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ADAPTABLE HOUSING FOR PEOPLE WITH DISABILITY IN AUSTRALIA: **A SCOPING STUDY**

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Adaptable housing for people with disability in Australia: a scoping study

2021

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Glossary of Acronyms

ABCB – Australian Building Codes Board

AHURI – Australian Housing and Urban Research Institute

CHSP – Commonwealth Home Support Programme

COAG – Council of Australian Governments

CRIS – Consultation Regulation Impact Statement

CRPD – Convention on the Rights of Persons with Disabilities

CTP – Compulsory Third Party Insurance

DDA – *Disability Discrimination Act 1992* (Cth)

HCP – Home Care Package

ICESCR – International Covenant on Economic, Social and Cultural Rights

ISCRR – Institute for Safety, Compensation and Recovery Research

LHDG – Livable Housing Design Guidelines

NCC – National Construction Code

NDIS – National Disability Insurance Scheme

NIIS – National Injury Insurance Scheme

SDA – Specialist Disability Accommodation

TAC – Transport Accident Commission (Victoria)

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Executive Summary

There are 4.4 million people with disability in Australia, yet the availability of appropriate accessible housing remains a challenge for many Australians with disability. Many existing homes are inaccessible and, as there is currently no mandatory accessibility standard for housing contained in the National Construction Code (NCC),¹ inaccessible homes continue to be built. The Committee on the Rights of Persons with Disabilities has expressed concern about this and recommended that federal law be amended to include mandatory rules on access for all new and extensively modified housing.²

Problems with existing housing include poor access; unsuitable internal layouts; inadequately designed bathrooms, kitchens and laundries; and a lack of other qualities such as good light and connections to outdoor views and spaces. As well, dwellings may be poorly located in relation to transport, services and amenities, further limiting life choices, particularly around employment. It is up to individual households to make changes to their dwellings – owned or rented – whether through limited government funding pathways if they qualify, or by privately funding them.

The provision and availability of accessible housing for people with disability can be enhanced in two ways:

- by ensuring that all housing is constructed to meet minimum accessibility requirements from the outset, or
- through some form of modification or adaptation, which may involve a substantial renovation.

There is a need to pursue both options to ensure people with disability have access to suitable housing in Australia. However, the focus of this report is on the second option – the modification or adaptation of existing housing stock in Australian cities and towns, to ensure that people with disability have choice about where to live. We also focus on non-specialist housing, where 96% of the 4.4 million Australians (17.7% of the population) with disability live, rather than on Specialist Disability Accommodation (SDA) for people with high care needs.

The primary aim of the report is to consider the applicability and replicability of established design-informed approaches for flexibility and adaptation that have been successfully employed in other contexts (such as the home office or housing for multi-generational families) to retrofitting housing for people with disability, which would also benefit the whole community. Such an approach goes beyond function and accessibility to consider the qualities that create a dignity-enabling home environment. The report considers opportunities for architectural design practice and research to complement and improve current approaches to the modification and adaptation of existing housing stock for people with disability.

This report is structured in three parts:

- **Part 1: People with Disability and Housing** provides an overview of the types of housing currently occupied by people with disability in Australia; the current approaches to and frameworks for the modification and adaptation of existing housing stock for universal access and added spatial flexibility; the legislative and policy frameworks in place in relation to housing; and the individualised funding and services available.
- **Part 2: Adaptable Housing: Design and Fabrication** articulates ways in which design informed approaches (for example, adaptation, retrofitting and fabrication) can support and improve accessibility and broader amenity for people with disability, and at the same time provide benefits to people without disability, including but not limited to people with injuries and other health issues affecting mobility, pram users, and people with changing space usage needs.
- **Part 3: Challenges and Opportunities** outlines opportunities for enhancing current approaches to the modification of existing housing stock through holistic design-informed improvements and innovations in this field. The discussion explores how systematic approaches to housing design, construction, modification and adaptation can facilitate accessibility as compared to one-off modifications for people with disability.

Introduction

The current policy and support frameworks for the provision of housing for people with disability have a number of strengths, ranging from universal design frameworks to Commonwealth and state support services and schemes, and regulatory reviews. For example, SDA provides bespoke homes for those with high support needs, the National Disability Insurance Scheme (NDIS) provides partial funding for home modifications, and the recent NCC review aims to improve regulatory provisions, standards and performance levels in newly constructed homes. However, a number of factors limit broad access to suitable and quality housing, and existing voluntary standards have done little to improve the availability and accessibility of housing. Private renters in particular face a lack of appropriate and available housing and yet experience the most barriers to home modifications because the administrative pathways required to undertake home modifications differ according to housing tenure. For example, renters have only some rights to modifications under the Victorian *Residential Tenancies Act 1997* (Vic).³

This scoping study focuses on the existing housing stock available to the 4.4 million Australians with disability who live in the community in houses, duplexes, apartments, townhouses and units that they own or rent. Many of these people have a disability with particular needs that would benefit from effective housing modifications. Most of Australia's dwellings – old and new – are not designed to meet the needs of people with disability. Problems include poor access and unsuitable internal layouts, particularly inadequately designed bathrooms. Dwellings may also be poorly located to support community participation.

Modifications are typically undertaken to achieve better access into a dwelling, to improve mobility throughout the home, to improve independence and safety, and also to enable safer caregiving. Typical modifications include ramps, handrails, removal of bathroom hobs, and widening doorways. In Australia, in privately owned and rented dwellings, it is left up to individual households to decide whether to make changes to their dwelling and to determine how the costs will be covered, whether by the limited government funding pathways or by privately funding them.

A more expanded approach to accessibility, beyond universal access guidelines, has been restricted in part by perceived costs and by a lack of generally available systematic design solutions and heterogeneity across housing types. There is, therefore, an opportunity to take a design-informed approach to improving the accessibility of Australia's housing stock.

This report outlines how design-informed approaches could contribute to discussions about housing for people with disability. It aims at an approach to adaptation that not only enhances the quality of daily life in multiple ways (access, comfort and connectivity), but also futureproofs the dwelling for use by other people, and increases the quantity of available and suitable housing choices for people with disability. This approach to the adaptation of housing stock has the potential to develop replicable adaptation options for different housing types that can also be integrated with the specific circumstances, values and needs of the person with disability and other users of the home, including family members, carers and visitors.

In addressing how to achieve such an approach, this report connects two streams of practice on how to modify or adapt homes for people with disability. One sits within the housing for people with disability area, which includes resources and frameworks devoted to the adaptation of existing housing stock for universal access with a functional approach. The other is in the architectural or adaptable design field. This field mostly sits outside the housing for people with disability sector, but its approach to spatial arrangements and fabrication methods could offer multiple benefits for housing for people with disability. This report brings together these streams of practice and identifies the potential for exchange and overlap. It identifies the importance of applying an accessibility lens at the design phase of home modification or renovation projects, with the potential of leveraging the vast sums spent on one-off renovations every year in Australia towards increasing the stock of accessible and adaptable housing.

Scope of Report

This report focuses on the potential for the modification or adaptation of existing housing stock in Australia. It does not cover new housing; however, we do address some overlaps between existing and new housing models. The report covers modifications appropriate for people with disability, including age-related disability, who are capable of either independent living or assisted independent living. SDA lies outside the scope of our report, although we do examine the existing housing provision for people with a range of disabilities, including those requiring SDA, in Part 1. Our primary aim is to consider the potential for a design-informed approach to adaptation to enable greater housing choices for people with a range of disabilities, while also achieving other, broader benefits.

Existing Research on Housing Design and Disability

There is extensive existing Australian research into supporting people with disability to live independently in suitable homes and neighbourhoods. Much of this research has been made possible by funding, support and coordination by the Australian Housing and Urban Research Institute (AHURI)⁴ and the Summer Foundation.⁵ A comprehensive overview of this literature is outside the scope of this report, but below we highlight research contributions connecting to our research interest in the role of architectural design in accessible housing provision. Our intention is to build on and complement existing research through a focus on the potential for design-informed systematisation.

Much of the existing research covers the impacts of current policy and how policy could be improved. With a focus on the NDIS policy context, researchers have offered a robust overview of funding support and housing availability for people with disability⁶ and a systematic review and assessment of the efficacy of models and strategies for supported accommodation, with an emphasis on stakeholder perspectives.⁷ Other areas of policy research include the evaluation of proposed changes to the NCC;⁸ supporting renters who are ageing or live with disability⁹ including preventing homelessness;¹⁰ the supports needed to enable ageing in place;¹¹ improving land use, including opportunities for infill and multi-generational housing¹² and downsizing;¹³ implications of and challenges surrounding home modifications on strata-titled properties;¹⁴ integrated housing and care options,¹⁵ including delivering care to people in precarious housing;¹⁶ and creating ageing-friendly neighbourhoods.¹⁷

In the area of designing or modifying homes to meet the needs of people with disability, there has been considerable research into how to evaluate housing for people with disability, including post-occupancy evaluation.¹⁸ There has been significant research into the technical aspects of home modification and how to choose cost-effective modifications that are best placed to mitigate the functional impairment in question. In particular, the extensive research in this area by the University of New South Wales' Home Modifications Information Clearinghouse, directed by Catherine Bridge,¹⁹ provides a set of resources pitched at a range of consumer, professional and technical levels. These resources are valuable for people with disability and their families and carers, supporting them to make informed decisions about their built environment needs should they wish to engage a builder or undertake their own DIY work. The home modification fact sheets also provide designers and architects with the specific knowledge they may need to make fittings and finish choices in a home modification or accessible design project.

The site includes information about a wide range of effective home modifications; advice on how to choose fixtures like grab rails, shower hoses and ramps; analysis of different non-slip finishes along with information on non-slip finishes for a range of contexts such as tiles or ramps; information on the use of colour and light for vision impairment or ageing eyes; and advice on how to choose between a lift and a ramp. It also includes DIY information such as how to arrange a home modification, how to get a quote from a contractor, an overview of the skills required for various DIY modification jobs and how to decide whether to modify your home or move to one more suitable. This sits alongside various guidelines and standards for accessible home design²⁰ to provide a significant foundation for further design-based research on systematic adaptation.

Similarly, research led by Phillippa Carnemolla (Faculty of Design, Architecture and Building, UTS) examined the effect of home modifications on wellbeing and levels of independence in the home for people with disability and older people, and was able to demonstrate that home modifications resulted in significant increases in wellbeing and reduced levels of caregiving.²¹ Dr Carnemolla has also advanced studies on understanding the experiences of the built environment from the perspectives of people with intellectual disability. This includes the evaluation of wellbeing and support implications of specific housing types and urban settings, and the identification and mapping of the prevalence of intellectual disability across New South Wales (NSW).²² The visualisation of this data has significant potential to inform planning and design research in this field.

Other significant research includes measuring the impacts of living in inaccessible housing,²³ evaluation of the role within the market of housing adaptation grant programs for people with disability as drivers of innovation,²⁴ an audit of accessible features in new builds²⁵ and a review of post-occupancy evaluation instruments,²⁶ as well as research into how to effectively incorporate assistive technologies.²⁷ This and other research has led to comprehensive home modification guidelines by bodies involved in the provision of housing for people with disability.²⁸

However, although there is an acknowledged issue that home modifications may be stigmatising,²⁹ may increase social isolation due to concerns about the state of the home, may devalue the home and may actively reduce enjoyment of the home for both the person with disability and other residents,³⁰ there is, to date, relatively little research into how to best integrate modifications into a home to suit the full human needs of the person with disability – their aesthetic preferences, how they want to live in their home, their relationships with others in the home and with neighbours and the street, how those others will share the modified home, and their future as well as their present economic situation, including resale value of an owned home. Similarly, although there is a recognised need for accessible housing that can be rented or onsold on the open market,³¹ there is, to date, a lack of research into how accessibility, universal design principles and adaptability can be retrofitted at a mass scale into the existing housing stock that makes up the bulk of the housing available to people with disability. Our position is that there is great potential for a design-informed knowledge and research approach to make further contributions to the field, and Part 2 of this report aims to highlight the opportunities design can bring to this space to help meet the recommendations of the Committee on the Rights of Persons with Disabilities.³²

Method

This report integrates existing but typically isolated operative frameworks and forms of knowledge. It synthesises this information to build a holistic picture of housing access and modification within the Australian setting. This is intended as an informative scoping study. In Part 1, sources consist mainly of government reports, policy documents, standards documents, guidelines and codes. This sits alongside literature – much from disability and housing advocacy groups – detailing the impacts of current and proposed policies. Part 2 highlights primary practice-based research and built case studies in fabrication and the design field.

Part 2 is informed largely by previous research done by the Monash Urban Lab for the Institute for Safety, Compensation and Recovery Research (ISCRR) on flexible housing design for independent living for people with disability, and for Housing Choices Australia on a new housing development that includes flexible layouts for social housing residents, some of whom are people with disability. The final discussion section highlights areas for further exploration.

Report Structure

The report is in three parts. Part 1 considers the frameworks that define and support the provision of housing for people with disability to provide an overview of current approaches and key considerations to inform Part 2. Part 2 engages with design-informed approaches to the adaptation of housing more generally through a discussion of definitions and systematic approaches to flexible and adaptable spatial design and construction of housing that could achieve benefits for people with disability alongside people without disability. Part 3 is a concluding discussion, where we identify the synergies and overlaps between these relatively distinct yet related fields of housing for people with disability and design-informed adaptable housing. Here we identify opportunities that go beyond current universal access guides and suggest categories of action that could achieve flexible, comfortable, quality and dignified home environments where individual choice is enabled through systematic adaptation and modification.

This report identifies opportunities for a more holistic approach to the development of accessible view of housing for people with disability; an approach that brings together ideas currently informing universal access for housing with more expansive ideas of adaptation, in the context of a whole-of-community housing approach, which aims to improve housing in ways that achieve multiple benefits for people with disability. This report is the preliminary stage of a larger project. The next stage of the research includes design studies to understand repeatable typologies and layouts and the mapping of streets and precincts to find patterns of building placement on blocks as well as spatial relationships between buildings and with streets and precincts. All of this will be developed into a kit of parts and pattern catalogue that will show how a replicable, systematic approach to the adaptation of existing housing to suit the needs of people with disability could be made possible.

01

People with Disability
+ Housing

Part 1 of this report provides an overview of Australia's disability and housing landscape. This discussion forms the foundation for Part 2 of this report, which explores opportunities to enhance access to flexible and quality homes with particular benefits for people with disability.

1.1 Disability in Australia + Housing: Definitions and Data

This section defines disability and provides an overview of the prevalence of disability within the Australian community and of the availability of suitable housing options.

(a) Disability and the Environment

Under the social model of disability, disability is a function of how well the external environment accommodates the requirements of people with disability. In an accessible environment, a person with disability is able to perform activities that may be difficult or impossible in an inaccessible environment. Hence Article 1 of the Convention on the Rights of Persons with Disabilities (CRPD) describes "disability" in the following terms:

Persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments *which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others* (emphasis added).³³

Disability can be present from birth or arise later in life. It can occur as a result of injury, illness, genetic condition or ageing. Thus, there is increasing agreement that disability is something that will affect most people, to some extent, at some point in their lives.³⁴ Barriers faced by people with disability can take a variety of forms. They can include physical barriers caused by an inaccessible environment, but also attitudinal barriers; institutional barriers created by discriminatory laws, policies and practices; and communication barriers. Removal of these barriers – including in housing – would reduce the prevalence of "disability" because people with disability would be afforded full and effective participation in society.

(b) People with Disability

Approximately 18% of Australians (4.4 million) have a disability.³⁵

Of these, 76.8% report a physical condition "causing the most problems", with many of these physical conditions causing mobility issues.³⁶ 60% of Australians with a disability need assistance with at least one daily activity.³⁷

Age is strongly correlated with disability – nearly 85% of Australians aged 90 or older have one or more conditions causing disability.³⁸ Over 14% of Australians are aged 65 or older,³⁹ and Australia's population of over 65s is expected to double in the next half-century.⁴⁰

As Australia's population ages, the number of Australians with disability, both in absolute terms and as a proportion of the population, will increase. An estimated 5.75 million Australians will have a mobility limitation by 2060.⁴¹

Thus, a significant proportion of society – immediately or later in life – would benefit from safe, comfortable homes that can be readily adapted to changing needs.

(c) Housing Context: Tenure Types and Affordability

The vast majority of Australians with disability – 96% – live in housing in the community.⁴²

Non-dependent people with disability are less likely to be homeowners than non-dependent people without disability:

- 55% of people with disability under the age of 65 own their own home (compared to 61% of younger people without disability)
- 79% of people with disability aged 65 or older own their own home (compared to 86% without disability).⁴³

With falling homeownership rates among younger Australians, in coming decades, fewer ageing Australians will own their own home.⁴⁴

Furthermore, people with disability are over-represented both in the rental market and in social and public housing:

- 32% of people with disability rent (compared to 27% of people without disability)
- 17% of non-dependent people with disability who rent do so from a state or territory housing authority (public housing) (compared to only 3% of those without disability)
- 41% of social housing households contain at least one person with disability.⁴⁵

While public and social housing is more likely to be built to accessibility or universal design standards (see 1.2), people living in rental accommodation who need to modify their home face significant challenges. Not only are they required to seek funding for or pay for the cost of both the initial modification (on entering) and its subsequent removal (on leaving), many landlords refuse to allow such modifications.⁴⁶

Overall, appropriate affordable housing is out of reach for many people with disability – particularly for those who rent:

- 11% of Australians with disability live in unaffordable housing, defined as spending more than 30% of gross household income on rent or mortgage payments.⁴⁷

According to Anglicare Australia, on the snapshot day of 1 August 2020, 0.3% of the 76,962 rental properties on the national market were affordable and suitable⁴⁸ for a single person over the age of 21 on the Disability Support Pension – a total of 192 homes.⁴⁹ This is exacerbated in metropolitan areas. For example, Anglicare Victoria found that in 2020, prior to the introduction of the Coronavirus supplement, on the snapshot day of 21 March 2020, a total of 14 rental listings in all Melbourne metropolitan LGAs were affordable and appropriate for a single person on the Disability Support Pension – close to 0% – a number rising to only 22 with the supplement.⁵⁰

Approximately 187,500 people with disability live in long-term care accommodation such as residential aged care, retirement villages, hospitals, psychiatric institutions and group homes for people with disability.⁵¹ This includes:

- Approximately 174,000 (9%) of people with disability over the age of 65
- A further 13,500 (0.6%) of people with disability under 65, with around 5,600 of those living in permanent residential aged care.⁵²

An estimated 28,000 people (6.1% of NDIS participants) with the highest support needs will be eligible for SDA (see 1.4(a)) once the NDIS is fully rolled out.⁵³

(d) Accessible Housing: Demand and Availability

Given the increasing prevalence of disability, an estimated 60% of homes will, at some point, be occupied by a person with disability or injury, and 90% will have a visitor with disability or injury.⁵⁴ Even where an injury is expected to resolve within six months, thus not meeting many definitions of disability, people with injuries will benefit from many of the same accommodations as people with disability.

Few homes are designed to directly suit or be adaptable to the needs of people with disability, causing a mismatch between people with disability and their homes:

- 4.9% of Australians with disability have moved because of a health reason (compared to only 0.6% of people without disability)
- 16% are dissatisfied with their homes.⁵⁵

Yet modifications to make a home more accessible are relatively rare. Only 12% (or 511,400) of people with disability living in households have home modifications.⁵⁶ These typically consist of minor works that meet immediate access and safety requirements. Examples include:

- 8.1% had hand grab rails
- 5.8% had bathroom, toilet or laundry modifications
- 2.6% had ramps installed.⁵⁷

Further, the majority of older Australians wish to or intend to age in place – over 90% of older Australians desire to stay in their current residence over the next 12 months.⁵⁸ Between 78 and 81% of older Australians (over 55) wish to age in their own home⁵⁹ – mostly in private dwellings designed for the mainstream market, which are unlikely to be suited to their changing needs or to be easily modified or adapted to meet those needs.

An inability to modify one's home – irrespective of the source of the barrier – can prematurely push people into residential aged care.⁶⁰ This situation has economic as well as social costs: residential aged care costs make up the bulk of federal aged care spending. In 2017–2018, the Commonwealth Government spent \$18 billion on aged care, of which \$12 billion was spent on residential care.⁶¹ In-home care and support is cheaper than residential aged care and enables older Australians to feel more in control of their lives,⁶² but is only possible if the older person's home can be adapted to meet their needs.

The Centre for International Economics estimates that the social cost of the current shortfall of accessible housing in Australia is “between \$2.2 billion and \$2.7 billion per year”,⁶³ with other sources indicating that this may be an underestimate.⁶⁴

Despite this strong economic incentive to increase accessible housing stock, progress has been slow. To date, it is estimated that less than 5% of existing housing stock is suitable for a person with a mobility disability.⁶⁵

Additionally, progress is hampered by the fact that an estimated 80% of extant building stock that will make up Australian cities in 2030 would have been built prior to 2010.⁶⁶ The need for a strategy to adapt existing housing stock will therefore form the core of Part 2 of this report.

1.2 Current Accessible Housing Concepts

This section provides an overview of the key concepts and paradigms employed in the provision of housing for people with disability.

(a) Modifications, Accessible and Universal Design and the Adaptable Home

Home Modifications

Home modifications are changes made to the home environment to help people to be more independent and safer in their own home and to reduce any risk of injury to their carers and care workers. They may or may not take aesthetic and quality considerations into account. Modifications are distinct from renovations, which are performed for a wide range of aesthetic or lifestyle reasons.⁶⁷

Modifications to the home include changes to the structure of the dwelling, such as widening doors, adding ramps or installing a wheelchair-accessible bathroom, alongside the installation of assistive devices inside or outside the dwelling, such as grab rails, handrails, lifts or ceiling hoists. Modifications can be off-the-shelf, such as the installation of a pre-made grab rail, or they can be bespoke, as discussed below.

Bespoke Modifications

Bespoke home modifications are alterations to an existing home that are custom-built and/or designed for the specific needs or desires of the occupant(s), taking into account the specific opportunities and limitations afforded by the existing space.

These tailored modifications may focus solely on meeting the accessibility need, or they may attempt to meet the accessibility requirement while taking into account aesthetic and other quality-of-life considerations. Bespoke modifications can be designed by an architect or designer. However, as described in Part 1.4 they are more commonly designed and implemented by a contractor or even as a DIY project, with possible input from an Occupational Therapist.

Accessible Housing and Accessible Design

Accessible housing is housing that meets the needs of people with disability. The Australian Building Codes Board (ABCB) defines “accessible housing” as any housing that includes features that enable use by people either with a disability or transitioning through life stages.⁶⁸ Accessible design is design that incorporates such features. Although the focus of many accessibility initiatives is on addressing mobility disabilities, accessibility requires addressing a broader range of environmental factors.

Many accessibility features can benefit people without disability. In addition to the most common accessibility feature of level entry, examples of features include:

- Bright/task lighting, use of contrasting colour, or use of texture contrasts for people with low vision;⁶⁹
- Induction stoves to prevent burns and fire risk for people with certain intellectual disabilities or mobility issues (with benefits for parents of young children);
- Wide doors, a lack of stairs or abrupt level changes, and space for manoeuvring or turning for a person in a wheelchair or walking frame (with benefits for someone manoeuvring a pram or on crutches, or carrying a heavy or awkward load);⁷⁰
- Adjustable height counters for wheelchair users or people who cannot stand for prolonged periods (with benefits for people significantly shorter or taller than the mean);⁷¹
- No-step or wheel-in showers for wheelchair users or people with mobility restrictions;⁷² and
- Dimmer switches, blackout blinds and noise reduction technologies such as double glazing and insulation for people with sensory processing issues (with benefits for migraine sufferers, shift workers or parents of young children).

Universal Design

Article 2 of the CRPD defines “universal design” as “the design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design”.⁷³

Universal design should follow seven principles, developed by the Center for Universal Design (North Carolina State University):

1. **Equitable Use** – The design is useful and marketable to people with diverse abilities (without the need for individual accommodation).
2. **Flexibility in Use** – The design accommodates a wide range of individual preferences and abilities.
3. **Simple and Intuitive Use** – Use of the design is easy to understand, regardless of the user’s experience, knowledge, language skills, or current concentration level.
4. **Perceptible Information** – The design communicates necessary information effectively to the user, regardless of ambient conditions or the user’s sensory abilities.
5. **Tolerance for Error** – The design minimizes hazards and the adverse consequences of accidental or unintended actions.
6. **Low Physical Effort** – The design can be used efficiently and comfortably and with a minimum of fatigue.
7. **Size and Space for Approach and Use** – Appropriate size and space is provided for approach, reach, manipulation, and use regardless of the user’s body size, posture, or mobility.⁷⁴

In the housing context, universal design features could be thoughtfully integrated into design solutions in the dwelling in a way that would benefit the whole population.

Adaptable Housing and Adaptable Design

The adaptable home is one that, at a relatively low cost, can be modified to suit the specific needs of the occupants.

The AS-4299-1995 views “adaptable housing” as “a move away from designing special accommodation for different community groups with different needs”, moving instead toward a framework of adaptable design being for everyone.⁷⁵

Designing for adaptability at the build stage can, at little extra cost, enable future modifications with minimum inconvenience, making it easy for occupants to stay in place as their needs change. Many access features are cost-neutral and easy to provide at the design stage (or during major renovations), but cost, on average, 19 to 22 times more if added after the home is built or renovation completed.⁷⁶

Examples of adaptable design in the context of current approaches to disability accommodation include removable cabinets under the bathroom sink to enable a choice between storage and wheelchair access, and height-adjustable cooktops which can not only accommodate sitting and standing, but can also accommodate people of differing heights.⁷⁷

Other examples of adaptability built in at the construction phase include reinforcing bathroom walls to allow grab rails to be easily installed at a later date, or allocating space for a lift in a multistorey residence to enable one to be installed, if required, without needing to move walls. Design for adaptability may also include attention to things not directly related to accessibility, such as the flexibility to easily re-size or partition rooms to accommodate the changing needs of a household.

1.3 International and Local Legislative and Policy Frameworks

This section provides an overview of the international and local legislative and policy frameworks that shape the Australian housing context, with particular reference to how they impact the supply of accessible housing.

(a) Housing and Human Rights under International Law

Access to appropriate housing is a fundamental human right.⁷⁸ Australia has ratified several international instruments that recognise the human rights of people with disability in the context of housing. Of particular relevance are Australia’s ratification of the CRPD in 2008 and the International Covenant on Economic, Social and Cultural Rights (ICESCR) in 1975.

The right to adequate housing is related to, indivisible from and interdependent with numerous other human rights. These include the right to life,⁷⁹ the right to the highest attainable standard of health,⁸⁰ and the rights to independent living and community inclusion with equal choices to others.⁸¹

Article 28 of the CRPD provides that people with disability have the right to an adequate standard of living for themselves and their families, including adequate housing.

The CRPD also requires that the public environment be accessible to people with disability. Article 9 provides that states should take appropriate measures to ensure that people with disability have access, on an equal basis with others, to the physical environment so they can live independently and participate fully in all aspects of life. This obligation extends to the elimination of barriers to accessibility in housing. It may require necessary and appropriate modification and adjustments of the existing environment in order to ensure accessibility.⁸²

Article 4(1)(f) requires the promotion of “Universal Design”, defined in Article 2 (see 1.2(a)).

Article 19 requires that people with disability should have the opportunity to live independently and be included in the community. This includes the ability to choose where and with whom they live.

Article 28(d) requires access to public housing programs.

The Committee on the Rights of Persons with Disabilities has referred to the interrelated nature of the right to accessibility and the right to independence and inclusion in the community. In its General Comment on accessibility, the Committee said (at [23]):

Since accessibility is a precondition for persons with disabilities to live independently, as provided for in article 19 of the Convention, and to participate fully and equally in society, denial of access to the physical environment, transportation, information and communication technologies, and facilities and services open to the public should be viewed in the context of discrimination.⁸³

Further, in its General Comment on living independently and being included in the community, the Committee said (at [34]):

Access to housing means having the option to live in the community on an equal basis with others. Article 19 is not properly implemented if housing is only provided in specifically designed areas and arranged in a way that persons with disabilities have to live in the same building, complex or neighbourhood. Accessible housing providing accommodation to persons with disabilities, whether they live alone or as a part of a family, must be available in sufficient number, within all areas of the community, to provide the right of persons with disabilities to choose and the possibility to do so. To this end, barrier-free new residential construction and the barrier-free retrofitting of existing residential structures are required. In addition, housing must be affordable to persons with disabilities.⁸⁴

The Committee has made numerous observations in relation to the human right to housing in Australia. In particular, it has expressed concern about:

The significant proportion of the existing built environment that is inaccessible and the lack of mandated national access requirements for housing in the NCC⁸⁵

and

The lack of appropriate, affordable and accessible social housing, which severely limits the capacity of persons with disabilities to choose their place of residence.⁸⁶

In light of these concerns, the Committee has recommended that Australia

[a]mend the federal law by including mandatory rules on access for all new and extensively modified housing⁸⁷

and that Australia

[i]ncrease the range, affordability and accessibility of public and social housing for persons with disabilities, including by implementing a quota for accessible social housing and by developing regulations and standards to guarantee the progressive application of universal design principles in accessible housing.⁸⁸

Hence there is a clear, human rights-based international law framework under which Australians with disability must, as much as possible, have access to housing that meets their needs, giving them access to the same opportunity to enjoy the benefits of their homes as all citizens. This is not currently being adequately met.

(b) Australian Legislative and Policy Frameworks for Construction of Accessible Housing

Several legislative and policy frameworks currently support and regulate the construction of housing for people with disability in Australia, with varied impact and efficacy.

National Disability Strategy

The Council of Australian Governments' (COAG) National Disability Strategy is the primary vehicle for Australia's implementation of the CRPD at a local level.⁸⁹

In 2010, the National Dialogue on Universal Housing Design set a voluntary target for all new housing to meet minimum accessibility requirements by 2020.⁹⁰ Commitments to improving the availability of accessible housing were also incorporated into the National Disability Strategy 2010–2020.⁹¹ This included a commitment to:

more than 15,000 new public and community housing dwellings incorporating universal design (5,000 to AS4299-1995 Class C standard),

along with the aspirational target that all new homes:

be of agreed universal design standards by 2020.⁹²

However, this voluntary approach has failed. A report by the Australian Network for Universal Housing Design and RI Australia found that based on progress to 2014, under a “generous estimation”, the approach would “achieve less than 5% of the 2020 target”.⁹³ The Centre for International Economics in its Consultation Regulation Impact Statement (CRIS) for the ABCB estimates that 5–10% of new housing stock meets Living Housing Design Guidelines (LHDG) Silver standards;⁹⁴ however, the Australian Network for Universal Housing Design disputes this as overly generous and unsubstantiated.⁹⁵

Thus, even in the best-case scenario, less than 10% of new stock is built to a baseline standard of universal and accessible design, with a much lower proportion of total housing stock meeting such standards. Given the failure of the voluntary target approach, a legislative approach is now under consideration, as discussed in 1.3(c).

Disability Discrimination Legislation

Section 23 of the Disability Discrimination Act 1992 (Cth) (DDA) makes it unlawful to discriminate against a person with disability by refusing them access to or use of any premises open to the public or a section of the public, including through the lack of provision of means of access to those premises.⁹⁶

Detailed requirements for accessibility are set out in the Disability (Access to Premises – Buildings) Standard 2010 (Cth) made under section 31(1) of the DDA. However, these obligations only apply to public buildings and the communal aspects of apartments – access paths to the front entrance of each apartment, as well as to communal spaces within apartment buildings.⁹⁷ The DDA does not specify any requirements for the accessibility of private housing.

Section 25 of the DDA prohibits discrimination against a person on the ground of their disability in relation to accommodation, including by refusing their application for accommodation or lowering them in the order of precedence in a list of applicants (section 25(1)).⁹⁸ While this prevents discrimination in access to rental accommodation, in most cases the DDA does not require that private accommodation being rented meets accessibility requirements.

Nevertheless, section 25(2) makes it unlawful to refuse to permit a person with disability to make reasonable alterations to accommodation they occupy, provided the alteration is done at the occupant’s expense, it does not involve altering any other occupier’s premises, and the occupant undertakes to restore the accommodation to its original condition when they leave the accommodation.

Similar provisions exist in state anti-discrimination legislation, for example, Part 4 of the *Equal Opportunity Act 2010* (Vic).⁹⁹

State and Territory Legislation and Policy

Currently, state and territory governments have a mix of aspirational targets and policies in place to increase the stock of accessible housing in both the private and social housing markets. This ranges from NSW, with aspirational targets, to Victoria, which requires that:

50 per cent of apartments in a building of more than 5 storeys are designed and built with LHDG Platinum for path of entry, LHDG Gold for main bedroom entry and toilet, and LHDG Silver for shower.¹⁰⁰

and Western Australia, which requires that:

for new apartments, either 20 per cent of all dwellings across a range of dwelling sizes, meet Silver Level requirements as defined in the LHDG; or 5 per cent of dwellings are designed to Platinum Level as defined in the LHDG.¹⁰¹

However, no state or territory has strict requirements for the accessibility of independent dwellings, except for where they are earmarked for particular populations.¹⁰²

Most states have a requirement for a proportion of public housing to be accessible – NSW, Queensland, SA, Tasmania and WA all have requirements that accessibility features be present in a proportion of public housing, while the ACT, NT and Victoria require that all new government-commissioned housing meets accessibility requirements. SA uses the AS 1428.1 standard and WA does not use a specific standard. All other states and territories require either LHDG Silver or Gold standards for public housing.

Local Government Planning Levers

Local governments have the potential to play a role in the supply of affordable housing, which can increase the supply of housing for people with disability, through levers that can become part of the planning system. These include inclusionary zoning, which is “a land use planning intervention by government” that “either mandates or creates incentives so that a proportion of a residential development includes a number of affordable housing dwellings”,¹⁰³ and voluntary planning agreements where 10% of the increase in land value due to rezoning and allowing for a higher density of development is paid by the landowner to the council for affordable rental dwellings. This can increase the flow of housing available for people with disability, though primarily through new builds, rather than retrofits.¹⁰⁴

Additionally, councils can play a role in promoting an increase in the number of public and social housing dwellings within their local area.

They can allocate land for building affordable housing, provide financial assistance to low-income homeowners to remain in their homes through rate discounts, and assist older residents to stay in their homes rather than moving to aged care through the provision of a range of community services. All of these are of benefit to people with disability, as is making sure that the larger neighbourhood environment is highly accessible.¹⁰⁵

(c) Codes and Guidelines

There are a number of codes and guidelines relevant to the planning, design and construction of housing – both for private mainstream homes and for homes specifically for people with disability.

Livable Housing Design Guidelines

The national 2017 LHDG provide a set of voluntary standards to certify a dwelling as “livable” to either Silver, Gold or Platinum standards. The LHDG use a Universal Design approach to ensure that homes are accessible and adaptable, while being attractive to a wide range of occupants without disability.

The lowest level of the LHDG, Silver, aims to ensure that the home design, while not fully accessible, can be readily and cheaply adapted. It focuses on design elements that ensure future flexibility and adaptability:

1. A safe, continuous and step-free path of travel from the street entrance and/or parking area to a dwelling entrance that is level.
2. At least one, level (step-free) entrance into the dwelling.
3. Internal doors and corridors that facilitate comfortable and unimpeded movement between spaces.
4. A toilet on the ground (or entry) level that provides easy access.
5. A bathroom that contains a hobless shower recess.
6. Reinforced walls around the toilet, shower and bath to support the safe installation of grab rails at a later date.

7. Stairways designed to reduce the likelihood of injury and also enable future adaptation.¹⁰⁶

The Gold and Platinum levels both improve immediate accessibility and the future potential of the building. The Gold level:

provides for more generous dimensions for most of the core livable housing design elements and introduces additional elements in areas such as the kitchen and bedroom.¹⁰⁷

While the Platinum level

describes design elements that would better accommodate ageing in place [i.e. staying in one's home as one gets older] and people with higher mobility needs. This level requires more generous dimensions for most of the core livable design elements and introduces additional elements for features such as the living room and flooring.¹⁰⁸

As previously mentioned, an approach targeting voluntary compliance with the LHDG was adopted by the National Dialogue on Universal Housing Design,¹⁰⁹ along with commitments in the National Disability Strategy 2010–2020.¹¹⁰ As the voluntary target was not met, incorporation of a mandatory accessibility standard into the NCC is under consideration at the time of writing.

Australian Standards Documents

The Australian Standard for Adaptable Housing AS4299-1995¹¹¹ and the Australian Standard Design for Access and Mobility 1428.1-2009¹¹² provide optional standards to which homes can be certified. They are detailed, technical standards, adopted as mandatory in some contexts, including for public housing in some states.

The Australian Standard for Adaptable Housing provides a standard for building design to enable “alterations to suit individual requirements [to] be achievable at minimal extra initial cost”.¹¹³

Conversely, the Australian Standard Design for Access and Mobility focuses on immediate accessibility, as it provides a standard for new build work to “provide access to people with disabilities”, with a focus on people with ambulatory disabilities (including wheelchairs), and people with sensory disabilities.¹¹⁴

Both standards documents have some overlap with the newer LHDG.

The National Construction Code

The NCC contains “all Performance Requirements for the construction of buildings”.¹¹⁵ It does not currently set any mandatory accessibility requirements for houses, townhouses and similar dwellings.¹¹⁶ For apartments – as per the DDA (see 1.3(b)) – requirements only cover areas external to individual apartments (building access and common areas); there are no mandatory accessibility requirements for the internal parts of individual apartments.¹¹⁷

As previously mentioned, the NCC is currently under review, with an examination of the feasibility of introducing accessibility and adaptability requirements for new constructions with the aim of avoiding the need for costly retrofits. An Options Paper was released in 2018.¹¹⁸ Development of content for the NCC 2022 is being completed this year (2021), with the new NCC due to take effect in 2022.

Because the options under consideration will only address new construction, even if the most stringent of the proposed changes are adopted, the stock of new accessible housing, “as a share of the total housing stock” will increase very slowly.¹¹⁹

1.4 Individualised Funding and Services

This section provides an overview of schemes and initiatives that provide specific funding and health services to individual people with disability.

(a) Funding

A variety of state and federal insurance and support schemes offer funding to people with disability, some of which can be spent by recipients to adapt existing housing to their needs or to move into more appropriate housing if their home is not readily adaptable.

At a federal level, the main funding sources are the NDIS for people under the age of 65, and the Commonwealth Home Support Programme (CHSP) for older Australians to age in place. Where disability is the result of injury or other trauma, the person may be eligible for funding through relevant state-based insurance schemes, such as for traffic accidents or workplace accidents. Other schemes exist. For example, the Department of Veterans' Affairs will fund home modifications for some veterans.¹²⁰ However, such schemes cover relatively small numbers of Australians.

NDIS-funded Support

The NDIS provides funding for various accommodations to improve independence and quality of life for scheme participants. Once fully implemented, it is expected to provide individualised support to 475,000 Australians with the highest support needs,¹²¹ or just under 11% of Australians with disability. Funding is allocated based on goals rather than level of disability, and participants have the choice to allocate their funding package as best meets their needs across a range of eligible supports, including home modifications alongside support services, support equipment, transport and workplace help.¹²²

At the upper end of the funding spectrum, eligible NDIS participants may receive funding to support SDA. SDA is usually purpose-built for the:

small proportion of NDIS participants with extreme functional impairment or very high support needs who meet specific eligibility criteria.¹²³

As of 30 September 2020, 15,240 Australians were receiving active SDA supports, or 4% of all NDIS recipients.¹²⁴ An estimated 28,000 people (6.1% of NDIS participants) will be eligible for SDA once it is fully rolled out.¹²⁵

SDA is privately owned – usually by charities or not-for-profits like community housing associations. Registered providers can claim an SDA payment from the NDIS for provision of the service, with rent contributions from the occupant, calculated based on their circumstances.¹²⁶

Although the home is not owned by the occupant, unlike with a standard rental, SDA occupants can reasonably expect to live in a single SDA dwelling for the long term, with an expected occupancy of 20 years.

Depending on their goals, NDIS participants ineligible for SDA can allocate some of their funding packages toward a capital support budget, which can be used for home modifications and assistive technologies.¹²⁷ Ordinarily, only “standard modifications and fittings” are funded, with individuals having the option of paying the difference between the base price and a more expensive finish or fitting that achieves an equivalent outcome to the supports funded in the NDIS plan.¹²⁸ Where home modifications are funded, it is generally expected that these modifications “will be suitable for the participant’s anticipated long-term needs”. For renters, the homeowner must agree to modifications in writing before they will be funded.

Funding for Ageing in Place

Where the need for home modification is due to ageing, the CHSP and Home Care Packages (HCP) provide funding to support ageing in place. These schemes are for people over the age of 65, with provisions for earlier support for Aboriginal or Torres Strait Islander people and people who are on a low income, homeless or at risk of homelessness.¹²⁹ As with the NDIS, funding is provided as packages, with individuals deciding how to allocate their funding among various services such as personal care, nursing, allied health and therapy as well as domestic assistance, transport and social support.

Funding can be allocated to cover home modifications such as ramps or rails, along with certain equipment and assistive technology (such as shower chairs) where that equipment is not provided by the medical system.

Participants are expected to contribute to the cost of their care. With total packages valued at \$52,000 per year at the highest level of care needs for all required services, significant modifications, such as installing an accessible bathroom, will not be covered unless a significant personal contribution can be made, or part of the package is saved for several years, during which time the person must make do without the accessibility benefits.

Workplace and Accident Insurance

Where the need for home modifications stems from injury (e.g. vehicular or workplace), Australians may be eligible for funding from a variety of state or federal government-run or -mandated insurance schemes, such as Compulsory Third Party Insurance (CTP) and workplace insurance. For example, in Victoria, the Transport Accident Commission (TAC) will, for eligible participants, “pay the reasonable cost of the home modifications you need because of your transport accident injuries to improve your safety and independence” for existing homes, newly purchased homes or homes built to meet requirements.¹³⁰ However, in many states – Qld, WA, NSW and SA – at-fault drivers are eligible for funding only in the case of catastrophic injury, leaving many without funding for accessibility modifications.

(b) Health and Support Services

A number of healthcare frameworks impact housing provision and support for remaining in the home. These health and support services can, alongside home modifications, improve quality of life and enable people with disability to begin to or continue to live independently.

In-home Care and Support

Many people with disability require care or support in the home. Much of the care provided and received in Australia is informal (unpaid) care, with 2.65 million unpaid carers in Australia, or 10.8% of the population.¹³¹ An estimated 40% of people with disability living in households require assistance from formal providers.¹³² Both formal (paid) and informal care can include assistance with household tasks and personal care. Allied healthcare professionals such as physiotherapists, exercise physiologists and occupational therapists may also need to occasionally or regularly work with the person with disability in their home.

Appropriate home modifications can significantly improve the efficiency of care and can, in some cases, remove the need for care entirely. Ninety-seven percent of informal carers surveyed by Sinclair et al. agreed that home design had a significant impact on the level of care required in the home, and the same percentage agreed that home design impacted their capacity to deliver services in the home.¹³³

A 2019 study by Carnemolla and Bridge found that home modifications reduce required hours of care by 42% in older people with disability, with the reduction predominantly in the need for informal care (46% reduction in informal care, 16% reduction in formal care).¹³⁴ This reduction in informal care is significant – carers reduce their work hours or leave the workforce due to caring responsibilities¹³⁵ and experience negative physical and mental health effects.¹³⁶ Further, with the ratio of working-age people to over 65s expected to drop from 4.5 in 2015 to 2.7 in 2054,¹³⁷ cost-effective ways of improving efficiency of care, such as home modifications, will become increasingly important from an economic perspective.

Where a person with disability requires formal in-home care or support, the home serves not only as a residence for the person with disability and their family, but also as a workplace for the carer and allied health workers. For carers, this means that the home should provide adequate space and supports to ensure a safe working environment.¹³⁸ For example, rooms must be large enough to allow the carer to safely support the person with disability. The carer may also require specific supports to be available, such as a ceiling hoist to safely transfer someone with limited mobility from wheelchair to bed. If a live-in carer is required, the dwelling will need to be able to accommodate the carer in order to prevent a move into residential care.

The regular presence of care and support workers in the home can impact the sense of “home” for the person receiving care and their family. Allowing space for the regular presence of support workers requires particular attention to avoid erosion of feelings of ownership, choice and control over one’s own space.¹³⁹

For example, where possible, occupants benefit from clear zoning between areas where support workers operate and areas which those people enter only if invited. This requires either multiple entrances or for the “public” part of the house to be adjacent to the main entrance.¹⁴⁰

Assistive Technologies

Assistive technologies (AT) are the equipment or systems that help people with disability to move around their home or community, communicate with others (e.g. text to speech), process information, and perform various daily tasks (e.g. remote door, window and blind opening).¹⁴¹ Implemented well, AT can improve independence and quality of life and reduce the need for care.¹⁴² They can range from simple and relatively inexpensive off-the-shelf technologies such as bath seats or non-slip bathmats to tailored or custom-made technologies such as pressure mattresses or implant speech processors.

Assistive technologies are commonly funded by the same bodies that fund home modifications. The use of assistive technologies may mitigate or negate the need for expensive home modifications; for example, an inexpensive non-slip mat may be an alternative to expensive bathroom resurfacing. However, such non-structural solutions can make the home look clinical or otherwise detract from the ambience of the home. In other cases, assistive technologies may complement home modifications – for example, where assistive technologies are integrated with the principles of a smart home and smart architectural components.

A smart home can be equipped with products and technologies that support and encourage independence, healing, health and quality of life. This can include a myriad of applications ranging from systems of sophisticated medical monitoring and intervention to those that enable control of the home fittings and environment.

The technology can include off-the-shelf components as well as bespoke and emerging products. Readily available smart technologies, when integrated with architectural elements, can support spatial flexibility and environmental adjustment.

For example, operable and interactive architectural thresholds such as external and internal doors, partitions and windows enable spatial flexibility whereby rooms are combined or separated. This supports mobility between rooms and indoor and outdoor environments; enables control of qualitative parameters such as privacy, security and safety; allows passive and automated environmental control of light, airflow, heating and cooling; and facilitates more economical use of resources.¹⁴³

Similarly, rooms such as the kitchen and bathroom are concentrated zones of activity. The incorporation of assistive technologies in these areas can support independent living and quality of life. For example, a smart kitchen can facilitate the informed and safe use of appliances, ameliorate impaired physical functions, detect and intervene in emergencies, and allow ergonomic adjustments for diverse circumstances and needs.¹⁴⁴

While there has been a surge in research and development in assistive and smart home technologies over the past two decades, and despite the readily available range of assistive technologies, within the context of modifications of existing housing stock in Australia such technologies have, to date, had limited application beyond basic assistive technology. Moreover, the available information about the range and application of emerging assistive technologies is fragmented and not readily accessible. Despite some preliminary research,¹⁴⁵ the field requires interdisciplinary planning and integration.¹⁴⁶ There is great scope for the systematic and holistic integration of assistive technologies and architectural components. Likewise, there are potentially significant benefits from better integration of products and technologies used in daily living (for example, those used for personal mobility and transportation) with products and technologies that are integrated with the physical built environment, including their interactions.

Support for Implementing Home Modifications

From a design perspective, current approaches to adapting or modifying existing housing stock are largely unsystematic. Where a home modification is funded, for example through the NDIS, CHSP, CTP or workplace insurance, the first step is, in most cases, an assessment by an Occupational Therapist.¹⁴⁷ The Occupational Therapist conducts an onsite visit to assess the current layout of the home, observe home activities and make recommendations for how assistive technologies could be adopted or the home modified to improve current and future independence.¹⁴⁸ A quote from a contractor is then obtained and provided to the funding body.

For larger-scale modifications, additional support beyond the Occupational Therapist and contractor may be funded. For example, for substantial modifications, the NDIS may fund “oversight by a project manager or independent building certifier to ensure compliance of the modification and a qualified and experienced Occupational Therapist to certify the effectiveness of the modification to meet the participant’s goals and likely future needs”.¹⁴⁹ However, a designer or architect – to ensure the modifications are optimally adapted to the specific challenges and opportunities offered by the space, and to ensure that the modification is aesthetically pleasing or at least aesthetically neutral – will not be funded. Furthermore, Occupational Therapists are often reluctant to work with architects due to a perception that architects will prioritise aesthetics over meeting functional requirements.¹⁵⁰ This problem is exacerbated by the fact that while much work exists in the space of design and architecture for disability, many architects nevertheless “regard mobility-friendly design as an impediment to good architecture”.¹⁵¹

Where external funding is not sought, a DIY approach is often taken, either by the person needing the accommodation or a family member or friend, especially for the installation of relatively straightforward modifications such as grab rails. In other cases, a contractor may be employed.

1.5 Implications of Current Approaches to Home Modification for People with Disability

Pathways to home modifications that are solely led through an allied health system can lead to a focus on functional needs at the expense of qualitative considerations, a “sense of home” and the needs of family members without disability. Home modifications for people with disability are often added to a dwelling after the original design and construction, and often in haste in response to an accident or sudden illness.

Such alterations tend to be conceptualised as medical, with a focus on interventions that directly address the condition or dysfunction. When implemented via a clinical or allied health sector, flow-on effects of the home modification, such as “security concerns, the social acceptability of the modifications, or the impact of the changes on the meaning or value of the home” are often ignored.¹⁵²

Because of this, accessible features often draw attention to themselves and can be stigmatising, though with well-thought-out design, this need not be the case.¹⁵³

Frameworks for universal design aim to combat ad hoc modifications by ensuring that accessibility needs are accounted for in a more integrated way, and by setting a baseline from which required modifications will be cheaper and faster to implement. Nevertheless, the requirements of people with disability are diverse and no universal approach will meet everyone’s needs. The needs of a wheelchair user will differ from the needs of someone who is Blind or has low vision, which will differ from the needs of someone with an intellectual disability.

Indeed, needs can pull in different directions; where a wheelchair user requires wide-open spaces for easy manoeuvrability, a visually impaired person or someone who needs support to walk will benefit from having close walls for navigation or support.¹⁵⁴ Therefore there are limits to what can be achieved with a universal design approach; ensuring stock of disability-friendly housing may require balancing different needs where they conflict and ensuring supply in a variety of categories.

Notwithstanding such limitations, the widespread adoption of universal design with planning for adaptability would support meaningful choice for people with disability – both about where to live (which requires a sufficient stock of accessible housing, especially for those who rent) and about how to live within their homes (opening the possibility for people with specific needs to adapt their homes rather than being forced to adapt themselves to the limitations of available homes).

Overall, none of these paradigms explicitly takes into account the holistic quality of a home as a space to spend time in – for example, natural light, good ventilation and access to or views of green space – nor how to balance accommodations for disability with the other needs of a person with disability and their co-occupants. Nor do they contemplate the combination of universal access with the flexible home and user-led choices. Such a holistic approach will be explored in Part 2 of this report.

02 Adaptable Housing: Design and Fabrication

Part 2 of this report outlines more generally design-informed definitions and approaches to adaptable design, which move beyond the functional benefits of universal and adaptable design discussed in Part 1. This material seeks to build a bridge between user needs and the disciplinary strengths of architecture and urban design in spatial planning in order to create more holistic and quality housing choices that could benefit many in the community, particularly people with disability. This broader community includes diverse groups such as older people, young families, shared households and people working from home, all of whom may need to adapt a dwelling for a range of reasons. Irrespective of the target occupant(s), when adapting housing, the focus should be on a set of components and qualities that go beyond physical access, enabling the adaptation of space to improve quality of life. In this, it is important to recognise that people with disability are as complex as any other members of the community – they are “individuals with their own needs, abilities, ambitions and priorities ... united only by the experience of living with disability”.¹⁵⁵

This part begins with a broad discussion of the term “adaptability” in housing design, encompassing approaches to adaptation that enhance the flexibility of existing residential dwellings in the broad community. It goes on to explore a design-informed approach that offers systematic adaptation whereby generic solutions and bespoke adjustments can be integrated. This involves considering broader design and fabrication strategies beyond the individual building or lot, where patterns of housing types could potentially be operated on collectively.

2.1 The Adaptable House

This section provides a general introduction to adaptable design with a focus on a holistic approach to flexibility and choice encompassing social, economic and environmental parameters. It then considers the implications of this approach in the context of the adaptation or retrofit of existing housing stock.

(a) Adaptable by Design

The ambition to design buildings that can readily adapt to future change is not new. Pre-modern housing types, such as courtyard houses, offered a diversity of rooms varying in scale and placement as a way to accommodate diverse needs and activities. The London terrace house of the late eighteenth and early nineteenth centuries is one example of an older building style that has proved particularly flexible – able to be extended backwards and upwards, and to be joined or re-divided with adjacent homes.¹⁵⁶ In the late nineteenth and twentieth centuries, material and structural innovations, leaps in industrialised product design and the embracing of new social norms combined to entrench spatial flexibility as a core theme of modern architecture.

However, this emphasis has not been without its critics, who dismiss the notion as naively utopian, top-down, lacking in precise definition and ultimately ineffectual. With such criticisms in mind, recent research on the subject of adaptable and flexible housing has been undertaken in light of explicit social and environmental objectives and participatory processes that ensure user engagement and agency.¹⁵⁷

(b) The Flexible Home

In Australia, the average lifespan of a home is 50–80 years, over which time it will, on average, be occupied by 8–13 different households.¹⁵⁸ Moreover, even within the period of a single occupancy, multiple and diverse factors may bring about the need to change the home environment. A holistic and integrated approach to design and delivery of adaptable dwellings is sensitive to such diversity. Taking a whole-of-life approach to the home, including residents' changing needs over a lifetime and the life cycle of buildings as well as the uncertainties brought about by climate change, like hotter and dryer weather, Till and Schneider define flexibility in housing as:

housing that can adjust to changing needs and patterns, both social and technological. These changing needs may be personal (say an expanding family), practical (i.e. the onset of old age) or technological (i.e. the updating of old services). The changing patterns might be demographic (say the rise of the single person household), economic (i.e. the rise of the rental market) or environmental (i.e. the need to update housing to respond to climate change).¹⁵⁹

Flexibility can be present in a dwelling in various ways. A home is adaptable insofar as desired changes can be achieved without modifying the physical fabric of the building.¹⁶⁰ For example, good design can enable a single rail to function as either a towel rail or a grab rail, while looking aesthetically like a towel rail. A home is transformable to the extent that the physical structure of the building can be modified, at a later stage, to suit changing needs: for example, where non-structural walls can be removed or re-positioned to change the internal layout.¹⁶¹ Flexibility is not a binary state – homes can be more or less adaptable and transformable depending on a range of design decisions implemented throughout the dwelling.

While the ideal time to design in adaptability and transformability is before construction, there is nevertheless the opportunity to retrofit a home for adaptability and transformability, especially in the context of an already-planned renovation.

Spatial Adaptability and Choice

Australian household types and patterns of home occupation are complex, diverse and changing, resulting in a variety of spatial needs. While the nuclear family unit is still the dominant household type, the ageing of the population, divorce, postponed marriages, mixed families, couples with no children, and group and individual household structures have radically transformed our households.¹⁶²

The response from housing policy planning frameworks and the development sector has been to increase housing diversity through the implementation of typologies such as high-rise apartments, townhouses and semidetached built forms alongside the detached low-rise house. However, this has largely been done without addressing spatial adaptability.¹⁶³ Hence the potential for change within individual dwellings has largely been neglected.

Spatial adaptability is the capacity of rooms or spaces within a home to be used for different purposes based on the needs of the occupants. Designing for spatial flexibility – in particular for adaptability that does not require structural changes – enables occupants to affordably and easily adapt their homes to suit their changing spatial, financial and environmental needs and wants:

A flexible home can enable people to “age in place”, work from home, accommodate a guest or live-in carer, take on an independent boarder to reduce rent, or accommodate a relative requiring care. The ability to adapt space increases independence and empowerment for people who receive care and reduces the costs of refurbishment and redesign. Simple design strategies such as multiple entrances ... or rooms that can be divided within the dwelling ... can provide great benefits and longevity for life-long living environments.¹⁶⁴

Well-designed spatial flexibility provides home occupants with the choice to adjust their everyday environments on a day-to-day basis (e.g. movable partitions that enable living and dining areas to be joined for open-plan benefits or partitioned off to create separate spaces for multiple concurrent activities) and across a whole-of-life time span (e.g. converting a garage to an accessible living space). A holistic approach to flexibility broadens housing diversity beyond targeting a specific fixed household type to encompass a multitude of social, perpetual and physical needs.

Economic Adaptability and Choice

Home ownership in Australia is increasingly out of reach, and for those for whom it is possible, it generally constitutes one of the most significant investments people make, with Australians frequently purchasing homes larger than their needs to maximise investment potential. Furthermore, relocating to a more suitable home is costly – financially, time-wise and emotionally – with the financial costs of stamp duty, estate agent and conveyancing fees, and moving costs, along with the time costs of locating a suitable new home, preparing for the move and setting up the new home.

Adaptable and flexible home design, particularly when coupled with quality construction, can eliminate or reduce the costs associated with built-in obsolescence by reducing the need to renovate or move as personal circumstances change.¹⁶⁵ Examples of built-in obsolescence include rigid construction systems such as load-bearing internal walls and trussed rafters in the roof that make it difficult to change room layout or expand upwards, non-accessible and non-adaptable access to services, and rooms designed for a single function such as narrow dining rooms that cannot readily be adapted to other uses.¹⁶⁶

Removing built-in obsolescence can reduce or remove the need for minor and major renovations, the need to move to a new residence as needs change, or the premature demolition of the home if it is replaced rather than renovated,¹⁶⁷ freeing up economic resources. However, a lack of awareness of the advantages of future flexibility can cause people to allocate financial resources to aspects of a new build or retrofit that do not enhance flexibility,¹⁶⁸ leading to reduced future options and increased future costs.

Adaptable and flexible spatial design can also enable financial liquidity by, for example, allowing the comfortable combination of diverse use types, such as work and living, or the subdivision of the house for subletting or partial sale. Such economic flexibility is particularly pertinent to the disability community, many of whom face economic disadvantage. Similarly, ageing empty-nesters may no longer need the full space of the home in which they raised their family, but may not wish to leave their home or community, and so may benefit from the option to subdivide or sublet. In recent years, design-based research has played a critical role in advocating for the economic benefits of adaptable and flexible design, aiming to influence new procurement models, long-term house finance and pay-back models, and increased adoption of quality construction and material longevity.¹⁶⁹

Environmental Adaptability and Choice

Adaptable and flexible spatial design can improve environmental responsibility and performance, which play a role in comfort and cost, both at the point of construction and by opening the space for the adoption of new technologies. For example, creating adaptable multi-function spaces can reduce the overall dwelling footprint without sacrificing functionality,¹⁷⁰ thereby reducing the construction materials required, using less land and reducing the amount of space in need of heating, cooling and maintenance.

Similarly, a dwelling designed following passive design principles to take advantage of natural light and airflow, passive heating, passive cooling and insulation¹⁷¹ can enable occupants to easily adapt their home to suit their particular personal comfort levels as ambient light and temperature change over the course of a day and throughout the year – for example, by opening or closing blinds to a sunny room, or opening windows to create airflow, giving them the choice to avoid using artificial lighting or heating and to enjoy aspects of the outdoors from within their homes.

Further, adaptable design that allows for the home to be updated with new materials, discoveries and technologies enables the option of continual enhancement for environmental performance. This has the potential to allow the home to continue to respond to the climate change challenge while offering residents increased benefits stemming from improved environmental performance. This includes the expected number of hotter days in any year, which is another pressure for people who spend much time at home.

Good passive design makes a home more pleasant to spend time in. While this is a benefit to any occupants of a home, it is particularly relevant to the many people with disability who may spend more of their time at home. Furthermore, there is evidence that natural light, pleasant views, green spaces and an overall pleasant built environment have benefits for both physical and mental health, including faster recovery from surgery, reduced anxiety and depression, and reduced need for pain medication.¹⁷² Yet, with only a few exceptions,¹⁷³ the quality of a home as a space to spend time in has, to date, largely been left out of discussions of disability-friendly housing in the Australian context.

2.2 Retrofitting for Added Flexibility

While much of the existing research into designing for flexibility has been in the context of new builds, there is scope to take a systematic approach to retrofitting existing housing stock to add flexibility. This approach has been most extensively explored in the context of protected heritage buildings and precincts, where designers have sought to creatively maintain the original order while allowing new and more diverse patterns of occupation. In recent years, efforts to improve the environmental performance of existing housing stock have led to novel retrofit solutions, while approaches to modular design have sought to enhance the flexibility of existing dwellings, encompassing changing needs in the context of disability and ageing. We outline a number of design research and project-based examples.

Adaptation of Old City Fabric

Retrofitting existing building stock in heritage and older areas can create a challenge for developing flexible approaches for diverse occupation and use. Nevertheless, such homes can be capable of adaptation and renewal if approached systemically and holistically.

In heritage areas, aesthetic character and the hierarchy of the individual house outweigh other considerations and are preserved through mandatory planning regulations. However, historic housing and neighbourhoods are often well situated, located close to services, amenities and infrastructure, and offer opportunities for re-use for different household types such as multi-generational groups or households with shared living arrangements or requiring divisible spaces. Alternative approaches to the adaptability of heritage buildings and areas shift from viewing heritage as static, with a need to avoid further loss, to viewing heritage as part of a continuum that is “organic, malleable and responsive over time”.¹⁷⁴

The adaptive re-use of heritage buildings can be achieved through multiple kinds of retrofit¹⁷⁵ or new building insertions.¹⁷⁶ At a systemic level, understanding repeated patterns – methods of construction, materials, building placement on blocks and spaces between sites and buildings, setback distances from fronts and backs, street and lane formations and room layout – creates an armature to support new housing models that can be both adaptable and flexible for a range of new uses.¹⁷⁷

Similarly, in both heritage suburbs and non-heritage older suburban fabric, design offers a systemic understanding of how to increase housing density and diversity through the adaptation of buildings and precincts via the covert negotiation of planning systems. In older areas where the layout includes access via laneways or the side of blocks, the site-responsive addition of a secondary dwelling, like a granny flat or backyard home, can assist in addressing the demands for wider housing availability and affordability,¹⁷⁸ and can offer the potential for the quick installation of a fully accessible secondary dwelling. Such an approach demonstrates possible pathways to rectify the currently prohibitive misalignments between strategic planning ambitions and directives by working within, rather than replacing, established planning processes.

Retrofitting for Energy Performance

Not only does retrofitting for improved energy performance improve the liveability of a home, but recent projects retrofitting for energy performance reveal that if systematised and done in bulk, renovations – at least in some cases – can be done quickly and cheaply while delivering significant benefits. The intention of such retrofits is to increase the energy performance of existing dwellings to save energy and reduce energy bills, while improving thermal comfort and the overall health and wellbeing of residents. In addition, further benefits to the community include being able to reduce electricity peak demand during extreme weather events and power blackouts, as well as reducing greenhouse gas emissions from otherwise high residential energy use.¹⁷⁹

The study *Comprehensive Energy Efficiency Retrofits to Existing Victorian Houses* examined the energy efficiency of existing (pre-2005) houses through a series of retrofit trials.¹⁸⁰ The study found that significant improvements to the thermal comfort of existing houses can be achieved through comprehensive retrofits that aim to reduce heating energy consumption. Further, significant energy bill savings can be achieved where inefficient water heaters, refrigerators and lighting are replaced.

An international example from the Netherlands of systematised retrofits to improve energy efficiency demonstrates that it is possible to renovate homes to no longer consume net energy. Using “highly standardized procedures and mass produced materials” and a continuous production approach, the project retrofitted batches of houses by installing solar panels and replacing wall and roof facades with prefabricated energy-efficient components.¹⁸¹ The work was completed at no upfront cost to homeowners, with the renovations paid for by money previously spent on energy bills, and in some prototype cases all onsite work, except the installation of PV cells, was completed within a day.

Such projects highlight that if dwellings are designed with an assembly system where parts can be pulled off and put back, changes can be made much more quickly and easily, and that systematised changes are possible even where the original design did not aim at such efficiencies. They also highlight that if a dwelling is designed to have replaceable parts – such as making it possible to remove the facade – changes not anticipated at the time of construction are more easily implemented as possibilities change.

Modular Internals

One approach to maximising flexibility – either in a new build or as part of a significant renovation – is to treat the home as a “shell”, with the internal spatial layout to be determined by the occupants. In such an approach, only wet areas – bathrooms, kitchen, laundry – are fixed in place, with other rooms being defined by movable partitions rather than fixed internal walls.¹⁸²

An example of this approach to flexibility being implemented in a systematised and modular way is the Future Adaptive Building (FAB) system developed by John Brown.¹⁸³ This approach replaces most or all internal walls (i.e. any non-load-bearing wall) with mass-customisable cabinetry – wardrobes, bookshelves, display units, bathroom and kitchen cabinetry – to enable a home’s layout, including size and number of bedrooms and living areas, to be adapted to the needs of occupants.

FAB has the potential to cater to accessibility-specific requirements through features such as designed-in grab rails that also serve as towel holders, and cabinetry designed to unobtrusively store bulky medical equipment for people with high medical needs, thereby maintaining a homely rather than hospital-like environment.¹⁸⁴ However, at present, the FAB approach is only available in Canada via <http://housebrand.ca/> and is currently targeting mainstream consumers seeking flexibility rather than those with specific accessibility requirements.

2.3 Scope for a Systematic Approach

Alterations and additions to existing housing stock in Australia remain largely unsystematic. Adaptations to homes are largely ad hoc and through DIY or conventional modes of small-scale construction and have little input from architects and design professionals. Despite emerging design-informed technological and assembly processes that promise responsiveness to user needs alongside economic and quality gains, there is currently little evidence of uptake within the Australian context. This section outlines current research and international trends in systems-based design and assembly systems, with a focus on the relevance and merit of these methods to the adaptation of existing housing stock.

(a) Systematic Design and Fabrication

The holistic approach to adaptable and flexible spatial design is echoed in new approaches to systematic design and fabrication. Recent approaches to transforming construction propose design-informed implementation of industrialised construction. Industrialised construction proposes the transfer and adaptation of manufacturing knowledge to the building sector, through approaches such as prefabrication. This holistic model of industrialised construction has been shown to reduce cost, introduce simpler construction techniques and open customer access to the design process.¹⁸⁵ However, unless a design focus is maintained, the implementation of such construction efficiencies could come at the cost of spatial integration and design integrity.¹⁸⁶

Thus the role of design and design professionals is increasingly valued here for their ability to integrate tasks and knowledge along the construction value chain, in particular to incorporate and emphasise intangible factors of social, environmental and cultural value.¹⁸⁷

A design-informed industrialised building approach to adapting existing housing stock promises increased build quality through offsite manufacture, the development of solutions that are essentially customer-focused, the use of new technologies for co-design and visualisation, and an approach that captures performance and seeks continual improvement.

Such a design-informed approach can lead to a “product platform” for accessible housing renovation through the creation of a reconfigurable “kit of parts”. Though this approach has yet to be turned to retrofits specifically targeting accessibility, advantages of the approach can be seen in examples such as the platform-based retrofit of 96 units in the 1960s-era Parisian apartment block the Tour Bois-le-Prêtre. By replacing the existing small-windowed facade with sliding glass doors and insulated curtains, and adding closeable terraces and balconies, architectural firm Lacaton and Vassal were able to convert a building slated for demolition into one with improved natural light and increased floor space. Importantly, the prefabricated construction techniques allowed residents to remain in occupation throughout the retrofit process.¹⁸⁸

Product platforms seek to standardise actions across “assets” in order to drive design variety that responds effectively and efficiently to changing end-user requirements.¹⁸⁹ For instance, components are physical parts that come together and are rearranged to create streams of products in response to different market segments. These components form a kit of parts where individual components can achieve the efficiency and quality improvements associated with mass production, while enabling versatility and customisation in how they are configured.

This means that designs can be rapidly altered in response to specific requirements of the location or user, allowing, for example, cabinetry with a built-in towel/grab rail that can be customised to fit an existing space and be available in a choice of finishes, while being cheaper and faster to produce than traditional custom cabinetry. Another example relates to the performance processes of production and assembly where the utilisation of offsite prefabrication means that manufacturing of building parts occurs in controlled conditions for ease of onsite assembly.

(b) Housing Types as a System

Research on systematic adaptation of existing building stock for added amenity and flexibility commonly relies on an analysis of the commonalities of various housing types and the opportunities and barriers each affords. House and apartment typologies common in Australia – the single detached home; the unit/villa cluster; duplexes, townhouses and other semidetached dwellings; and medium and high-rise apartments – all have different potentials for retrofitting to improve adaptability and accessibility.¹⁹⁰

Likewise, the original layout, construction techniques, block size and presence or absence of other features (such as multiple storeys, movable internal walls and hallway width) will impact adaptability potential. An analysis of the features that enhance or detract from adaptability¹⁹¹ can therefore help current homeowners determine if their home is suitable for retrofitting as well as enabling those who have to relocate to identify a home suitable to retrofit to their specific needs. Furthermore, in many Australian suburbs, homes follow similar patterns,¹⁹² with the majority of homes built within the same decade using similar construction techniques, patterns and floor plans. This enables a precinct-level analysis that can both identify suburbs with high retrofit potential and generate precinct-level plans for systematised approaches and design plans to retrofit for accessibility and adaptability.

03 Challenges and Opportunities

In Parts 1 and 2 of this report, we provided an overview of current approaches to the modification and adaptation of existing housing stock for universal access and added spatial flexibility. Part 1 provided a snapshot of frameworks that define and support the provision of housing for people with disability. Part 2 described design-informed systematic approaches to flexible and adaptable spatial design and construction more broadly, and demonstrated how the adoption of such an approach would particularly benefit people with disability. In this part, we discuss what we see as current challenges to the modification of existing housing stock for people with disability and outline opportunities for new, research-informed improvements and innovations in this field.

3.1 Australia's Disability and Housing Landscape: Observations

The current policy and support frameworks for the provision of housing for people with disability offer a number of core strengths. These range from strong universal design frameworks to Commonwealth and state support services and schemes. SDA accommodation provides highly tailored homes for those who are eligible, and many Australians have access to at least partial funding of their required home modifications. Notwithstanding the efficacy of current measures and ongoing improvements to regulatory levers, a number of factors limit broad access to suitable and quality housing for people with disability. These are outlined with a focus on existing housing stock and accommodation.

Existing Housing Stock

Within the Australian context, economic and regulatory approaches to the provision of housing for people with disability have largely focused on new builds, progressive guidelines for future developments and highly specialised housing provision. Where the adaptation of existing housing stock has received consideration, it has been through innovative product design and practical guides, but without systematic and holistic design strategies. In the absence of structured solutions, the complexities of working with existing built fabric, coupled with lack of access to design professionals, mean that people with disability live in homes that are unable to:

easily accommodate the changing needs of households over their lifetime.¹⁹³

This problem is more acute for renters, who are required to undo any modifications they do make.

Universal and Bespoke Approaches

Frameworks and voluntary guidelines for universal and accessible home design have had limited uptake. Where these principles are adopted, they can lead to generic outcomes and lack personal specificity. And although “flexibility in use” is a core attribute of universal design, guidelines for flexibility and adaptation are not well developed and remain rudimentary.

The recent centralisation of funding for disability and ageing, through the introduction of the NDIS and the CHSP, has increased the focus on empowering individuals to make choices about their needs and priorities. Despite the progressive nature of such a user-led approach, individualised alterations can hinder or even undermine future flexibility. In the absence of an integrated relationship between design-informed approaches to adaptive design and housing paradigms deployed within the housing for people with disability sector, principles of universal design can at times appear in tension with user engagement and choice.

Funding

Despite funding frameworks for the provision of housing for people with disability, the vast majority of the 4.4 million Australians with disability are, and will continue to be, ineligible for funding to help them adapt their housing to meet their specific needs. Moreover, in seeking to effectively use public or insurance funds, schemes tend to only fund the minimal cost of the accommodation needed. Thus, funding recipients who are not in a position to pay extra may be forced to devalue their homes through unattractive, clinical modifications rather than enjoying a well-thought-out, integrated solution.

Funding for adaptation is particularly limited for those who rent. With 29% of people with disability who live in the community being renters,¹⁹⁴ many people with disability are locked out of funding for accommodations that could make a significant quality-of-life difference. Receiving funding for home modification also makes it difficult to move. For example, if an NDIS participant moves after being provided with home modification funding, they need to make the case for funding for modifications in their new home.¹⁹⁵ This reinforces the already reduced choice that people with disability have regarding where to live.

Design Solutions

Designers and architects are rarely involved in discussions on how to best adapt a home for the needs of a person with disability. For example, under the NDIS, an Occupational Therapist is responsible for making recommendations regarding modifications. While an Occupational Therapist is an expert in determining the types of modifications to housing that would benefit a person with disability, they do not have the design training to advise how that accommodation could best be achieved within the specific constraints of the home being adapted. A collaborative approach involving designers and architects, allied health professionals, and people with disability and their families could enable quality-of-life enhancing modifications that also enhance rather than detract from the quality and aesthetic value, and future sale value, of the property.

3.2 A Synthesised Approach: Opportunities

In Part 2 of this report we highlighted design-based research that integrates the functional benefits of universal and adaptable design within a broader, more systematic and holistic approach to adaptability. We suggest that such a synthesis offers significant opportunity to expand the ambition, impact and effectiveness of current approaches to the provision of housing for people with disability, particularly around home modification. By developing a systematic approach to the retrofitting of existing housing stock and treating these works more strategically as part of a holistic approach to the built environment, quality of life and independence for people with disability could be significantly improved. Such a systematic approach offers the opportunity to integrate the principles of universal design with user engagement, empowerment and choice. It also provides the opportunity to leverage the significant funds already spent every year on renovations in Australia.

We observe the following opportunities:

Evaluation of Existing Housing Stock in a Neighbourhood Context

Design-informed and systematic evaluation of the latent potential of existing housing stock can help people envisage their future and hence make more effective decisions about where and how they might live long-term. Fundamental decisions such as whether or not to continue living in one's existing home can be enabled by this process, which in turn can empower people to make decisions about the first stages of home modifications and thus avoid abortive work. Such evaluation can take place at the scales of neighbourhood, plot and dwelling:

- A visual depiction and analysis of urban precincts and neighbourhoods can identify synergies between user priorities and the latent potential of a neighbourhood. Factors such as proximity to public transport; public, medical and commercial facilities; and parks and recreational services, for example, can be mapped to allow direct comparisons.

- A visual depiction and analysis of house plot types can identify the latent potential of plot types for adaptation to universal access codes and flexible spatial configurations. Factors such as the relationship of the plot to neighbouring buildings, the relationship between the house and its immediate outdoor environment, the plot gradient and proportion, and the relationship of the plot to the street can impact the potential for adaptation.
- A visual depiction and analysis of dwelling types can identify the latent potential of building types for adaptation to universal access codes and flexible spatial configurations. The dwelling proportion, volume, internal arrangements, dwelling edge conditions and relationship to its immediate outdoor environment as well as the locations of the garage, storage, kitchen and bathrooms all significantly impact the latent potential of dwelling types for adaptation.

Systematic Design Options and Building Solutions

Design-informed strategies for the adaptation of existing housing stock can meet the functional and safety requirements of people with disability while improving the flexibility and overall quality of the house. The visualisation of design options can further help depict diverse life scenarios for the occupant and clarify user priorities. Such systematic approaches to adaptation can range in scope from minor alterations and retrofits to major structural changes and can offer integration with systematic approaches to manufacturing and assembly:

- Options for adaptation of existing housing stock across the registers of time, cost and flexibility can offer users the choice to align adaptability options with personal circumstances. As an example, a suburban detached house with a garage can be adapted in multiple ways. This could include a fast, economical retrofit of a garage to an accessible studio, simple alterations of key building parts such as bathrooms and hallways within a moderate budget, or more lengthy and substantive structural changes at the scale of the entire dwelling.

- A holistic approach to adaptation and spatial flexibility combines pragmatic drivers with qualitative outcomes. Decisions around access and function, for example, can maximise opportunities for connections with gardens, with outside spaces, with neighbours and with the wider community, responding to the opportunities afforded by the specific site conditions. Design further allows a strategic economy, where each element of modification work can serve more than one purpose, such as a ramp that is also a deck.
- A holistic approach to adaptation can resolve safety and access requirements in a manner that is seamless and consistent with the domestic environment as a whole, thus avoiding a clinical “hospital” style appearance. More than just an aesthetic choice, an integrated approach to material and spatial detail maintains a sense of comfort and accommodates the dignity of personal expression and appearance.
- A systematic approach to home modification offers the opportunity to synthesise design-informed approaches with methods of manufacture and production. Despite recent innovations in manufacturing and production, such methodologies have not been utilised within the Australian market. The regulatory frameworks and support systems that define the provision of housing for disability in Australia offer a clear and structured environment for testing the viability and potential benefits of systematic production.
- Although much retrofitting for accessibility is self-funded, the housing for people with disability space nevertheless offers an excellent opportunity for exploring a more systematised approach to home modifications, given that much of the funding and policy are government-led. Funding bodies such as the NDIS, CHSP and workplace and traffic accident insurance providers fund a significant value of home modifications, and do so following a systematised, rule-based approach.

This approach will enable the identification of commonalities between the accessibility requirements of users, the broader desires of the person with disability and their family about how they wish to live in their home, and the possibilities and limitations presented by the homes in which they live. There may also be the opportunity to identify synergies at the suburb or precinct level, enabling greater efficiencies.

- Opportunities also exist to leverage the considerable spend on housing renovations. If renovations not targeting accessibility also adopted the approaches of adaptability and flexibility, this could enlarge the pool of housing suitable for people with disability.

Participation and Choice

Participation in the design process is critical for ensuring the success of any design changes to a person’s home. Offering people living in the home greater control over the decisions being made throughout an adaptation means that they have a sense of ownership and agency around the designed solution – one that relates directly to a person’s particular needs as well as the needs of their family. A systematic approach to the adaptation of housing stock, when integrated with options and choice, can facilitate a meaningful engagement with the user and their particular circumstances, values and needs. In the context of housing for disability, this extends from the needs of the person with disability to family members, carers and visitors to the home. Having the design tools and knowledge to facilitate an understanding of the potential of individual housing needs in a holistic way that goes beyond functional and often inadequate solutions has the potential to improve the quality of housing in Australia as well as the quality of life for all Australians, particularly those with disability.

References

- Adams, Rob. "Transforming Australian Cities for a More Financially Viable and Sustainable Future: Transportation and Urban Design." *The Australian Economic Review* 42, no. 2 (2009): 209-16.
- Aitchison, Mathew. *Prefab Housing and the Future of Building: Product to Process*. London: Lund Humphries, 2018.
- Allouf, David, Andrew Martel, and Alan March. "Discretion Versus Prescription: Assessing the Spatial Impact of Design Regulations in Apartments in Australia." *Environment and Planning B: Urban Analytics and City Science* 47, no. 7 (2019): 1260-78. <https://doi.org/10.1177/2399808318825273>.
- Anglicare Australia. *Rental Affordability Snapshot: Special Update August 2020*. (2020). <https://www.anglicare.asn.au/docs/default-source/default-document-library/special-release-rental-affordability-update.pdf?sfvrsn=4>.
- Anglicare Victoria. *Rental Affordability Snapshot 2020: Anglicare Victoria – Victorian Rental Market*. (2020). https://www.anglicarevic.org.au/wp-content/uploads/2020/04/RAS2020_Mini-Report_AnglicareVictoria_April2020.pdf.
- Aplin, T., D. de Jonge, and L. Gustafsson. "Understanding Home Modifications Impact on Clients and Their Family's Experience of Home: A Qualitative Study." *Australian Occupational Therapy Journal* 62, no. 2 (2015): 123-31. <https://doi.org/10.1111/1440-1630.12156>.
- Australian Building Codes Board. *Accessible Housing Options Paper Consultation Report*. (2019). <https://www.abcb.gov.au/Resources/Publications/Consultation/Accessible-Housing-Options-Paper-Consultation-Report>.
- Accessible Housing: Options Paper. (2018). <https://www.abcb.gov.au/Resources/Publications/Consultation/Accessible-Housing-Options-Paper>.
- Australian Bureau of Statistics. "4430.0 - Disability, Ageing and Carers, Australia: Summary of Findings, 2018." 24 October 2019. <https://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/4430.0Main%20Features52018?opendocument&tabname=Summary&prodno=4430.0&issue=2018&nu m=&view=>.
- Australian Housing and Urban Research Institute. "What's Needed to Make 'Ageing in Place' Work for Older Australians." 2019. <https://www.ahuri.edu.au/research/ahuri-briefs/whats-needed-to-make-ageing-in-place-work-for-older-australians>.
- Australian Human Rights Commission. *Submission in Response to the National Disability Strategy Position Paper* (July 2020). (2020). https://humanrights.gov.au/sites/default/files/ahrc_submission_nds_position_paper_2020_0.pdf.
- Australian Institute of Health and Welfare. *People with Disability in Australia*. (2019). <https://www.aihw.gov.au/reports/disability/people-with-disability-in-australia/housing/type-of-housing/living-in-private-dwellings-or-cared-accommodation>.
- Australian Institute of Health and Welfare. *The Desire to Age in Place among Older Australians*. (2013). <https://www.aihw.gov.au/getmedia/69a6b0b9-6f86-411c-b15d-943144296250/15141.pdf.aspx?inline=true>.
- Older Australia at a Glance. (2018). <https://www.aihw.gov.au/reports/older-people/older-australia-at-a-glance/contents/demographics-of-older-australians>.
- People with Disability in Australia. (Australian Government, 2020). <https://www.aihw.gov.au/reports/dis/73-1/people-with-disability-in-australia/contents-1/>.
- Australian Network for Universal Housing Design. "Let's Do It Right First Time", *Response to the Consultation Regulatory Impact Statement: Proposal to Include Minimum Accessibility Standards for All Housing in the National Construction Code*. (2020). <https://aduhdblog.files.wordpress.com/2020/08/anuhd-response-to-the-consultation-ris.pdf>.
- Submission by Australian Network for Universal Housing Design to the Royal Commission into Violence, Abuse, Neglect and Exploitation of People with Disability. (2019). <https://aduhdblog.files.wordpress.com/2019/12/anuhd-submission-to-the-disability-royal-commission.finalnen.pdf>.
- Australian Network for Universal Housing Design, and RI Australia. *Report on the Progress of the National Dialogue on Universal Housing Design 2010-2014*. (2015). <https://apo.org.au/sites/default/files/resource-files/2015-01/apo-nid53494.pdf>.
- Bennett, Alysia. "Stealth Urbanism: The Covert Advance of Suburban Density and Diversity." PhD, Monash University, 2016.
- Bertram, Nigel, Holly Board, Byron Meyer, Catherine Murphy, and Deborah Rowe. *TAC Accommodation Practices Discussion Paper*. (2015).
- Bertram, Nigel, Helena Harry, and Holly Board. *Towards a Holistic Home Modification Design Process; 3 Case Studies*. (ISCRR, 2017). http://research.iscrr.com.au/_data/assets/pdf_file/0005/861656/towards-a-holistic-home-modification-design-process.pdf.
- Bertram, Nigel, Deborah Rowe, Catherine Murphy, Byron Meyer, and Holly Board. *Best Practice Discussion Paper: A Comprehensive Evidence-Base for Innovative Design Methods That Can Improve Accommodation Outcomes for Tbi and Sci Residents*. (ISCRR, 2015). https://research.iscrr.com.au/_data/assets/pdf_file/0004/359050/094-Best-Practice-Discussion-Paper.pdf.
- Bittman, Michael, Trish Hill, and Cathy Thomson. "The Impact of Caring on Informal Carers' Employment, Income and Earnings: A Longitudinal Approach." *Australian Journal of Social Issues* 42, no. 2 (2007): 255-72. <https://doi.org/10.1002/j.1839-4655.2007.tb00053.x>.
- Blasco, Ruben, Alvaro Marco, Roberto Casas, Diego Cirujano, and Richard Picking. "A Smart Kitchen for Ambient Assisted Living." *Sensors (Basel)* 14, no. 1 (2014): 1629-53. <https://doi.org/10.3390/s140101629>.
- Bridge, C., P. Phibbs, N. Gohar, and K. Chaudhary. *Identifying Barriers to Home Modifications: Evidence Based Research*. (Home Modification Information Clearinghouse: 2007). <https://www.homemods.info/Download.ashx?File=6f732f373bfdd8ce4ac3637e136470ef&C=31342c3233392c30>.

- Brown, John L. "Going Home: Future Adaptive Building for Aging-in-Place." Doctor of Philosophy, RMIT University, 2016. https://researchrepository.rmit.edu.au/discovery/delivery?vid=61RMIT_INST:ResearchRepository&repId=1224832060001341#13248366540001341.
- Callaway, Libby, and Kate Tregloan. "Government Perspectives on Housing, Technology and Support Design within Australia's National Disability Strategy." *Australian Journal of Social Issues* 53, no. 3 (2018): 206-22. <https://doi.org/10.1002/ajs4.40>.
- Callaway, Libby, Kate Tregloan, Lewis Moore, and Em Bould. "Audit of Advertised Housing and Support Vacancies for People with Disabilities in Australia." *Australian Journal of Social Issues* (2020). <https://doi.org/10.1002/ajs4.114>.
- Callaway, Libby, Di Winkler, Sue Sloan, Loyal Pattuwege, Will Osborn, and Veronica Pitt. *Models of Supported Accommodation for People with Traumatic Brain Injury: A Systematic Review*. (ISCRR, 2013). https://www.tac.vic.gov.au/_data/assets/pdf_file/0018/125415/Models-of-supported-accommodation-for-TBI-Evidence-Review.pdf.
- Callaway, Libby, Di Winkler, Alice Tippet, Christine Migliorini, Natalie Herd, and Barry Willer. *The Community Integration Questionnaire-Revised (CIQ-R)*. Summer Foundation (Melbourne, Australia: 2014). <https://www.summerfoundation.org.au/wp-content/uploads/CIQ-R-Normative-Data-Report-2014.pdf>.
- Carnemolla, P. "Individualized Apartment Accommodation for People with Intellectual Disability: Protocol for a Qualitative Study Examining the Well-Being and Support Outcomes Linking Housing and Health." *JMIR Research Protocols* 9, no. 8 (2020): e18248. <https://doi.org/10.2196/18248>.
- Carnemolla, P., and C. Bridge. "Housing Design and Community Care: How Home Modifications Reduce Care Needs of Older People and People with Disability." *International Journal of Environmental Research and Public Health* 16, no. 11 (2019). <https://doi.org/10.3390/ijerph16111951>.
- Carnemolla, P., P. Srasuebkul, H. Robertson, J. Trollor, and N. Nicholas. "Prevalence of Intellectual Disability in New South Wales, Australia: A Multi-Year Cross-Sectional Dataset by Local Government Area (Lga)." *Data Brief* 31 (2020): 105673. <https://doi.org/10.1016/j.dib.2020.105673>.
- Carnemolla, Phillippa. "Ageing in Place and the Internet of Things – How Smart Home Technologies, the Built Environment and Caregiving Intersect." *Visualization in Engineering* 6, no. 1 (2018). <https://doi.org/10.1186/s40327-018-0066-5>.
- Centre for International Economics. *Proposal to Include Minimum Accessibility Standards for Housing in the National Construction Code: Consultation Regulation Impact Statement*, V2. (2020). <https://consultation.abcb.gov.au/engagement/consult-ris-accessible-housing/>.
- Chan, M., E. Campo, D. Esteve, and J. Y. Fourniols. "Smart Homes - Current Features and Future Perspectives." *Maturitas* 64, no. 2 (2009): 90-7. <https://doi.org/10.1016/j.maturitas.2009.07.014>.
- Chief Parliamentary Counsel (Victoria). "Authorised Version No. 093: Residential Tenancies Act 1997." 1997.
- "Equal Opportunity Act 2010 (Vic)." 2015. https://content.legislation.vic.gov.au/sites/default/files/29c43705-c5ac-3ef7-9ca2-366392ee6f7e_10-16aa020%20authorised.pdf.
- Committee on Economic, Social and Cultural Rights. *General Comment No. 14 (2000): The Right to the Highest Attainable Standard of Health (Article 12 of the International Covenant on Economic, Social and Cultural Rights)*. (United Nations, 2000). <https://undocs.org/E/C.12/2000/4>.
- Committee on the Rights of Persons with Disabilities. *Concluding Observations on the Combined Second and Third Periodic Reports of Australia**. (United Nations, 2019). <https://undocs.org/CRPD/C/GC/5>.
- Committee on the Rights of Persons with Disabilities. *General Comment No. 5 (2017) on Living Independently and Being Included in the Community*. (United Nations, 2017). <https://undocs.org/CRPD/C/GC/5>.
- Decision of the Committee on the Rights of Persons with Disabilities under Article 5 of the Optional Protocol to the Convention on the Rights of Persons with Disabilities (12th Session). (United Nations, 2014). <https://undocs.org/en/CRPD/C/12/D/10/2013>.
- General Comment No. 2 (2014): Article 9: Accessibility. (United Nations, 2014). <https://undocs.org/CRPD/C/GC/2>.
- General Comment No. 5 (2017) on Living Independently and Being Included in the Community. (United Nations, 2017). <https://undocs.org/CRPD/C/GC/5>.
- Commonwealth of Australia. *National Disability Strategy 2010-2020*. (2011). https://www.dss.gov.au/sites/default/files/documents/05_2012/national_disability_strategy_2010_2020.pdf.
- Commonwealth of Australia (Department of Social Services). *Younger People in Residential Aged Care: Strategy 2020-25*. (2020). https://www.dss.gov.au/sites/default/files/documents/09_2020/dac_younger-people-residential-aged-care_20092020.pdf.
- Cornell, Victoria. "Housing Implications of Individual Budget Home Care Models for Older Renters: An Australian Case Study." *Journal of Housing For the Elderly* 33, no. 1 (2018): 16-30. <https://doi.org/10.1080/02763893.2018.1451798>.
- Dalton, Andrew, and Rob Carter. *Economic Advice Prepared to Assist with Responses to the Consultation Regulation Impact Statement on Minimum Accessibility Standards for Housing in the National Construction Code*. (University of Melbourne and the Summer Foundation The Melbourne Disability Institute, 2020). https://disability.unimelb.edu.au/_data/assets/pdf_file/0010/3469492/DaltonCarter-Economic-Report-v9-18.08.2020.pdf.
- Davern, M., R. Winterton, K. Brasher, and G. Woolcock. "How Can the Lived Environment Support Healthy Ageing? A Spatial Indicators Framework for the Assessment of Age-Friendly Communities." *International Journal of Environmental Research and Public Health* 17, no. 20 (2020). <https://doi.org/10.3390/ijerph17207685>.

- Davison, Gethin, Nicole Gurran, Ryan van den Nouwelant, Simon Pinnegar, Bill Randolph, and Glen Bramley. *Affordable Housing, Urban Renewal and Planning: Emerging Practice in Queensland, South Australia and New South Wales*. (Australian Housing and Urban Research Institute, 2012).
- De Paris, Sabine Ritter, and Carlos Nuno L. Lopes. "Housing Flexibility Problem: Review of Recent Limitations and Solutions." *Frontiers of Architectural Research* 7, no. 1 (2018): 80-91. <https://doi.org/10.1016/j.foar.2017.11.004>.
- "Younger People in Residential Aged Care: Priorities for Action." Australian Government, 2020, accessed 18 December 2020, <https://www.health.gov.au/initiatives-and-programs/younger-people-in-residential-aged-care-priorities-for-action>.
- Department of Social Services. *National Dialogue on Universal Housing Design: Strategic Plan*. Australian Government (2010). <https://www.dss.gov.au/our-responsibilities/disability-and-carers/program-services/government-international/national-disability-strategy-initiatives/livable-housing-design/national-dialogue-on-universal-housing-design-strategic-plan?HTML#:~:text=The%20National%20Dialogue%20members%20have%20agreed%20to%20pursue%20an%20aspirational,to%20assist%20in%20this%20effort>.
- "Home Modifications: Helpful Information for Prescribers, the Veteran or Their Family." n.d., https://www.dva.gov.au/sites/default/files/files/health%20and%20wellbeing/homecare/major_mods_external.pdf.
- Easthope, Hazel, and Ryan van den Nouwelant. *Home Modifications in Strata Properties*. (University of New South Wales City Futures Research Centre, 2013). https://cityfutures.be.unsw.edu.au/documents/69/Hazel_DiscussionPaperFINAL.pdf.
- Fiedler, J, and D Faulkner. "Ageing on the Edge Older Persons Homelessness Prevention Project." *Parity* 31, no. 4 (2018): 8-10.
- Gurran, Nicole, Catherine Gilbert, Kenneth Gibb, Ryan van den Nouwelant, Amity James, and Peter Phibbs. "Supporting Affordable Housing Supply: Inclusionary Planning in New and Renewing Communities." *AHURI Final Report*, no. 297 (2018). <https://doi.org/10.18408/ahuri-7313201>.
- Heywood, Frances. "Adaptation: Altering the House to Restore the Home." *Housing Studies* 20, no. 4 (2005): 531-47. <https://doi.org/10.1080/02673030500114409>.
- Home Modification Information Clearinghouse. "Consumer Factsheet: Arranging Home Modifications." (2019). <https://doi.org/10.26288/5df9ade8b5570>.
- "Home Modifications Information Clearinghouse." UNSW Sydney, 2020, accessed 17 December 2020, <https://www.homemods.info/>.
- James, Amity, Steven Rowley, Wendy Stone, Sharon Parkinson, Angela Spinney, and Margaret Reynolds. "Older Australians and the Housing Aspirations Gap." *AHURI Final Report*, no. 317 (2019). <https://doi.org/10.18408/ahuri-8117301>.
- Jamwal, R., L. Callaway, D. Winkler, L. Farnworth, and R. Tate. "Evaluating the Use of Smart Home Technology by People with Brain Impairment: Protocol for a Single-Case Experimental Design." *JMIR Research Protocols* 7, no. 11 (2018): e10451. <https://doi.org/10.2196/10451>.
- Jamwal, R., H. K. Jarman, E. Rosegrave, J. Douglas, and D. Winkler. "Smart Home and Communication Technology for People with Disability: A Scoping Review." *Disability and Rehabilitation: Assistive Technology* (2020): 1-21. <https://doi.org/10.1080/17483107.2020.1818138>.
- Jones, Andrew, Martin Bell, Cheryl Tilse, and George Earl. "Rental Housing Provision for Lower-Income Older Australians." *AHURI Final Report* 98 (2007). <https://www.ahuri.edu.au/research/final-reports/98>.
- Jones, Andrew, Desleigh de Jonge, and Rhonda Phillips. "The Impact of Home Maintenance and Modification Services on Health, Community Care and Housing Outcomes in Later Life." *AHURI Positioning Paper* 103 (2008). <https://www.ahuri.edu.au/research/position-papers/103>.
- "The Role of Home Maintenance and Modification Services in Achieving Health, Community Care and Housing Outcomes in Later Life." *AHURI Final Report* 123 (2008). <https://www.ahuri.edu.au/research/final-reports/123>.
- Judd, Bruce, Edgar Liu, Hazel Easthope, Laura Davy, and Catherine Bridge. "Downsizing Amongst Older Australians." *AHURI Final Report* 214 (2014). <https://www.ahuri.edu.au/research/final-reports/214>.
- Judd, Bruce, Diana Olsberg, Joanne Quinn, Lucy Groenhardt, and Oya Demirbilek. "Dwelling, Land and Neighbourhood Use by Older Home Owners." *AHURI Final Report* 144 (2010). <https://www.ahuri.edu.au/research/final-reports/144>.
- Lessing, J. "Industrialised House-Building: Concept and Processes." Licentiate Thesis, Lund University, 2006.
- Livable Housing Australia. "Livable Housing Design Guidelines." 4th, 2017.
- Madigan, Damian. "Alternative Infill: A Design Study of Housing Intensification, Adaptation and Choice in the Established Suburbs of Adelaide." PhD, Monash University, 2016.
- Magdziak, Monika. "Flexibility and Adaptability of the Living Space to the Changing Needs of Residents." *IOP Conference Series: Materials Science and Engineering* 471 (2019). <https://doi.org/10.1088/1757-899x/471/7/072011>.
- Marfella, G., and A. Martel. "Design-to-Live or Design-to-Build? The Impact of Delegated Design Responsibility in Melbourne's High-Rise Residential Buildings." In *Structures and Architecture: Bridging the Gap and Crossing Borders*: CRC Press, 2019.
- Maxwell, Duncan. "The Case for Design-Value in Industrialised House Building Platforms: Product to Ecosystem." PhD, University of Sydney, 2018.
- "Passive Design." *YourHome*, 2013, accessed 24 November 2020, <https://www.yourhome.gov.au/passive-design>.

- Murray, Shane, Nigel Bertram, Catherine Murphy, Rutger Pasman, Deborah Rowe, and Kate Tregloan. *Design Contributions to Lifetime Care: A Design-Based Approach to the Integration of Dwelling Design Strategies and Supportive Technologies in Order to Improve Accommodation Outcomes for Sci and Tbi Users*. (ISCRR, 2013).
- Murray, Shane, Simon Whibley, and Diego Ramirez-Lovering, eds. *Rehousing : 24 Housing Projects*: RMIT Publishing, 2008.
- "Commonwealth Home Support Programme." Commonwealth of Australia, n.d., accessed 10 August 2020, <https://www.myagedcare.gov.au/help-at-home/commonwealth-home-support-programme>.
- "Home Care Packages." Commonwealth of Australia, n.d., accessed 11 August 2020, <https://www.myagedcare.gov.au/help-at-home/home-care-packages>.
- "How It Works." 2020, accessed 27 October 2020, <https://ncc.abcb.gov.au/ncc-online/How-it-works>.
- "Access to the NDIS - the Disability Requirements." 2019, accessed 18 December 2020, <https://www.ndis.gov.au/about-us/operational-guidelines/access-ndis-operational-guideline/access-ndis-disability-requirements>.
- "Assistive Technology Explained." 2020, accessed 7 December 2020, <https://www.ndis.gov.au/participants/home-equipment-and-supports/assistive-technology-explained>.
- "Home Modifications Explained." 2020, accessed 23 November 2020, <https://www.ndis.gov.au/participants/home-equipment-and-supports/home-modifications-explained>.
- NDIS. *Home Modifications: Guidance for Builders and Designers*. NDIS. <https://www.ndis.gov.au/media/2124/download>.
- National Disability Insurance Scheme Price Guide 2020-21: Specialist Disability Accommodation, Version 2.1. (2020).
- NDIS Quarterly Report to Disability Ministers: 30 September 2020. (2020). <https://www.ndis.gov.au/media/2801/download>.
- NDIS Specialist Disability Accommodation Design Standard. (2019). <https://www.ndis.gov.au/media/1868/download>.
- "Plan Budget and Rules." Updated 2 December 2019, 2019, accessed 26 October 2020, <https://www.ndis.gov.au/participants/creating-your-plan/plan-budget-and-rules>.
- "Specialist Disability Accommodation." 2020, accessed 28 July 2020, <https://www.ndis.gov.au/providers/housing-and-living-supports-and-services/housing/specialist-disability-accommodation>.
- "Supports Funded by the NDIS." Updated 10 October 2019, 2019, accessed 26 October 2020, <https://www.ndis.gov.au/understanding/supports-funded-ndis>.
- Ochodo, C., D. M. Ndeti, W. N. Moturi, and J. O. Otieno. "External Built Residential Environment Characteristics That Affect Mental Health of Adults." *J Urban Health* 91, no. 5 (2014): 908-27. <https://doi.org/10.1007/s11524-013-9852-5>.
- Office of Parliamentary Counsel Canberra. "Disability Discrimination Act 1992." 2018.
- Oliver, S, E Gosden-Kaye, D Winkler, and J Douglas. "The Outcomes of Individualized Housing for People with Disability and Complex Needs: A Scoping Review." *Disability and Rehabilitation* (2020): 1-15. <https://doi.org/10.1080/09638288.2020.1785023>.
- Ong, Rachel, Gavin Wood, Melek Cigdem, and Silvia Salazar. "Mortgage Stress and Precarious Home Ownership: Implications for Older Australians." *AHURI Final Report*, no. 319 (2019). <https://doi.org/10.18408/ahuri-8118901>.
- Parliamentary Budget Office. *Australia's Ageing Population: Understanding the Fiscal Impacts over the Next Decade*. Commonwealth of Australia, (2019). https://www.aph.gov.au/-/media/05_About_Parliament/54_Parliamentary_Depts/548_Parliamentary_Budget_Office/Reports/2018-19/02_2019_Australias_ageing_population/Australias_Ageing_Population_PDF.pdf?la=en&hash=97A05620F5D6DE87D021938A844A65BFC4B335A6.
- Pinquart, Martin, and Silvia Sorensen. "Correlates of Physical Health of Informal Caregivers: A Meta-Analysis." *The journals of gerontology. Series B, Psychological sciences and social sciences* 62, no. 2 (2007): P126-37. <https://doi.org/10.1093/geronb/62.2.p126>.
- Productivity Commission. *National Disability Insurance Scheme (NDIS) Costs*. (2017). <https://www.pc.gov.au/inquiries/completed/ndis-costs/report/ndis-costs.pdf>.
- Ramirez-Lovering, Diego. "The Space of Dwelling: An Investigation into the Potential for Spatial Flexibility to Improve Volume Housing in Australia." PhD, Monash University, 2012.
- Robertson, David, and Karl Ulrich. "Planning for Product Platforms." *Sloan Management Review* 39, no. 4 (1998): 19-31. http://repository.upenn.edu/oid_papers/266.
- Rovers, Ronald, Aleš Zikmund, Antonin Lupisek, Anatolijs Borodinecs, Erik Novák, Eva Matoušková, Guus de Haas, et al. *A Guide into Renovation Package Concepts for Mass Retrofit of Different Types of Buildings with Prefabricated Elements for (N)Zeb Performance*. (2018). <https://www.more-connect.eu/wp-content/uploads/2018/12/A-GUIDE-INTO-RENOVATION-PACKAGE-CONCEPTS-FOR-MASS-RETROFIT-OF-DIFFERENT-TYPES-OF-BUILDINGS-WITH-PREFABRICATED-ELEMENTS-FOR-NZEB-PERFORMANCE.pdf>.
- Ryan, S. *Designing for Inclusion and Independence*. (Melbourne, Vic: Summer Housing Ltd., 2017). <https://summerhousing.org.au/designing-for-inclusion-and-independence/>.
- Schaik, Leon van, and Nigel Bertram. *Suburbia Reimagined: Ageing and Increasing Populations in the Low-Rise City*. New York: Routledge, 2018. <https://doi.org/https://doi.org/10.4324/9781315111315>.
- Schneider, Tatjana, and Jeremy Till. "Flexible Housing: Opportunities and Limits." *theory* 9, no. 2 (2005): 157-66.
- Secretary General, United Nations. *Report of the Special Rapporteur on Adequate Housing as a Component of the Right to an Adequate Standard of Living, and on the Right to Non Discrimination in This Context*. (United Nations, 2016). <https://undocs.org/A/71/310>.
- SGS Economics and Planning. *Specialist Disability Accommodation: Market Insights*. Summer Foundation (2018).

- Sinclair, Sarah, Ashton de Silva, and Foula Kopanidis. *Exploring the Economic Value Embedded in Housing Built to Universal Design Principles: Bridging the Gap between Public Placemaking and Private Residential Housing*. (2020).
- Standards Australia. *Australian Standard Adaptable Housing As4299-1995*. 1995.
- Australian Standard Design for Access and Mobility As1428.1-2009. 2009.
- Story, M. F. "Maximizing Usability: The Principles of Universal Design." *Assistive Technology* 10, no. 1 (1998): 4-12. <https://doi.org/10.1080/10400435.1998.10131955>.
- Summer Foundation. "Mainstream Housing Options." (2018). <https://www.summerfoundation.org.au/wp-content/uploads/2018/07/mainstream-housing-options-web.pdf>.
- Sustainable Victoria. *Comprehensive Energy Efficiency Retrofits to Existing Victorian Houses*. (2019). <https://assets.sustainability.vic.gov.au/susvic/Report-Energy-Comprehensive-Energy-Efficiency-Retrofits-to-Existing-Victorian-Houses-PDF.pdf>.
- Taylor, Mark, and Laurie Buys. "Ageing in Suburbia: Designing for Demographic Change in Australia and New Zealand." *Architectural Design* 84, no. 2 (2014): 54-59. <https://doi.org/10.1002/ad.1728>.
- The National People with Disabilities and Carer Council. *Shut Out: The Experience of People with Disabilities and Their Families in Australia*. Department of Social Services, (2009). <https://www.dss.gov.au/our-responsibilities/disability-and-carers/publications-articles/policy-research/shut-out-the-experience-of-people-with-disabilities-and-their-families-in-australia>.
- The Treasury. *2015 Intergenerational Report: Australia in 2055*. Commonwealth of Australia, (2015). https://treasury.gov.au/sites/default/files/2019-03/2015_IGR.pdf.
- Till, Jeremy, and Tatjana Schneider. *Flexible Housing*. Taylor and Francis Group, 2007. <https://ebookcentral.proquest.com/lib/monash/detail.action?docID=4694325>.
- "Flexible Housing: The Means to the End" *theory* 9, no. 3/4 (2005): 287-96.
- "Home Modifications." n.d., accessed 16 November 2020, <https://www.tac.vic.gov.au/clients/how-we-can-help/treatments-and-services/services/home-modifications>.
- Tregloan, Kate, Libby Callaway, Ilan Wiesel, Bruce Bonyhady, and David Bowen. *Research to Support the TAC Client Housing Strategy: Housing and Support Stakeholder Perspectives on Housing and Support for People with Disability in Victoria*. (2019).
- Ulrich, R. S. "View through a Window May Influence Recovery from Surgery." *Science* 224, no. 4647 (1984): 420-1. <https://doi.org/10.1126/science.6143402>.
- UN Human Rights Committee. *General Comment No. 36: Article 6: Right to Life**. (United Nations, 2019). <https://undocs.org/CCPR/C/GC/36>.
- United Nations. *Convention on the Rights of Persons with Disabilities and Optional Protocol*. (2006). <http://www.un.org/disabilities/documents/convention/convoptprot-e.pdf>.
- International Covenant on Economic, Social and Cultural Rights. (1966). <https://www.ohchr.org/Documents/ProfessionalInterest/cescr.pdf>.
- Van Houtven, C. H., N. B. Coe, and M. M. Skira. "The Effect of Informal Care on Work and Wages." *Journal of Health Economics* 32, no. 1 (2013): 240-52. <https://doi.org/10.1016/j.jhealeco.2012.10.006>.
- Wiesel, Ilan. *Living with Disability in Inaccessible Housing: Social, Health and Economic Impacts*. University of Melbourne (2020). https://disability.unimelb.edu.au/_data/assets/pdf_file/0019/3522007/Accessible-Housing-FINAL-REPORT.pdf.
- Wiesel, Ilan, and Daphne Habibis. "NDIS, Housing Assistance and Choice and Control for People with Disability." *AHURI Final Report*, no. 258 (2015).
- Wilkinson, Alex, Nicola Brackertz, Michael Fotheringham, and Di Winkler. "Housing for People with Disability: Evidence Review of Post-Occupancy Evaluation Instruments." *AHURI Research Paper* (2018). <https://www.ahuri.edu.au/research/research-papers/housing-for-people-with-disability-evidence-review-of-post-occupancy-evaluation-instruments>.
- Housing for People with Disability: Evidence Review of Post-Occupancy Evaluation Instruments*. AHURI Professional Services (2018). https://www.ahuri.edu.au/_data/assets/pdf_file/0023/18680/Housing-for-people-with-disability-evidence-review-of-post-occupancy-evaluation-instruments.pdf.
- Winkler, D, C Harvey, E Davis, I Goodwin, C Wellecke, J Douglas, and P Mulherin. *Incorporating Minimum Accessibility Standards in New Housing: A Survey of Access Consultants and Architects*. Melbourne. Summer Foundation (Melbourne, Australia: 2021). https://www.summerfoundation.org.au/wp-content/uploads/2021/03/Study_1_Survey_of_Consultants_and_Architects_March_26-web.pdf.
- Winkler, D, A Martel, Y Chen, and T Greaves. *Audit of Accessible Features in New Build House Plans*. Summer Foundation (Melbourne, Australia: 2020). <https://www.summerfoundation.org.au/wp-content/uploads/2020/08/Audit-of-accessible-features-in-new-build-house-plans-Feb-2021-1.pdf>.

Endnotes

- 1 The inclusion of minimum accessibility standards in the National Construction Code is currently being considered, with an outcome expected in 2021.
- 2 Committee on the Rights of Persons with Disabilities, *Concluding observations on the combined second and third periodic reports of Australia** (United Nations, 2019), <https://undocs.org/CRPD/C/GC/5>, [17], [18(b)].
- 3 Chief Parliamentary Counsel (Victoria), "Authorised Version No. 093: Residential Tenancies Act 1997," (1997), Section 64.
- 4 For a full list of research, see <https://www.ahuri.edu.au/research/research-library>.
- 5 For a full list of research, see <https://www.summerfoundation.org.au/documents-category/research-outputs/>.
- 6 E.g. Libby Callaway et al., "Audit of advertised housing and support vacancies for people with disabilities in Australia," *Australian Journal of Social Issues* (2020), <https://doi.org/10.1002/ajs4.114>; SGS Economics and Planning, *SPECIALIST DISABILITY ACCOMMODATION: MARKET INSIGHTS*, Summer Foundation (2018); Ilan Wiesel and Daphne Habibis, "NDIS, housing assistance and choice and control for people with disability," *AHURI Final Report*, no. 258 (2015).
- 7 E.g. Kate Tregloan et al., *RESEARCH TO SUPPORT THE TAC CLIENT HOUSING STRATEGY: Housing and support stakeholder perspectives on housing and support for people with disability in Victoria* (2019); Libby Callaway et al., *Models of supported accommodation for people with traumatic brain injury: A systematic review* (ISCRR, 2013), https://www.tac.vic.gov.au/_data/assets/pdf_file/0018/125415/Models-of-supported-accommodation-for-TBI-Evidence-Review.pdf; Libby Callaway et al., *The Community Integration Questionnaire-Revised (CIQ-R)*, Summer Foundation (Melbourne, Australia, 2014), <https://www.summerfoundation.org.au/wp-content/uploads/CIQ-R-Normative-Data-Report-2014.pdf>; Alex Wilkinson et al., *Housing for people with disability: evidence review of post-occupancy evaluation instruments*, AHURI Professional Services (2018), https://www.ahuri.edu.au/_data/assets/pdf_file/0023/18680/Housing-for-people-with-disability-evidence-review-of-post-occupancy-evaluation-instruments.pdf.
- 8 E.g. Australian Network for Universal Housing Design, "Let's do it right first time", *Response to the Consultation Regulatory Impact Statement: Proposal to include minimum accessibility standards for all housing in the National Construction Code* (2020), <https://aduhdblog.files.wordpress.com/2020/08/anuhd-response-to-the-consultation-ris.pdf>; Centre for International Economics, *Proposal to include minimum accessibility standards for housing in the National Construction Code: Consultation Regulation Impact Statement*, v2 (2020), <https://consultation.abcb.gov.au/engagement/consult-ris-accessible-housing/>; D Winkler et al., *Incorporating minimum accessibility standards in new housing: A survey of access consultants and architects*. Melbourne, Summer Foundation (Melbourne, Australia, 2021), https://www.summerfoundation.org.au/wp-content/uploads/2021/03/Study_1_Survey_of_Consultants_and_Architects_March_26-web.pdf.
- 9 E.g. Andrew Jones et al., "Rental housing provision for lower-income older Australians," *AHURI Final Report* 98 (2007), <https://www.ahuri.edu.au/research/final-reports/98>; Callaway et al., "Audit of advertised housing and support vacancies for people with disabilities in Australia."
- 10 E.g. J Fiedler and D Faulkner, "Ageing on the edge older persons homelessness prevention project," *Parity* 31, no. 4 (2018).
- 11 E.g. Australian Housing and Urban Research Institute, "What's needed to make 'ageing in place' work for older Australians," (2019). <https://www.ahuri.edu.au/research/ahuri-briefs/whats-needed-to-make-ageing-in-place-work-for-older-australians>; Amity James et al., "Older Australians and the housing aspirations gap," *AHURI Final Report*, no. 317 (2019), <https://doi.org/10.18408/ahuri-8117301>.
- 12 E.g. Bruce Judd et al., "Dwelling, land and neighbourhood use by older home owners," *AHURI Final Report* 144 (2010), <https://www.ahuri.edu.au/research/final-reports/144>; Damian Madigan, "Alternative Infill: a design study of housing intensification, adaptation and choice in the established suburbs of Adelaide" (PhD Monash University, 2016); Alysia Bennett, "Stealth Urbanism: The covert advance of suburban density and diversity" (PhD Monash University, 2016).
- 13 E.g. Bruce Judd et al., "Downsizing amongst older Australians," *AHURI Final Report* 214 (2014), <https://www.ahuri.edu.au/research/final-reports/214>.
- 14 E.g. Hazel Easthope and Ryan van den Nouweland, *Home Modifications in Strata Properties* (University of New South Wales City Futures Research Centre, 2013), https://cityfutures.be.unsw.edu.au/documents/69/Hazel_DiscussionPaperFINAL.pdf.
- 15 E.g. Andrew Jones, Desleigh de Jonge, and Rhonda Phillips, "The impact of home maintenance and modification services on health, community care and housing outcomes in later life," *AHURI Positioning Paper* 103 (2008), <https://www.ahuri.edu.au/research/position-papers/103>; Andrew Jones, Desleigh de Jonge, and Rhonda Phillips, "The role of home maintenance and modification services in achieving health, community care and housing outcomes in later life," *AHURI Final Report* 123 (2008), <https://www.ahuri.edu.au/research/final-reports/123>; S Oliver et al., "The outcomes of individualized housing for people with disability and complex needs: a scoping review," *Disability and Rehabilitation* (2020), <https://doi.org/10.1080/09638288.2020.1785023>.
- 16 E.g. Victoria Cornell, "Housing Implications of Individual Budget Home Care Models for Older Renters: An Australian Case Study," *Journal of Housing For the Elderly* 33, no. 1 (2018), <https://doi.org/10.1080/02763893.2018.1451798>.
- 17 E.g. M. Davern et al., "How Can the Lived Environment Support Healthy Ageing? A Spatial Indicators Framework for the Assessment of Age-Friendly Communities," *International Journal of Environmental Research and Public Health* 17, no. 20 (2020), <https://doi.org/10.3390/ijerph17207685>.
- 18 E.g. D Winkler et al., *Audit of accessible features in new build house plans*, Summer Foundation (Melbourne, Australia, 2020), <https://www.summerfoundation.org.au/wp-content/uploads/2020/08/Audit-of-accessible-features-in-new-build-house-plans-Feb-2021-1.pdf>; Alex Wilkinson et al., "Housing for people with disability: evidence review of post-occupancy evaluation instruments," *AHURI Research Paper* (2018), <https://www.ahuri.edu.au/research/research-papers/housing-for-people-with-disability-evidence-review-of-post-occupancy-evaluation-instruments>.
- 19 "Home Modifications Information Clearinghouse," UNSW Sydney, 2020, accessed 17 December 2020, <https://www.homemods.info/>.

- 20 E.g. S Ryan, *Designing for Inclusion and Independence* (Melbourne, Vic: Summer Housing Ltd., 2017), <https://summerhousing.org.au/designing-for-inclusion-and-independence/>; Livable Housing Australia, "Livable Housing Design Guidelines," (4th, 2017); *Australian Standard Design for access and mobility AS1428.1-2009*, (Standards Australia, 2009); *Australian Standard Adaptable Housing AS4299-1995*, (Standards Australia, 1995).
- 21 P. Carnemolla, "Individualized Apartment Accommodation for People With Intellectual Disability: Protocol for a Qualitative Study Examining the Well-Being and Support Outcomes Linking Housing and Health," *JMIR Research Protocols* 9, no. 8 (2020), <https://doi.org/10.2196/18248>.
- 22 P. Carnemolla et al., "Prevalence of intellectual disability in New South Wales, Australia: a multi-year cross-sectional dataset by Local Government Area (LGA)," *Data Brief* 31 (2020), <https://doi.org/10.1016/j.dib.2020.105673>.
- 23 E.g. Ilan Wiesel, *Living with disability in inaccessible housing: social, health and economic impacts*, University of Melbourne (2020), https://disability.unimelb.edu.au/_data/assets/pdf_file/0019/3522007/Accessible-Housing-FINAL-REPORT.pdf.
- 24 E.g. David Allouf, Andrew Martel, and Alan March, "Discretion versus prescription: Assessing the spatial impact of design regulations in apartments in Australia," *Environment and Planning B: Urban Analytics and City Science* 47, no. 7 (2019), <https://doi.org/10.1177/2399808318825273>.
- 25 E.g. Winkler et al., *Audit of accessible features in new build house plans*.
- 26 E.g. Wilkinson et al., "Housing for people with disability: evidence review of post-occupancy evaluation instruments."
- 27 E.g. R. Jamwal et al., "Smart home and communication technology for people with disability: a scoping review," *Disability and Rehabilitation: Assistive Technology* (2020), <https://doi.org/10.1080/17483107.2020.1818138>; R. Jamwal et al., "Evaluating the Use of Smart Home Technology by People With Brain Impairment: Protocol for a Single-Case Experimental Design," *JMIR Research Protocols* 7, no. 11 (2018), <https://doi.org/10.2196/10451>.
- 28 E.g. NDIS, *Home Modifications: Guidance for Builders and Designers*, NDIS, <https://www.ndis.gov.au/media/2124/download>; "Home modifications," n.d., accessed 16 November 2020, <https://www.tac.vic.gov.au/clients/how-we-can-help/treatments-and-services/services/home-modifications>.
- 29 C. Bridge et al., *Identifying Barriers to Home Modifications: Evidence based research* (Home Modification Information Clearinghouse, 2007), <https://www.homemods.info/Download.ashx?File=6f732f373bfdd8ce4ac3637e136470ef&C=31342c3233392c30>; T. Aplin, D. de Jonge, and L. Gustafsson, "Understanding home modifications impact on clients and their family's experience of home: A qualitative study," *Australian Occupational Therapy Journal* 62, no. 2 (2015), <https://doi.org/10.1111/1440-1630.12156>.
- 30 Frances Heywood, "Adaptation: Altering the House to Restore the Home," *Housing Studies* 20, no. 4 (2005), <https://doi.org/10.1080/02673030500114409>.
- 31 E.g. Libby Callaway and Kate Tregloan, "Government perspectives on housing, technology and support design within Australia's National Disability Strategy," *Australian Journal of Social Issues* 53, no. 3 (2018), <https://doi.org/10.1002/ajs4.40>.
- 32 Australian Human Rights Commission, *Submission in response to the National Disability Strategy Position Paper (July 2020)* (2020), https://humanrights.gov.au/sites/default/files/ahrc_submission_nds_position_paper_2020_0.pdf; Committee on the Rights of Persons with Disabilities, *Decision of the Committee on the Rights of Persons with Disabilities under article 5 of the Optional Protocol to the Convention on the Rights of Persons with Disabilities (12th session)* (United Nations, 2014), <https://undocs.org/en/CRPD/C/12/D/10/2013>; Committee on the Rights of Persons with Disabilities, *Decision of the Committee on the Rights of Persons with Disabilities under article 5 of the Optional Protocol to the Convention on the Rights of Persons with Disabilities (12th session)*; "Access to the NDIS - The disability requirements," 2019, accessed 18 December 2020, <https://www.ndis.gov.au/about-us/operational-guidelines/access-ndis-operational-guideline/access-ndis-disability-requirements>; "Younger people in residential aged care: priorities for action," Australian Government, 2020, accessed 18 December 2020, <https://www.health.gov.au/initiatives-and-programs/younger-people-in-residential-aged-care-priorities-for-action>. Other noteworthy resources for individuals seeking accessible accommodation include <https://www.housinghub.org.au/>, which links people with disability to specific accessible homes available to rent or buy; <https://www.disabilitygateway.gov.au/>, which provides information and services to people with disability and their families, including resources to support finding accessible rental properties; <https://www.summerfoundation.org.au/our-focus/housing/finding-housing/>, which helps people with disability to navigate the NDIS to secure housing support; and <https://www.olderrenters.org.au/>, which works with older people to achieve housing justice and social change.
- 33 The definition of disability is contested, and a comprehensive evaluation of the existing literature on the definition of "disability" is beyond the scope of this report. Disability statistics used in this report follow the Australian Bureau of Statistics' (ABS) definition of "disability":
any limitation, restriction or impairment which restricts everyday activities and has lasted, or is likely to last, for at least six months.
Australian Bureau of Statistics, "4430.0 - Disability, Ageing and Carers, Australia: Summary of Findings, 2018," (24 October 2019). <https://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/4430.0Main%20Features52018?opendocument&tabname=Summary&prodno=4430.0&issue=2018&num=&view=>.
For further definitions, see the section 4 of the Disability Discrimination Act: Office of Parliamentary Counsel Canberra, "Disability Discrimination Act 1992," (2018). For further discussion of the social construction of disability see Committee on the Rights of Persons with Disabilities, 2014 Committee on the Rights of Persons with Disabilities, *General comment No. 2 (2014): Article 9: Accessibility* (United Nations, 2014), <https://undocs.org/CRPD/C/GC/2>. For the disability requirements to be eligible for NDIS support, see NDIS, "Access to the NDIS - The disability requirements."
- 34 Australian Institute of Health and Welfare, *People with disability in Australia* (Australian Government, 2020), p. 6, <https://www.aihw.gov.au/reports/dis/73-1/people-with-disability-in-australia/contents-1/>.

- 35 Australian Bureau of Statistics, "4430.0 - Disability, Ageing and Carers, Australia: Summary of Findings, 2018." An additional 20% (1 in 5) of Australians having a long-term health condition that does not limit everyday activities. It is likely that many of these people would gain benefits from various accessibility features.
- 36 Australian Bureau of Statistics, "4430.0 - Disability, Ageing and Carers, Australia: Summary of Findings, 2018."
- 37 Australian Bureau of Statistics, "4430.0 - Disability, Ageing and Carers, Australia: Summary of Findings, 2018."
- 38 Australian Bureau of Statistics, "4430.0 - Disability, Ageing and Carers, Australia: Summary of Findings, 2018."
- 39 Australian Institute of Health and Welfare, *Older Australia at a glance* (2018), <https://www.aihw.gov.au/reports/older-people/older-australia-at-a-glance/contents/demographics-of-older-australians>.
- 40 Mark Taylor and Laurie Buys, "Ageing in Suburbia: Designing for Demographic Change in Australia and New Zealand," *Architectural Design* 84, no. 2 (2014), <https://doi.org/10.1002/ad.1728>.
- 41 Centre for International Economics, *Proposal to include minimum accessibility standards for housing in the National Construction Code: Consultation Regulation Impact Statement*, v2, p. 29.
- 42 Australian Institute of Health and Welfare, *People with disability in Australia*, p. 164.
- 43 Australian Institute of Health and Welfare, *People with disability in Australia*.
- 44 Rachel Ong et al., "Mortgage stress and precarious home ownership: implications for older Australians," *AHURI Final Report*, no. 319 (2019), <https://doi.org/10.18408/ahuri-8118901>.
- 45 Australian Institute of Health and Welfare, *People with disability in Australia*.
- 46 Australian Building Codes Board, *Accessible Housing Options Paper Consultation Report* (2019), <https://www.abcb.gov.au/Resources/Publications/Consultation/Accessible-Housing-Options-Paper-Consultation-Report>, p. 58. This is despite the impermissibility of such conduct under state and federal anti-discrimination legislation federal (see discussion at 1.3.2 (b)).
- 47 Australian Institute of Health and Welfare, *People with disability in Australia*.
- 48 Note that "appropriate" means appropriate in terms of size relative to number of occupants, not accessibility features.
- 49 Anglicare Australia, *Rental Affordability Snapshot: Special Update August 2020* (2020), <https://www.anglicare.asn.au/docs/default-source/default-document-library/special-release-rental-affordability-update.pdf?sfvrsn=4>.
- 50 Anglicare Victoria, *Rental Affordability Snapshot 2020: Anglicare Victoria – Victorian rental market* (2020), https://www.anglicarevic.org.au/wp-content/uploads/2020/04/RAS2020_Mini-Report_AnglicareVictoria_April2020.pdf.
- 51 Australian Institute of Health and Welfare, *People with disability in Australia*, p. 25.
- 52 Australian Institute of Health and Welfare, *People with disability in Australia*, p. 25, 107.
The Australian Government has earmarked \$10.4 million to stop the flow of younger people into nursing homes and to transition people under 65 currently living in nursing homes into other accommodation arrangements under the Younger People in Residential Aged Care Strategy, Department of Health, "Younger people in residential aged care: priorities for action."
- 53 NDIS, *NDIS Specialist Disability Accommodation Design Standard* (2019), <https://www.ndis.gov.au/media/1868/download>.<https://www.ndis.gov.au/media/1868/download>.
- 54 Australian Network for Universal Housing Design, *Submission by Australian Network for Universal Housing Design to the Royal Commission into Violence, Abuse, Neglect and Exploitation of People with Disability* (2019), <https://aduhdblog.files.wordpress.com/2019/12/anuhd-submission-to-the-disability-royal-commission.finalnen.pdf>.
- 55 Australian Institute of Health and Welfare, *People with disability in Australia*.
- 56 Australian Bureau of Statistics, "4430.0 - Disability, Ageing and Carers, Australia: Summary of Findings, 2018."
- 57 Australian Bureau of Statistics, "4430.0 - Disability, Ageing and Carers, Australia: Summary of Findings, 2018."
- 58 Australian Institute of Health and Welfare, *The desire to age in place among older Australians* (2013), <https://www.aihw.gov.au/getmedia/69a6b0b9-6f86-411c-b15d-943144296250/15141.pdf.aspx?inline=true>.
- 59 Australian Housing and Urban Research Institute, "What's needed to make 'ageing in place' work for older Australians."
- 60 see Commonwealth of Australia (Department of Social Services), *Younger People in Residential Aged Care: Strategy 2020–25* (2020), https://www.dss.gov.au/sites/default/files/documents/09_2020/dac_younger-people-residential-aged-care_20092020.pdf.
- 61 Parliamentary Budget Office, *Australia's Ageing Population: Understanding the fiscal impacts over the next decade*, Commonwealth of Australia, (2019), https://www.aph.gov.au/-/media/05_About_Parliament/54_Parliamentary_Depts/548_Parliamentary_Budget_Office/Reports/2018-19/02_2019_Australias_ageing_population/Australias_Ageing_Population_PDF.pdf?la=en&hash=97A05620F5D6DE87D021938A844A65BFC4B335A6.
- 62 P. Carnemolla and C. Bridge, "Housing Design and Community Care: How Home Modifications Reduce Care Needs of Older People and People with Disability," *International Journal of Environmental Research and Public Health* 16, no. 11 (2019), <https://doi.org/10.3390/ijerph16111951>.
- 63 Centre for International Economics, *Proposal to include minimum accessibility standards for housing in the National Construction Code: Consultation Regulation Impact Statement*, v2.
- 64 Andrew Dalton and Rob Carter, *Economic advice prepared to assist with responses to the Consultation Regulation Impact Statement on minimum accessibility standards for housing in the National Construction Code* (University of Melbourne and the Summer Foundation, The Melbourne Disability Institute, 2020), https://disability.unimelb.edu.au/_data/assets/pdf_file/0010/3469492/DaltonCarter-Economic-Report-v9-18.08.2020.pdf.
- 65 Centre for International Economics, *Proposal to include minimum accessibility standards for housing in the National Construction Code: Consultation Regulation Impact Statement*, v2; Australian Institute of Health and Welfare, *People with disability in Australia*.
- 66 Rob Adams, "Transforming Australian Cities for a More Financially Viable and Sustainable Future: Transportation and Urban Design," *The Australian Economic Review* 42, no. 2 (2009).
- 67 Bridge et al., *Identifying Barriers to Home Modifications: Evidence based research*.

- 68 Australian Building Codes Board, *Accessible Housing: Options Paper* (2018), <https://www.abcb.gov.au/Resources/Publications/Consultation/Accessible-Housing-Options-Paper>.
- 69 Standards Australia, *Short Australian Standard Design for access and mobility AS1428.1-2009*.
- 70 Livable Housing Australia, "Livable Housing Design Guidelines."
- 71 Judd et al., "Dwelling, land and neighbourhood use by older home owners."; M. F. Story, "Maximizing usability: the principles of universal design," *Assistive Technology* 10, no. 1 (1998), <https://doi.org/10.1080/10400435.1998.10131955>.
- 72 Livable Housing Australia, "Livable Housing Design Guidelines."
- 73 United Nations, *Convention on the Rights of Persons with Disabilities and Optional Protocol* (2006), <http://www.un.org/disabilities/documents/convention/convoptprot-e.pdf>, Art. 2.
- 74 Story, "Maximizing usability: the principles of universal design."
- 75 Standards Australia, *Short Australian Standard Adaptable Housing AS4299-1995*, 4.
- 76 Livable Housing Australia, "Livable Housing Design Guidelines."; Australian Network for Universal Housing Design, *Submission by Australian Network for Universal Housing Design to the Royal Commission into Violence, Abuse, Neglect and Exploitation of People with Disability*.
- 77 Story, "Maximizing usability: the principles of universal design."
- 78 Article 11 of ICESCR provides that everyone has the right to an adequate standard of living for themselves and their family, including housing. United Nations, *International Covenant on Economic, Social and Cultural Rights* (1966), <https://www.ohchr.org/Documents/ProfessionalInterest/cescr.pdf>. Article 28 of the CRPD uses equivalent language. United Nations, *Convention on the Rights of Persons with Disabilities and Optional Protocol*.
- 79 See UN Human Rights Committee, *General comment No. 36: Article 6: right to life** (United Nations, 2019), [26], <https://undocs.org/CCPR/C/GC/36>; Secretary General, United Nations, *Report of the Special Rapporteur on adequate housing as a component of the right to an adequate standard of living, and on the right to non discrimination in this context* (United Nations, 2016), <https://undocs.org/A/71/310>.
- 80 See Social and Cultural Rights Committee on Economic, *General Comment No. 14 (2000): The right to the highest attainable standard of health (article 12 of the International Covenant on Economic, Social and Cultural Rights)* (United Nations, 2000), [3], <https://undocs.org/E/C.12/2000/4>.
- 81 See Committee on the Rights of Persons with Disabilities, *General comment No. 5 (2017) on living independently and being included in the community* (United Nations, 2017), [9], [15]-[16], [25], [34], [38], [46], [54], [59], <https://undocs.org/CRPD/C/GC/5>.
- 82 United Nations, *Convention on the Rights of Persons with Disabilities and Optional Protocol*, Art. 2, 5(3).
- 83 Committee on the Rights of Persons with Disabilities, *General comment No. 2 (2014): Article 9: Accessibility*.
- 84 Committee on the Rights of Persons with Disabilities, *General comment No. 5 (2017) on living independently and being included in the community* (United Nations, 2017), <https://undocs.org/CRPD/C/GC/5>.
- 85 Committee on the Rights of Persons with Disabilities, *Concluding observations on the combined second and third periodic reports of Australia**, [17].
- 86 Committee on the Rights of Persons with Disabilities, *Concluding observations on the combined second and third periodic reports of Australia**, [37].
- 87 Committee on the Rights of Persons with Disabilities, *Concluding observations on the combined second and third periodic reports of Australia**, [18].
- 88 Committee on the Rights of Persons with Disabilities, *Concluding observations on the combined second and third periodic reports of Australia**, [38].
- 89 The process of updating the NDIS for beyond 2020 is currently underway, including recommendations specifically addressing accommodation. see Australian Human Rights Commission, *Submission in response to the National Disability Strategy Position Paper* (July 2020).
- 90 Department of Social Services, *National Dialogue on Universal Housing Design: Strategic Plan*, Australian Government (2010), <https://www.dss.gov.au/our-responsibilities/disability-and-carers/program-services/government-international/national-disability-strategy-initiatives/livable-housing-design/national-dialogue-on-universal-housing-design-strategic-plan?HTML#:~:text=The%20National%20Dialogue%20members%20have%20agreed%20to%20pursue%20an%20aspirational,to%20assist%20in%20this%20effort>.
- 91 Commonwealth of Australia, *National Disability Strategy 2010-2020* (2011), https://www.dss.gov.au/sites/default/files/documents/05_2012/national_disability_strategy_2010_2020.pdf.
- 92 Commonwealth of Australia, *National Disability Strategy 2010-2020*.
- 93 Australian Network for Universal Housing Design and RI Australia, *Report on the Progress of the National Dialogue on Universal Housing Design 2010-2014* (2015), <https://apo.org.au/sites/default/files/resource-files/2015-01/apo-nid53494.pdf>.
- 94 Centre for International Economics, *Proposal to include minimum accessibility standards for housing in the National Construction Code: Consultation Regulation Impact Statement*, v2.
- 95 Australian Network for Universal Housing Design, "Let's do it right first time", *Response to the Consultation Regulatory Impact Statement: Proposal to include minimum accessibility standards for all housing in the National Construction Code*.
- 96 Office of Parliamentary Counsel Canberra, "Disability Discrimination Act 1992."
- 97 Office of Parliamentary Counsel Canberra, "Disability Discrimination Act 1992."
- 98 However, Section 29A also provides that the Disability Discrimination Act does not render it unlawful to discriminate against another person on the ground of their disability if avoiding the discrimination would impose an unjustifiable hardship on the discriminator.
- 99 Chief Parliamentary Counsel (Victoria), "Equal Opportunity Act 2010 (Vic)," (2015). https://content.legislation.vic.gov.au/sites/default/files/29c43705-c5ac-3ef7-9ca2-366392ee6f7e_10-16aa020%20authorised.pdf.
- 100 Centre for International Economics, *Proposal to include minimum accessibility standards for housing in the National Construction Code: Consultation Regulation Impact Statement*, v2, p. 31.

- 101 Centre for International Economics, *Proposal to include minimum accessibility standards for housing in the National Construction Code: Consultation Regulation Impact Statement*, v2, p. 31-32.
- 102 Centre for International Economics, *Proposal to include minimum accessibility standards for housing in the National Construction Code: Consultation Regulation Impact Statement*, v2, p. 31.
- 103 Gethin Davison et al., *Affordable housing, urban renewal and planning: emerging practice in Queensland, South Australia and New South Wales* (Australian Housing and Urban Research Institute, 2012).
- 104 Nicole Gurran et al., "Supporting affordable housing supply: inclusionary planning in new and renewing communities," *AHURI Final Report*, no. 297 (2018), <https://doi.org/10.18408/ahuri-7313201>.
- 105 Gurran et al., "Supporting affordable housing supply: inclusionary planning in new and renewing communities".
- 106 Livable Housing Australia, "Livable Housing Design Guidelines," p. 13.
- 107 Livable Housing Australia, "Livable Housing Design Guidelines," p. 12.
- 108 Livable Housing Australia, "Livable Housing Design Guidelines," p. 12.
- 109 Department of Social Services, *National Dialogue on Universal Housing Design: Strategic Plan*.
- 110 Commonwealth of Australia, *National Disability Strategy 2010-2020*.
- 111 Standards Australia. *Short Australian Standard Adaptable Housing AS4299-1995*.
- 112 Standards Australia. *Short Australian Standard Design for access and mobility AS1428.1-2009*.
- 113 Standards Australia. *Short Australian Standard Adaptable Housing AS4299-1995*.
- 114 Standards Australia. *Short Australian Standard Design for access and mobility AS1428.1-2009*.
- 115 "How it works," 2020, accessed 27 October 2020, <https://ncc.abcb.gov.au/ncc-online/How-it-works>.
- 116 Australian Building Codes Board, *Accessible Housing: Options Paper*.
- 117 Australian Building Codes Board, *Accessible Housing: Options Paper*.
- 118 Australian Building Codes Board, *Accessible Housing: Options Paper*.
- 119 Centre for International Economics, *Proposal to include minimum accessibility standards for housing in the National Construction Code: Consultation Regulation Impact Statement*, v2.
- 120 "HOME MODIFICATIONS: Helpful Information for Prescribers, the Veteran or their family," n.d., https://www.dva.gov.au/sites/default/files/files/health%20and%20wellbeing/homecare/major_mods_external.pdf.
- 121 Productivity Commission, *National Disability Insurance Scheme (NDIS) Costs* (2017), <https://www.pc.gov.au/inquiries/completed/ndis-costs/report/ndis-costs.pdf>.
- 122 "Supports funded by the NDIS," updated 10 October 2019, 2019, accessed 26 October 2020, <https://www.ndis.gov.au/understanding/supports-funded-ndis>.
- 123 "Specialist Disability Accommodation," 2020, accessed 28 July 2020, <https://www.ndis.gov.au/providers/housing-and-living-supports-and-services/housing/specialist-disability-accommodation>.
- 124 NDIS, *NDIS Quarterly Report to disability ministers: 30 September 2020* (2020), p. 540, <https://www.ndis.gov.au/media/2801/download>.
- 125 NDIS, *NDIS Specialist Disability Accommodation Design Standard*.
- 126 For further details, see NDIS, *National Disability Insurance Scheme Price Guide 2020-21: Specialist Disability Accommodation*, version 2.1 (2020), p. 6, 8.
- 127 "Plan budget and rules," updated 2 December 2019, 2019, accessed 26 October 2020, <https://www.ndis.gov.au/participants/creating-your-plan/plan-budget-and-rules>.
- 128 "Home modifications explained," 2020, accessed 23 November 2020, <https://www.ndis.gov.au/participants/home-equipment-and-supports/home-modifications-explained>.
- 129 "Commonwealth Home Support Programme," Commonwealth of Australia, n.d., accessed 10 August 2020, <https://www.myagedcare.gov.au/help-at-home/commonwealth-home-support-programme>; "Home Care Packages," Commonwealth of Australia, n.d., accessed 11 August 2020, <https://www.myagedcare.gov.au/help-at-home/home-care-packages>.
- 130 Transport Accident Commission, "Home modifications."
- 131 Australian Bureau of Statistics, "4430.0 - Disability, Ageing and Carers, Australia: Summary of Findings, 2018."
- 132 Australian Institute of Health and Welfare, *People with disability in Australia*.
- 133 Sarah Sinclair, Ashton de Silva, and Foula Kopanidis, *Exploring the economic value embedded in housing built to universal design principles: Bridging the gap between public placemaking and private residential housing* (2020).
- 134 Carnemolla and Bridge, "Housing Design and Community Care: How Home Modifications Reduce Care Needs of Older People and People with Disability."
- 135 C. H. Van Houtven, N. B. Coe, and M. M. Skira, "The effect of informal care on work and wages," *Journal of Health Economics* 32, no. 1 (2013), <https://doi.org/10.1016/j.jhealeco.2012.10.006>; Michael Bittman, Trish Hill, and Cathy Thomson, "The Impact of Caring on Informal Carers' Employment, Income and Earnings: a Longitudinal Approach," *Australian Journal of Social Issues* 42, no. 2 (2007), <https://doi.org/10.1002/j.1839-4655.2007.tb00053.x>.
- 136 Martin Pinquart and Silvia Sorensen, "Correlates of physical health of informal caregivers: a meta-analysis," *The journals of gerontology. Series B, Psychological sciences and social sciences* 62, no. 2 (2007), <https://doi.org/10.1093/geronb/62.2.p126>.
- 137 The Treasury, *2015 Intergenerational Report: Australia in 2055*, Commonwealth of Australia, (2015), https://treasury.gov.au/sites/default/files/2019-03/2015_IGR.pdf.
- 138 Nigel Bertram et al., *TAC Accommodation Practices Discussion Paper* (2015).
- 139 Nigel Bertram et al., *Best Practice Discussion Paper: A comprehensive evidence-base for innovative design methods that can improve accommodation outcomes for TBI and SCI residents* (ISCRR, 2015), https://research.iscrr.com.au/_data/assets/pdf_file/0004/359050/094-Best-Practice-Discussion-Paper.pdf.
- 140 Bertram et al., *Best Practice Discussion Paper: A comprehensive evidence-base for innovative design methods that can improve accommodation outcomes for TBI and SCI residents*.

- 141 "Assistive technology explained," 2020, accessed 7 December 2020, <https://www.ndis.gov.au/participants/home-equipment-and-supports/assistive-technology-explained>.
- 142 Jamwal et al., "Smart home and communication technology for people with disability: a scoping review."
- 143 M. Chan et al., "Smart homes - current features and future perspectives," *Maturitas* 64, no. 2 (2009), <https://doi.org/10.1016/j.maturitas.2009.07.014>.
- 144 Ruben Blasco et al., "A smart kitchen for ambient assisted living," *Sensors (Basel)* 14, no. 1 (2014), <https://doi.org/10.3390/s140101629>.
- 145 E.g. Philippa Carnemolla, "Ageing in place and the internet of things - how smart home technologies, the built environment and caregiving intersect," *Visualization in Engineering* 6, no. 1 (2018), <https://doi.org/10.1186/s40327-018-0066-5>.
- 146 Callaway and Tregloan, "Government perspectives on housing, technology and support design within Australia's National Disability Strategy."
- 147 E.g. Transport Accident Commission, "Home modifications.," NDIS, "Home modifications explained."
- 148 Home Modification Information Clearinghouse, "Consumer factsheet: Arranging home modifications," (2019), <https://doi.org/10.26288/5df9ade8b5570>.
- 149 NDIS, "Home modifications explained."
- 150 E.g. the OT involved in one of the projects discussed in Nigel Bertram, Helena Harry, and Holly Board, *Towards a holistic home modification design process; 3 case studies* (ISCR, 2017), http://research.iscr.com.au/_data/assets/pdf_file/0005/861656/towards-a-holistic-home-modification-design-process.pdf.
- 151 Taylor and Buys, "Ageing in Suburbia: Designing for Demographic Change in Australia and New Zealand," p. 58.
- 152 Jones, Jonge, and Phillips, "The impact of home maintenance and modification services on health, community care and housing outcomes in later life."
- 153 Story, "Maximizing usability: the principles of universal design.," This will be discussed in detail in Part 2 of this document.
- 154 John L Brown, "Going Home: Future Adaptive Building for Aging-in-Place" (Doctor of Philosophy RMIT University, 2016), https://researchrepository.rmit.edu.au/discovery/delivery?vid=61RMIT_INST:ResearchRepository&repId=12248320600001341#13248366540001341.
- 155 The National People with Disabilities and Carer Council, *SHUT OUT: The experience of people with disabilities and their families in Australia*, Department of Social Services (2009), p. iv, <https://www.dss.gov.au/our-responsibilities/disability-and-carers/publications-articles/policy-research/shut-out-the-experience-of-people-with-disabilities-and-their-families-in-australia>.
- 156 Jeremy Till and Tatjana Schneider, "Flexible housing: the means to the end," *theory* 9, no. 3/4 (2005).
- 157 Jeremy Till and Tatjana Schneider, *Flexible Housing* (Taylor and Francis Group, 2007), <https://ebookcentral.proquest.com/lib/monash/detail.action?docID=4694325>.
- 158 Diego Ramirez-Lovering, "The space of dwelling: An investigation into the potential for spatial flexibility to improve volume housing in Australia" (PhD Monash University, 2012).
- 159 Till and Schneider, *Flexible Housing*.
- 160 Ramirez-Lovering, "The space of dwelling: An investigation into the potential for spatial flexibility to improve volume housing in Australia."
- 161 Ramirez-Lovering, "The space of dwelling: An investigation into the potential for spatial flexibility to improve volume housing in Australia."
- 162 Shane Murray, Simon Whibley, and Diego Ramirez-Lovering, eds., *reHousing: 24 housing projects* (RMIT Publishing, 2008), p. 8.
- 163 Ramirez-Lovering, "The space of dwelling: An investigation into the potential for spatial flexibility to improve volume housing in Australia."
- 164 Bertram et al., *Best Practice Discussion Paper: A comprehensive evidence-base for innovative design methods that can improve accommodation outcomes for TBI and SCI residents*, p. 59.
- 165 Till and Schneider, *Flexible Housing*; Tatjana Schneider and Jeremy Till, "Flexible housing: opportunities and limits," *theory* 9, no. 2 (2005).
- 166 Till and Schneider, "Flexible housing: the means to the end".
- 167 Till and Schneider, *Flexible Housing*; Schneider and Till, "Flexible housing: opportunities and limits."
- 168 Sabine Ritter De Paris and Carlos Nuno L. Lopes, "Housing flexibility problem: Review of recent limitations and solutions," *Frontiers of Architectural Research* 7, no. 1 (2018), <https://doi.org/10.1016/j.foar.2017.11.004>.
- 169 E.g. Bertram et al., *TAC Accommodation Practices Discussion Paper*; Bertram et al., *Best Practice Discussion Paper: A comprehensive evidence-base for innovative design methods that can improve accommodation outcomes for TBI and SCI residents*; Shane Murray et al., *Design Contributions to Lifetime Care: A design-based approach to the integration of dwelling design strategies and supportive technologies in order to improve accommodation outcomes for SCI and TBI users* (ISCR, 2013); Leon van Schaik and Nigel Bertram, *Suburbia Reimagined: Ageing and Increasing Populations in the Low-Rise City* (New York: Routledge, 2018), <https://doi.org/https://doi.org/10.4324/9781315111315>.
- 170 Monika Magdziak, "Flexibility and Adaptability of the Living Space to the Changing Needs of Residents," *IOP Conference Series: Materials Science and Engineering* 471 (2019), <https://doi.org/10.1088/1757-899x/471/7/072011>.
- 171 E.g. "Passive design," YourHome, 2013, accessed 24 November 2020, <https://www.yourhome.gov.au/passive-design>.
- 172 R. S. Ulrich, "View through a window may influence recovery from surgery," *Science* 224, no. 4647 (1984), <https://doi.org/10.1126/science.6143402>; C. Ochodo et al., "External built residential environment characteristics that affect mental health of adults," *J Urban Health* 91, no. 5 (2014), <https://doi.org/10.1007/s11524-013-9852-5>.
- 173 E.g. Bertram et al., *Best Practice Discussion Paper: A comprehensive evidence-base for innovative design methods that can improve accommodation outcomes for TBI and SCI residents*.
- 174 Madigan, "Alternative Infill: a design study of housing intensification, adaptation and choice in the established suburbs of Adelaide," p. 40.
- 175 E.g. Madigan, "Alternative Infill: a design study of housing intensification, adaptation and choice in the established suburbs of Adelaide."

- 176 E.g. Madigan, "Alternative Infill: a design study of housing intensification, adaptation and choice in the established suburbs of Adelaide."; Bennett, "Stealth Urbanism: The covert advance of suburban density and diversity."
- 177 Madigan, "Alternative Infill: a design study of housing intensification, adaptation and choice in the established suburbs of Adelaide," Section 2.4.
- 178 Bennett, "Stealth Urbanism: The covert advance of suburban density and diversity."
- 179 Sustainable Victoria, *Comprehensive Energy Efficiency Retrofits to Existing Victorian Houses* (2019), <https://assets.sustainability.vic.gov.au/susvic/Report-Energy-Comprehensive-Energy-Efficiency-Retrofits-to-Existing-Victorian-Houses-PDF.pdf>.
- 180 Sustainable Victoria, *Comprehensive Energy Efficiency Retrofits to Existing Victorian Houses*.
- 181 Ronald Rovers et al., *A guide into renovation package concepts for mass retrofit of different types of buildings with prefabricated elements for (N)ZEB performance* (2018), Section 4.8, <https://www.more-connect.eu/wp-content/uploads/2018/12/A-GUIDE-INTO-RENOVATION-PACKAGE-CONCEPTS-FOR-MASS-RETROFIT-OF-DIFFERENT-TYPES-OF-BUILDINGS-WITH-PREFABRICATED-ELEMENTS-FOR-NZEB-PERFORMANCE.pdf>.
- 182 E.g. Bertram et al., *Best Practice Discussion Paper: A comprehensive evidence-base for innovative design methods that can improve accommodation outcomes for TBI and SCI residents*, p. 6.
- 183 Brown, "Going Home: Future Adaptive Building for Aging-in-Place."
- 184 Brown, "Going Home: Future Adaptive Building for Aging-in-Place."
- 185 J Lessing, "Industrialised house-building: concept and processes" (Licentiate Thesis, Lund University, 2006), p. 93.
- 186 G. Marfella and A. Martel, "Design-to-live or Design-to-build? The impact of delegated design responsibility in Melbourne's high-rise residential buildings," in *Structures and Architecture: Bridging the Gap and Crossing Borders* (CRC Press, 2019).
- 187 Mathew Aitchison, *Prefab housing and the future of building: product to process* (London: Lund Humphries, 2018); Duncan Maxwell, "The Case for Design-Value in Industrialised House Building Platforms: Product to Ecosystem" (PhD, University of Sydney, 2018).
- 188 Bertram et al., *Best Practice Discussion Paper: A comprehensive evidence-base for innovative design methods that can improve accommodation outcomes for TBI and SCI residents*, p. 127.
- 189 David Robertson and Karl Ulrich, "Planning for Product Platforms," *Sloan Management Review* 39, no. 4 (1998), http://repository.upenn.edu/oid_papers/266.
- 190 Ramirez-Lovering, "The space of dwelling: An investigation into the potential for spatial flexibility to improve volume housing in Australia."
- 191 E.g. Ramirez-Lovering, "The space of dwelling: An investigation into the potential for spatial flexibility to improve volume housing in Australia," p. 65.
- 192 E.g. Madigan, "Alternative Infill: a design study of housing intensification, adaptation and choice in the established suburbs of Adelaide," p. 63.
- 193 Centre for International Economics, *Proposal to include minimum accessibility standards for housing in the National Construction Code: Consultation Regulation Impact Statement*, v2.
- 194 Australian Institute of Health and Welfare, *People with disability in Australia* (2019), <https://www.aihw.gov.au/reports/disability/people-with-disability-in-australia/housing/type-of-housing/living-in-private-dwellings-or-cared-accommodation>.
- 195 Summer Foundation, "Mainstream housing options," (2018), <https://www.summerfoundation.org.au/wp-content/uploads/2018/07/mainstream-housing-options-web.pdf>.



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