures as-built residential conditions objectively, repeatably, and at the precision required by NCC compliance frameworks. The as-built condition is the only condition relevant to accessibility assessment. Architectural plans do not reflect the actual environment.
- The prevailing high-density approach to LiDAR deployment produces outputs that require specialist processing infrastructure. These outputs sit outside the professional toolkit of most assessors and building professionals.
- The Foundation's smart data methodology addresses this limitation directly. It optimises spatial capture at the point of acquisition, producing compliance-referenced outputs legible to clinicians and builders without specialist post-processing.
- Spatial data does not replace clinical judgement. It provides the objective evidential foundation that lets clinical expertise focus on the functional and human dimensions of assessment.
- Standardised spatial measurement complements the functional capacity assessment tools now being adopted across the NDIS, including the I-CAN Support Needs Assessment.

4.1 What LiDAR does

LiDAR (Light Detection and Ranging) works by emitting laser pulses and measuring the time each pulse takes to return after striking a surface. From millions of these measurements, the system constructs a precise 3D representation of the scanned environment, known as a point cloud. Every surface, edge, recess and protrusion is recorded as a spatial coordinate, with measurable relationships to every other point in the dataset (Fugro 2025).

In residential applications, LiDAR can capture highly accurate 3D representations of existing homes, supporting the creation of detailed Building Information Models (BIM) for design, modification and construction processes (LiDAR Solutions n.d.).

Unlike manual measurement, which records individual dimensions in isolation, LiDAR captures the full spatial context of a dwelling. A single LiDAR scan of a bathroom captures not just the nominal width of a doorway, but its actual usable clearance with hardware in place, at the height relevant to wheelchair passage, accounting for wall irregularities or floor transitions. A scan of a staircase captures every riser height and tread depth individually, identifying variation across the full run rather than relying on one or two sampled steps.

This supports more reliable planning of renovations, accessibility modifications and construction works, while also providing a shared, objective dataset usable across clinical, design and construction workflows.

In the context of NDIS-funded home modifications, this is particularly relevant in CHM assessments, where small dimensional variations affect usability and compliance. A single, objective spatial dataset reduces reliance on interpretation and improves consistency.

4.2 The limits of high-density capture

The prevailing approach to LiDAR in built environment applications prioritises data density. High-specification scanners generate point clouds of extremely high resolution, often comprising hundreds of millions of data points. For large-scale infrastructure assessment, forensic reconstruction or heritage documentation, this level of detail may be appropriate.

For residential accessibility assessment, high-density capture presents practical limitations. A point cloud of 200 million data points does not directly assist an occupational therapist to complete a CHM report, nor does it support a project manager in specifying a bathroom modification. Interpreting this data requires specialist software, substantial computational resources, and technical expertise that sit outside the typical professional toolkit. In its raw form, the output is not actionable information. It is data that must be processed before it can inform decisions. This is a significant barrier to practical adoption.

4.3 Smart data: an alternative methodology

The Foundation's methodology is built on a different principle. Rather than capturing maximum data and filtering retrospectively, the Foundation's algorithms optimise spatial information at the point of capture. They acquire what is needed in the form it is needed, without the computational overhead and storage burden of density-first approaches.

A smart data approach treats measurement as a communication problem rather than a data problem. The more precisely capture is targeted to the question being asked, the more directly useful the output. In residential accessibility assessment, the questions are specific: Is this doorway wide enough? Is this ramp gradient compliant? Is this circulation space adequate for the participant's mobility equipment? The methodology should answer those questions directly, not generate a dataset from which answers must later be extracted.

The Foundation’s algorithms achieve this through optimised capture protocols that identify and measure compliance-relevant spatial features in real time. Riser heights, clearance widths, gradient measurements and circulation envelopes are extracted as discrete, documented data points. Outputs are expressed in the language of NCC tolerances and CHM documentation requirements, making them legible to clinicians and actionable by builders.

The methodology is built on the Foundation’s Building Modelling System. The underlying system architecture is supported by granted patents in Australia (AU2013203521), the United States (US10769864) and the European Union (EP2883215). The Foundation is releasing the implementation algorithms, validation datasets and benchmarks under open access terms, with the patents licensed on terms compatible with public-interest research and adoption.

4.4 Capabilities in the accessibility context

Applied to residential accessibility assessment, the Foundation's smart data methodology supports the following capabilities:

- Stair and ramp assessment. Individual riser heights, tread depths and gradients are captured across the full run of a staircase or ramp and verified against NCC tolerances. Variation is flagged rather than averaged.
- Doorway and circulation clearance. Actual clearance widths are recorded under load at relevant passage heights, accounting for hardware, floor transitions and wall irregularities that nominal frame measurements miss.
- Handrail verification. Placement, continuity, height and graspability are assessed against both NCC requirements and functional need.

- Bathroom and wet area spatial modelling. Turning circles, transfer spaces and fixture relationships are captured as a complete spatial model, allowing modification design to be based on verified as-built geometry.
- Circulation path analysis. End-to-end assessment of accessible routes through a dwelling identifies gradient changes, surface transitions and pinch points that individually may be within tolerance but collectively create functional barriers.

In each case, the output is a structured, compliance-referenced dataset that integrates directly into existing assessment and documentation workflows.

4.5 Alignment with functional assessment tools

The Instrument for the Classification and Assessment of Support Needs (I-CAN) is a standardised, evidence-based assessment tool developed by the Centre for Disability Studies (CDS) to measure a person's disability-related support needs across multiple life domains. It provides a consistent and structured way of understanding functional capacity and required supports, using trained and accredited assessors (CDS n.d.).

The NDIS has adopted I-CAN Version 6 as the foundation of its new Support Needs Assessment framework. This will be progressively introduced to improve consistency, reduce reliance on participant-supplied evidence and support fairer, more transparent plan budgets (NDIA 2025). This shift reflects a broader move toward standardised, objective assessment of participant need at system scale.

A comparable level of rigour is required in measuring the residential environment. A participant's functional outcomes are closely shaped by the spaces they live in and move through. Assessing functional capacity with precision while relying on approximate environmental data creates an imbalance in the evidence base. The Foundation's methodology is intended to provide the environmental measurement complement.

4.6 Implications for clinical practice and building delivery

A common concern about technology-assisted assessment is that it may replace clinical judgement. Evidence suggests the opposite when technology is used appropriately. Objective spatial data does not replace the occupational therapist's understanding of a participant's functional needs, lived experience and adaptive strategies. It reduces the need for estimation and lets clinical expertise focus on the human aspects of the assessment (Carnemolla and Bridge 2019).

When assessors can rely on accurate measurements, they can focus more fully on how the participant moves through their home, where difficulties arise and what matters most to them. The spatial data supports compliance requirements and the clinician focuses on individual needs. Together, they enable an assessment that is both more accurate and more person-centred than either approach alone.

For building professionals, the benefits are similarly practical. A project manager working from verified as-built spatial data can prepare construction specifications with greater confidence, obtain more accurate quotes and anticipate compliance requirements before work begins. The handover gap described in section 3.3 is not resolved through additional effort alone, but through the use of information that is objective, complete and unambiguous.

Policy implications

- A formally structured pilot programme should evaluate spatially informed assessment methodology within the CHM pathway. Key metrics should include assessment accuracy, time to approved modification, rework rates, compliance verification outcomes and participant satisfaction.
- The NDIA should examine whether the adoption of the I-CAN Support Needs Assessment creates a structural rationale for complementary standardisation of residential spatial assessment.
- Independent evaluation of pilot outcomes should be funded through relevant research bodies to generate the peer-reviewed evidence base necessary for broader adoption.

5. Risk reduction and value for money

Key points

- Improving spatial measurement accuracy directly reduces system risk across 3 domains. This includes financial, clinical and safety, and administrative.
- Inaccurate assessment generates direct costs through rework, variation orders, disputes and reassessments. These are avoidable costs that accurate upfront measurement can prevent.
- The value proposition aligns with the NDIS reform objective of delivering better outcomes per dollar spent. This is achieved by reducing error and inefficiency in the assessment and delivery chain not by reducing participant entitlements.
- The Foundation's methodology aims to ensure participants receive what they require to function safely and independently. This means supports are neither over-scoped nor under-scoped relative to their actual environmental need.
- Precise spatial data also enables smarter integration of assistive technology (AT) into the residential environment, reducing avoidable care hours by ensuring technology is correctly positioned for each participant's actual as-built conditions.

5.1 Financial risk reduction

Inaccurate residential accessibility assessment creates financial risk at multiple points in the modification delivery process. When measurements are imprecise or existing conditions are not accurately captured, the resulting construction specification may not reflect what the environment actually requires. This can lead to over-scoping, where modifications are more extensive than necessary, or under-scoping, where the work does not meet the participant's functional needs and must be revised.

Both outcomes carry costs. Over-scoping directs funding beyond what is required. Under-scoping leads to further assessments, additional approval cycles and repeat construction works. Variation orders are a well-established source of cost escalation in construction and are often caused by differences between documented and actual site conditions. Accurate, verifiable spatial data upfront reduces the likelihood of these issues.

At a system level, the financial case for measurement accuracy is clear. The cost of adopting a more precise assessment method is limited and predictable. The cost of inaccurate assessment is ongoing and cumulative, particularly as the number of participants continues to grow.

5.2 Clinical and safety risk reduction

Inaccurate assessment also creates clinical and safety risks for participants. When a modification is based on incorrect or incomplete measurements, it may not meet the participant's functional needs in practice, even if it appears compliant on paper. A bathroom turning circle based on estimated dimensions may be too small for the participant's mobility equipment. A ramp gradient derived from approximation may be non-compliant or unsafe.

These risks are not theoretical. For a population in which 1 in 3 people with disability lives with a severe or profound mobility limitation (AIHW 2026a), an incorrectly specified modification represents a safety concern rather than a minor inconvenience. Modifications that fail to address the actual barrier do not reduce this cost but instead contribute to it.

5.3 Enabling smarter assistive technology integration

Beyond structural modifications, the home is increasingly the setting for smart home AT, including automated doors, sensor-activated lighting and environmental control systems. These technologies can extend independence and reduce reliance on formal care. Research from AHURI indicates that, when implemented effectively, smart home AT can reduce the number of formal care hours required. It does so by enabling people to perform daily activities more independently (Bridge et al. 2021).

The effectiveness of smart home AT depends heavily on how it is positioned and configured. Devices installed using generic layouts or approximate measurements often underperform or go unused, contributing to non-adoption. Inaccurate measurements result in a poor fit between the equipment, the person and the environment, increasing the likelihood of abandonment (Spiliotopoulou et al. 2018).

Precise LiDAR-derived spatial data allows these systems to be designed and installed according to the actual dimensions, clearances and layout of a specific dwelling. This shifts the outcome from technology designed for an average user in an assumed space to technology that works reliably for an individual in their own home.

In the context of NDIS fiscal sustainability, smart home AT that functions as intended can reduce the need for ongoing formal care. Accurate spatial data is a key enabler of that performance. The value of precise measurement therefore extends beyond the initial modification to the longer-term support costs it can reduce.

5.4 Administrative risk reduction

Inaccurate or unverifiable assessment data also creates administrative risk for the NDIS and providers. Funding decisions based on subjective or unverified measurements are difficult to audit, defend or review. When disputes arise between participants, providers and the NDIA about whether a modification meets need or complies with standards, the absence of objective spatial evidence can make resolution slow and costly.

Verified spatial data provides an auditable evidence base. It allows funding decisions to be grounded in objective measurement, supports more consistent decision-making across providers and regions, and reduces the administrative burden associated with dispute resolution. As the NDIS continues to scale, this audit function becomes increasingly important to effective scheme governance.

5.5 The value-for-money proposition

Taken together, these risk reduction factors present a clear value-for-money case for more rigorous spatial measurement. The Foundation's methodology is positioned not as an additional cost to the system, but as a way to recover costs currently lost through inaccuracy. This framing aligns with the NDIS reform objective of delivering better outcomes per dollar spent.

Fiscal sustainability does not require reducing what participants receive. It requires ensuring that supports are accurately matched to need, and that the assessment and delivery process operates with a level of precision appropriate to the scale of the scheme and the complexity of participant needs. A properly specified modification is more likely to deliver the intended functional outcome and less likely to require costly revision. Precision in assessment protects both participants and the scheme by reducing error, not entitlement.

Policy implications

- The NDIA should commission analysis of the current cost of assessment inaccuracy—including rework rates, variation orders, dispute resolution costs and reassessment frequency—to establish a baseline against which efficiency gains from more rigorous measurement can be evaluated.
- Investment in spatial measurement methodology should be assessed against the full cost of inaccurate assessment, not only against the incremental cost of the measurement tool.
- The risk reduction benefits of improved spatial measurement—including reduced falls risk, reduced inappropriate care utilisation, and more effective smart home AT deployment—should be incorporated into broader economic evaluations of the NDIS home modification pathway.

6. Research contributions and open methodology

Key points

- The Foundation has conducted over a decade of applied indoor spatial measurement research, generating algorithms, validation datasets and performance benchmarks directly relevant to residential accessibility assessment.
- The research prioritises data precision over data maximisation, distinguishing the methodology from the density-first paradigm dominant in current LiDAR applications in the built environment.
- All measurement algorithms, validation datasets and performance benchmarks are being released into the public domain under open access terms, beginning with the methodologies most directly relevant to the CHM pathway.
- Independent replication and critical scrutiny are actively invited. The aim is to provide an evidential foundation for sector-wide improvement, not to advocate for a particular product or procurement pathway.

6.1 Background and research orientation

The Foundation emerged from sustained commercial practice in indoor spatial measurement across a range of built environment applications. Over more than a decade, this work generated proprietary research into measurement accuracy, data optimisation, algorithmic efficiency, and the practical conditions under which spatial measurement succeeds or fails in real-world residential settings.

The transition to a dedicated, not-for-profit research foundation reflects a deliberate choice. The knowledge developed through commercial practice is most valuable as a sector-wide contribution, rather than a competitive asset. An independent research model also lets the Foundation engage directly with clinical, regulatory and policy communities whose work intersects with spatial measurement, without the conflicts of interest associated with a commercial structure.

The Foundation's research focuses on a central question, namely what data is actually required in residential accessibility assessment and how capture methods can be optimised to produce it directly. The dominant paradigm in LiDAR-based spatial measurement assumes that more data leads to better outcomes. The Foundation's work challenges this assumption in the accessibility context, where professionals need data that is precise, usable and easy to interpret.

6.2 What the Foundation is publishing

The Foundation's research contributions span 3 interconnected areas, each of which is being progressively released into the public domain:

- **Measurement algorithms -** Optimised capture protocols for real-time feature identification and measurement extraction. These cover stairs and ramps, doorway and circulation clearances, handrail verification and bathroom spaces. Released under open access terms.
- **Validation datasets -** Curated datasets drawn from over a decade of real-world measurement across residential and commercial environments. Made available to researchers, regulators and professional bodies for independent validation and benchmarking.
- **Accuracy and performance benchmarks -** Systematic research into the accuracy, repeatability and real-world performance of the methodology, including comparisons with manual measurement. Published as peer-reviewed research.

6.3 An invitation to the sector

The Foundation's work is presented as a starting point, not a conclusion. Independent replication is essential. It is through replication that methodology becomes evidence and evidence informs policy. The Foundation invites occupational therapists, building professionals, regulators and academic researchers to test its methods within their own practice environments and standards of evidence.

The Foundation also seeks collaboration to extend the methodology into areas not yet fully explored, including different dwelling typologies, participant cohorts and regulatory contexts across states and territories. This paper is a starting point. Ongoing engagement, critique and collaboration are the means by which this work can develop into a robust evidence base for the sector.

Policy implications

- The NDIA and relevant research funding bodies, including the National Health and Medical Research Council (NHMRC) and university-based disability research centres, should support independent validation of spatially informed assessment approaches through peer-reviewed research.
- The ABCB should develop clear guidance on the use of spatial measurement data in compliance verification, including the evidentiary standards and data formats that allow such data to be relied on.
- Collaborative research programmes extending spatial measurement methodology to different dwelling typologies, participant cohorts and jurisdictions should be supported to broaden the evidence base.

7. Recommendations

The evidence in this paper points to clear and achievable improvements in how residential accessibility is assessed under the NDIS. The following 5 recommendations are grounded in the research and policy analysis set out in the preceding sections. They are offered as a pathway for the sector to consider, test and refine collectively.

Recommendation 1: Establish a funded pilot programme

The NDIA, in collaboration with state and territory housing and disability agencies, should establish a formally structured pilot programme to evaluate spatially informed assessment methodology within the CHM pathway. The pilot should generate comparative evidence by measuring outcomes from spatially informed assessments against current practice across a defined cohort of participants and providers. Key metrics should include assessment accuracy, time from assessment to approved modification, rework rates, compliance verification outcomes and participant satisfaction.

A pilot of this nature requires modest investment relative to the systemic inefficiencies it has the potential to quantify and address. It will generate the evidence required to assess whether spatial measurement improves accuracy, reduces rework and supports faster approval timelines.

Recommendation 2: Review the CHM template to accommodate spatial data

The NDIA should commission a review of the CHM assessment template. The review should identify how verified spatial data can be formally integrated into the assessment record. This includes clearance measurements, gradient recordings and circulation models. This does not require a wholesale redesign. It requires the addition of structured data fields that allow spatial evidence to sit alongside clinical observation in a form legible to both clinicians and building professionals. Such a revision would, for the first time, create a consistent and auditable spatial data trail across the CHM pathway.

Recommendation 3: Develop assessor guidance on spatial measurement tools

Occupational therapists and allied health assessors should not be expected to become spatial measurement specialists. They should be supported to understand what objective spatial data can and cannot tell them, and how to integrate it into clinical practice effectively.

Occupational Therapy Australia (OTA) and equivalent state associations should be engaged to develop guidance on the appropriate use of spatial measurement tools within accessibility assessment practice. The guidance should address data interpretation, documentation standards and how spatial evidence informs clinical judgement. It should also emphasise that technology supports professional expertise, rather than replacing it.

Recommendation 4: Engage the ABCB on compliance verification standards

The ABCB is the appropriate national body to consider how spatially derived measurement data should be treated within compliance verification processes. As LiDAR-based assessment becomes more prevalent, questions will arise about the evidentiary status of spatial data in NCC compliance determinations. This includes whether a verified LiDAR measurement carries different weight from a manual measurement in a dispute or audit context.

The ABCB should be engaged proactively to develop clear guidance establishing the evidentiary standards and data formats that allow spatial data to be relied on with confidence by assessors, building professionals, certifiers and regulators alike.

Recommendation 5: Support open research and independent validation

The Foundation's methodologies and findings will be progressively released into the public domain. The NDIA and relevant research funding bodies should support independent validation of spatially informed assessment approaches through peer-reviewed research programmes. This includes organisations such as the NHMRC and university-based disability research centres. Independent scrutiny is not a risk to be managed. It is the mechanism by which methodology becomes evidence, and evidence becomes policy.

This supports the NDIS Review's recommendation to establish a learning system that builds an evidence base of what works and improves disability data quality (DPMC 2023).

8. Conclusion

Australia's residential accessibility assessment system operates under increasing demographic, structural and fiscal pressure. The proportion of the population living with disability is growing, driven principally by population ageing. Most older Australians prefer to age in place, with research indicating that between 78 and 81 per cent of those aged over 55 hold this preference. Its feasibility depends directly on the accuracy of home modification assessment. The NDIS now operates at a scale and cost that requires assessment to function as a precision instrument, not an approximation.

Against this backdrop, the methodology used to assess, document and verify home modification needs has not kept pace with current demands. It does not meet the level of precision required by regulatory frameworks, the scale of the participant population, or the fiscal sustainability objectives central to NDIS reform. Current assessment practice is characterised by inter-rater variability, structural inefficiencies in the handover from clinical to construction documentation, and an inability to reliably capture as-built spatial conditions to the accuracy required by NCC tolerances. These are not peripheral quality concerns. They are efficiency failures with direct and compounding costs to the scheme, to participants and to the broader community.

LiDAR-based spatial measurement, applied through a smart data philosophy that prioritises actionable precision over data maximisation, offers a practical and evidence-grounded pathway. It provides objective, reproducible spatial data that supports clinical practice rather than displacing it. It enables the translation from clinical recommendation to construction specification. It produces a verifiable evidence trail capable of supporting compliance and audit functions that the current system cannot reliably deliver. And it aligns with the broader policy direction toward evidence-based, standardised assessment of participant need.

The Foundation's research is offered to contribute to a longer programme of work. It is not a solution to be adopted but an evidential foundation to be tested, scrutinised and built on. The algorithms, validation datasets and performance benchmarks are being released into the public domain for that purpose. Independent replication, critical engagement and collaborative extension are actively sought. The sector's engagement with these findings is the mechanism by which a more accurate, equitable and fiscally sustainable accessibility assessment system can be developed.

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Appendix A: Authors and the Foundation

About Auto-Measure and the Foundation

Founded in 2012, Auto-Measure originated as an indoor-survey product developer dedicated to bridging the gap between physical environments and digital representation. The company's early technological foundation was built on custom motorised mechanical bases equipped with laser distance meters. These hardware arrays systematically scanned interior spaces, interfacing with Auto-Measure's proprietary Indoor Survey (IDS) software and the internationally patented Snap-Plans modelling system to render precise, automated floor plans.

By 2018, the advent of accessible, high-precision LiDAR technology prompted a strategic evolution. Auto-Measure integrated the Leica BLK360 scanner into its workflow and re-engineered the IDS software to process complex point cloud data. The company shifted from a product-centric focus to a service-based model known as Indoor-Surveyor. This change provided extensive practical scanning experience across diverse real-world environments.

The COVID-19 pandemic temporarily interrupted the commercial rollout of Indoor-Surveyor. Auto-Measure used this period for intensive background development, including migrating its core content management systems to a modern Drupal 10 framework. This delivered a robust application where clients could book services and interact with spatial data directly within a web browser.

Today, inspired by rapid advances in artificial intelligence and the critical need for verifiable spatial data in the accessibility sector, Auto-Measure has executed its most significant pivot. The company has transitioned from a commercial service provider to a dedicated metrological research organisation. It is focused on releasing a decade of proprietary algorithms, smart-data methodologies and validation datasets into the public domain. Operating as a foundational research body, Auto-Measure aims to equip the broader industry with transparent, evidence-based tools for objective, system-scale building compliance.

Le Tong

Le Tong is the Principal Investigator for Methodology and Industry Development at the Foundation. A multidisciplinary designer, Le brings experience and research interests across accessibility, user-centred design, the built environment and digital interfaces. Le holds a Bachelor of Industrial Design and a Diploma of Building and Construction, and has completed studies in web production and multimedia.

Le has applied this cross-disciplinary background to accessible housing practice, including the management and delivery of an adaptable housing development project in which accessibility and mobility requirements were integrated into the design from the outset.

Jim Bosdriesz

Jim Bosdriesz is a professional engineer and the Managing Director of Auto-Measure. With an extensive background in metrology and 3D data analysis, his work specialises in the mathematical modelling of LiDAR point clouds to represent complex indoor spatial environments. As the inventor of the internationally patented Snap-Plans building modelling system, he is now focused on translating his commercial R&D experience into open-source methodologies that improve accessibility assessment and regulatory compliance across the built environment.