Housing for Special Needs:
Physical Interior Design to Accommodate Special Needs

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Abstract

In this paper we have adopted a novel approach to 'housing for special needs', redefining people with special needs philosophically, and using statistical analysis of the South African population to reinforce our argument.

We have examined housing design in its wider context- in relation to housing policy and to urban and environmental planning.

We have investigated the design features common to groups of people with identified 'access needs' and considered the design features that should be included in all housing, social or otherwise. We have also analyzed the features that should exist in housing to accommodate for the diversity of society as a whole.

Establishing the context: title definition and underlying philosophy

"...disabled people aren't like everyone else. They are everyone else."[1]

The term INCLUSIVE ENVIRONMENTS refers to environments that account for the needs of users, including people who are physically disabled, people with sensory disabilities: both hearing and sight, people with learning disabilities, people with mental illnesses, elderly people, young children, people with heavy luggage, people with dexterity problems, people with neurological problems, woman who are very pregnant, people who are in a hurry and not looking where they are going, people who have had an accident and are temporarily disabled, people who are not wearing their glasses that day, people who are distracted or concentrating on something else.

In fact, all of us require an inclusive environment.

Inclusive Design is design that accounts for all of the above users. Product design forms part of environmental design. It is in essence, any design that fulfils function, and addresses all the following human needs:
Physical needs: - health, safety, shelter, water, cleanliness, employment etc.
Psychological needs: - security, identity, a sense of belonging, a sense of individuals being able to affect their own destinies
Social needs: - opportunities for interaction and social ties
Sensory needs: - exposure to stimulatory, learning environments[2]

The above needs should be addressed for all sectors of the community, people with mobility, visual, mental, psychological or hearing impairments included. It will be noticed in this paper that everyone benefits from the above and, if this approach is adopted in housing policies and design regulations, a "...greater number of usable dwellings can be better adapted to almost any occupant's needs and marketed to the general public."[3]

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[1] Anonymous, 1994, Prologue, in *Barrier-free Design: a manual for building designers and managers*. Holmes Siedle, J. Butterworth Architecture, Oxford, 1996
[2] Dewar, D. & Uytenbogaart, R.S. *South African Cities: a manifesto for change*, p.17, Urban Problems Research Unit, UCT, 1991
[3] Mace, R.L. 'Design for Special Needs: what are the considerations' in *Housing: symbol, structure, site* Taylor, L. (editor) Cooper-Hewitt Museum, The Smithsonian Institution, N.Y. 1990

Inclusive Environments and Inclusive Design are terms which are both used in the UK to describe user-friendly products, internal and external environments, and transport systems. They form part of the means by which people should expect to be able to access employment, goods and services.

Although disabled people are not the sole group of people affected by environmental design, they are an identified group of people who have been significantly impeded from using the environment. In order to recreate an environment that works for all users, their experiences have to be accounted for.

There are two terms frequently used in the United States of America that relate to this subject area, Universal Design and Barrier-free Design, which have similar meanings. The terms used signify a move away from the traditional approach to design and disability, that of designing for the disabled. This concept has until recently been the international approach towards disabled people, including the approach in South Africa.

When designers create environments or products for disabled people, people with a specific disability use the product, and few others. It reinforces the way that disabled people become separated from main stream society and are seen as a distinct group, having to use various adaptations and specialised equipment.

Certain environmental features are barriers to disabled people, who require adaptations or specialised equipment in order to access that environment. In the UK the term ARCHITECTURAL APARTHEID has been coined which amply illustrates the separative nature that is caused by such design philosophy. It is a term that has significant resonance in South Africa.

The present approach to the issue is explained in the White Paper on an Integrated National Disability Strategy. The historical medical model is described as follows: "The emphasis was on dependence and the focus on the nature of the impairment...The result is that disabled people and their families have been isolated from their communities and mainstream activities. Dependency on state assistance has disempowered people with disabilities and has seriously reduced their capacity and confidence to interact on an equal level with other people in society."[4]

The medical model assumes that the human being is flexible and alterable, whilst society is fixed and unalterable.

On the other hand: "The social model is based on the belief that the circumstances of people with disabilities and the discrimination they face are socially created phenomena and have little to do with the impairments of disabled people. The disabled rights movement believes, therefore, that the "cure" to the "problem" of disability lies in restructuring society."[5]

The focus is now on creating non-segregating and 'enabling' rather than 'disabling' environments, socially and physically.

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[4] 'White paper on an integrated National Disability Strategy', p.9, Office of the Deputy President T.M. Mbeki, November 1997

[5] Holmes-Seidle, J. p.5

Relevance of inclusive design to South Africa and disabled people in South Africa

There are certain groups of people that can be identified as experiencing the greatest difficulties with the built environment. We have considered these groups in the South African context.

Disabled people

The number of people identified as having a moderate to severe disability in South Africa is estimated to be between 5-12% of the population.[6]

This is based on the 1996 census figures and does not include people living in institutions. For analysis reasons it would therefore be reasonable to use the 12% figure as a representative, if conservative, estimate of the proportion of disabled people in the South African population.

Causes of disabilities are road accidents, violence, poverty, lack of information, failure of medical services, unhealthy lifestyles, environmental factors or/and social environment.[7]

The percentage of people identified as experiencing certain disabilities are as follows[8]:

Disability	
Sight	41%
Hearing	15%
Physical (including wheelchair users and people with dexterity impairments)	21%
Mental (mental illness and learning disability)	7%
More than one disability	6%
Unspecified	10%

99% of disabled people are excluded from employment in the open market as well as from access to other fundamental social and political rights. This is due to inequalities of the Apartheid system, social attitudes and a discriminatory and weak legislative framework.[9]

People with HIV/AIDS

4 Million adults are HIV+ (will rise to 6 Million by 2005).[10] The majority of those people will have a disability for part of their shorter lives as a result of their positive HIV status. If drug treatments are introduced, or if people develop the capacity to survive with the virus, then their vulnerability to other diseases, as well as the associated opportunistic infections that result in an AIDS diagnosis will cause a higher rate of disability in the population as a whole.

Aside from the affects of opportunistic infections, people with AIDS or people who have been HIV positive for a long period of time without developing AIDS commonly experience shortness of breath, fatigue, and frequently, mobility impairments. It is possible therefore to identify this group as a group of people who have problems with, or are likely to experience problems with the built environment.

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[6] South African Yearbook, 1999

[7] White Paper on an Integrated Disability Strategy, p.8

[8] The people of South Africa, Population Census 1996. Statistics South Africa forth Ed Pub 1999

[9] Ibid p.2

[10] Coombe, C. 'Managing the impact of HIV/AIDS on the Education Sector' July 2000

Children

There are an estimated 6 million children in South Africa below the age of 6.[11] Whether or not they are disabled, all children experience some problems with the built environment; they are prone to falls and trips, and need protection from hazards such as water, fire or electricity. Children under the age of six have problems with steps and stairs. In addition, small children may be pushed in pushchairs and have similar needs to wheelchair users.

It is typical for small children to be carried on their mothers' back, in part due to the generally unfriendly urban environment. However, for women with back problems this will exacerbate their condition and maybe a contributing factor towards a future disability.

Elderly people

11% of the population was aged 55 or over in the 1996 census figures[12].
Given the increase in life expectancy in wealthier areas of the world such as Europe, the United States of America, Canada, Japan and Australasia, it is reasonable to assume that certain economic groups in South Africa will experience the same longevity. Projected figures for South Africa have not been taken, for this reason the 1996 figures have been used. It is expected that the current number of elderly people in South Africa greater than the figure used in this exercise.

We can develop a picture of the percentage of the population in South Africa most likely to be experiencing problems with the built environment, including their own homes:

Total population estimate of South Africa for 2000	44.5 Million
Disabled people	4.9
HIV+	4
Children (under 6)	6
Elderly	4.9
Total	19.8

This figure equates to 44%, almost half the total population

Policy relating to housing

Addressing human needs in housing design cannot be studied in isolation. Past and present policies, management procedures and organisation restrict or enhance the ability of people to influence the development of housing.

Housing environments are formal expressions of social and political systems, and this impacts on the role of housing to improve health, generate incomes and provide security.

Housing policy in South Africa is strongly linked to land reform issues. Through long periods in time there was systematic control imposed on land through the Apartheid authorities in terms of the influx of Africans to urban areas, race segregation, and restrictions on land acquisition.

[11] The SA National Council for Child Welfare, 'HIV/AIDS and the Care of Children'
[12] The people of South Africa, Population Census 1996. Statistics South Africa forth Ed Pub 1999

These policies had profound implications on the visual landscape of the townships. The gaps that were created by the strong divisions are still existing and this fragmentation is one of the greatest challenges facing professionals today. Boundaries need to be erased, gaps filled and more integrated cities created. The 'matchbox' houses became linked to the massive housing schemes of the '50s and are, ironically, still linked to the recently developed housing schemes of today- despite the changing political scene.

One of the more extreme problems was that the townships never developed viable independent economic centres. In fact the issue of physical distance from the urban economic centres and job opportunities is probably on of the most 'disabling' features of South African cities. "The primary physical barrier to ease of access is the cost of overcoming the friction of distance."[13]

Despite the removal of many legislative and political restrictions, there are still obstacles to housing delivery and the quality of housing being delivered. Housing in South Africa is still being measured by the 'number of units per year' or how quickly housing units can be delivered. It is viewed "...as an economic and utilitarian conception."[14] This is unfortunate since housing is a PROCESS that long precedes the construction phase and extends beyond handing over the keys to the house owner. A housing project should create an environment where there can be an ongoing process of community and capacity building.

To the housing practitioner involved in housing on a daily basis, these issues may be lost among the more pressing, and genuine, realities of the need to house large numbers of people who are desperate for a home. Yet, some reflection will reveal that the present approach is unsustainable and large amounts of money may now be spent on projects that may very soon become inappropriate or redundant altogether.

Existing policy frameworks do not encourage alternative solutions to housing problems through innovative approaches and designs. Legislation, as well as the subsidy system, are very restrictive. The more that DIVERSITY is accommodated for in housing schemes, the more that this diversity will become evident visually and spatially, and the more that solutions will address longer-term needs, thus rendering these approaches more sustainable.

When such aspects of HOUSING QUALITY are mentioned the issue of affordability inevitably comes up. It must be emphasised that there is no one solution to cost efficiency and that it needs to be addressed in more creative ways with a long-term vision.

Taking into consideration the unique situation in South Africa, as covered in the previous section, there is an urgent need to make housing more accessible at all levels of development. To what extent this should have implications on policy frame works will be tackled in the conceptual design investigations below.

[13] Dewar, D. & Uytenbogaart, 1991, p.17

[14] Lowe, I. 'Transforming Reality: architecture and the possibility for a new social order in South Africa', ACSA European Conference, Berlin, 1997

The special needs of housing

The location of housing has been mentioned above as being one of the primary factors that enhance or inhibit people's ability to access education or job opportunities. This is even more evident for people with disabilities. These problems are exacerbated in rural environments due to isolation, lack of accessible infrastructure and transport.

In trying to design an accessible house, but pay no attention to the pedestrian environment, then architectural apartheid is reinforced, by limiting movement of peoples in relation to the nearest shop/centre for social (and religious) activity/park. This can be referred to as Ghettoisation.

The housing setting also has implications on safety, which is a major problem for all disabled people, who are less likely to be able to avoid attack or to protect themselves when being attacked. Danger leads to self-ghettoisation- that is the disabled person avoids social interaction or other economic activities that assist them to be integrated with society.

Town planning can accentuate ghettoisation. In the Victorian era in the United States of America and the UK, institutions for disabled people where positioned on the outskirts of Urban areas by designers under the philanthropic notion that in so doing they were providing proper care for such people. The effect was to create ghettos of disabled people and effectively remove them from mainstream society, reinforcing general fears and prejudice towards disabled people. Such a pattern is visible in the urban design of some areas of South Africa, used by certain racial groups.[15]

Safety and Security

Disabled or elderly people tend to be more concerned about personal safety because they are more vulnerable to defending themselves in an attack. Housing design should help to protect them. There is an obvious conflict between security in the home and access, which has to be carefully addressed in a successful design.

Statistics in the UK show that 80% of fires happen in people's own homes. It is likely that statistics in South Africa are higher, given that there is a greater reliance on fossil fuels and open fires for cooking. It is therefore imperative that means of escape is unconstrained from the home. Whilst this is also true for disabled people, it is more likely that, given current housing design, they will experience greater difficulties in such situations.[16]

People with a hearing impairment have a particular problem unless they are provided with some sort of visual or tactile alerting device.

Services

Availability of clean water, access to warmth, removal of rubbish and hazardous materials are important considerations in the design of inclusive housing

Cleanliness plays an important role in the prevention of cross infection and prevention of disease. This is especially the case in relation to people with HIV/AIDS where the person who is HIV-positive is at more risk of infection from people with stronger immune systems.

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[15] Imrie, R. *Disability and the City*, 1995

[16] Miller, J. 'Means of Escape, Disabled People and the Domestic Environment' Paper for the College of Occupational Therapists, May 1998

We are also aware that the current outbreak of cholera in Kwa-zulu Natal is exacerbated by the lack of clean water available to the local population.

Disabled people with restricted mobility will experience difficulty accessing basins, toilets, and baths unless certain design features are taken into account, and may therefore be more susceptible to illness and disease.

People with spinal injuries and elderly people have a greater degree of difficulty in keeping themselves warm, in part due to an affected metabolism. Thermal comfort can be accommodated within the design of housing.

It is unfortunately still assumed that good quality services are always expensive. This means that poor people must tolerate insufficient or no services. Designers have a major role to play in investigating appropriate and alternative infrastructure options.

Assessment of previous and current house designs based on access and safety criteria

It was seen appropriate for the purpose of this paper to examine the way that houses are being designed and to what extent they are seen as complying, or not, to some accepted criteria of accessibility and safety.

We believe that housing delivery today is as 'disabling' to all users as it was during the Apartheid era, if not worse. The focus here is on internal planning and design and not on the overall context, although it needs to be mentioned that:

- Housing is still being located far from the economic centres, valuable resources are being spent on roads and service lines. This also places a burden on commuters in terms of transport costs.
- Densities are still very low which has negative environmental implications and is ultimately unsustainable.
- Relation of house to the street and its setting within the site still has extremely negative impacts on the general character of residential areas. The sterile nature of these areas creates monotony and lack of visual or sensory stimulation. This is vital for practical as well as psychological reasons.
- People are still removed from a process over which they have little power. Skills of managing and having control over their own environments are still being lost.

There are variations on housing forms throughout South Africa, but the ubiquitous 'matchbox' is by far the dominating feature in the townships. For this reason the brief analysis and comparison of the safety and accessibility features of the NE51/9 and the basic RDP units has been attempted as follows:

THE NE51/9 MODEL	THE RDP MODEL
▪ Due to the structure of the unit, future expansion and alterations are difficult, even though the height at the lowest point is higher than in some of the RDP models.	▪ Future expansion more difficult- the height at the lowest point is 2650mm
▪ Stepped threshold.	▪ Stepped threshold
▪ Passage is small in size, turning angles are difficult.	▪ Open plan design is an advantage, especially if the possibility to demolish some of the internal walls is a possibility.
▪ Window heights should be lower for security and escape possibilities.	▪ Window sill heights also higher than the recommended standard.
▪ Lack of shaded access at front entrance. Placing of a light would also be an advantage.	▪ Also lack of shade or lighting.
▪ Bathroom size small, inaccessible taps, no shower option	▪ Similar problems as NE51/9 model.
▪ Door openings 750mm clear width, if doors are fitted. This is below the standard required.	▪ (Door sizes unavailable.)
▪ Encouraging overcrowding.	▪ Very small sizes for a family house. Less privacy.
▪ Floor surface are unsurfaced, trip hazards and difficult to access by wheel chair users.	▪ (Floor finishes unavailable.)
▪ No cross-ventilation.	▪ Better possibility for thermal comfort
▪ (Heights of sockets and light switches unavailable.)	▪ (unavailable information)
▪ Hygiene problems due to the number of people/bathroom. No wash hand-basin	▪ Similar problem if this basic unit is used by a family
▪ Circulation and work areas conflicting, as in back door.	▪ Similar problem with sink position and bathroom and bedroom doors.
▪ No protection for windows. Glare is bad for sight-impaired people as they need uniform light.	▪ Same problem.
▪ Lines of vision not available for deaf people. Window heights next to main door are also important to be able to identify approaching visitors.	▪ Open plan is an advantage in this respect.
▪ Tiering house for the elderly or ill.	▪ Open plan is also an advantage.
▪ No fixed furniture which is an advantage	▪ No fixed furniture, but due to the sizes of the bedroom and living area, as well as the door positions and openings of doors, the placing of furniture is a problem. Maneuvering space would be minimal.
▪ Bathroom door opens inwards which is a disadvantage.	▪ Bathroom door opens inwards, Opening directions of other doors can be a hazard for the elderly, children or sight-impaired people.
▪ Insufficient storage space	▪ Insufficient storage space
▪ There is no space for a carer around the bed	
▪ Limited natural daylight to passage	
▪ No space next to the stove to put hot pans	▪ The same comments apply as to the NE51/9 model.
▪ No space for a fire.	
▪ Little regard for the individual's ergonomic requirements	
▪ The external paths are uneven	
▪ Trees types must be specified- sunlight must not be blocked from rooms in winter	
▪ Window catches- information not available	
▪ Information on the wall strength not available	

There are a number of positive aspects in the housing scene today, such as the focus on inner city areas, existing building conversions and the re-vitalisation of degrading urban areas. These approaches address a number of problems that have been mentioned above, yet, with the focus on accessibility issues, the limited areas and limited funds make it extremely difficult to ensure that all the residential units meet up to accessibility standards. The focus in these projects would rather be to specify a percentage of the housing provided to be located on the lower floor levels and to comply with a set of standards that would make it easily adaptable to special needs if necessary. Yet, all communal areas and facilities should be fully accessible. This will ensure that disabled residents would at least be able to participate in all community functions and to socialise with neighbours.

Design Considerations

The most noted problem features that limit living independently and visiting friends are as follows:

- Raised thresholds and steps at the front entrance
- Circulation space to the main reception room and to the toilet
- Steps and narrow bathroom doors
- Narrow doors to other rooms
- Limited manoeuvring space in bathrooms and kitchens
- Light switches, faucets, receptacles, counter tops, thermostats, shelves, and closet rods mounted too high or too low or too far away to reach
- Doorknobs, faucet handles, appliance controls that are difficult to grasp and operate17

Through sensitive planning and selection of suitable products during specification writing the above problems can be dealt with at no major additional costs. Due to poor design some features of houses can become a hazard to children, the elderly, the physically disabled or people with visual impairments. Some of these are identified as follows:

- Overhead cupboard doors
- Doors opening into a room
- Bathroom doors opening inwards
- No contrast in colours for visually impaired people
- No lines of vision for deaf residents
- Unnecessary steps
- Slippery floor finish or lack of level floors surfaces

In the following exercise, the functional design considerations of specific groups of people were analysed and the common factors identified. This allows us to set a practical framework for the design of new housing where the elements of a house can be categorised as follows, based on the principles of INCLUSIVE HOUSING:

- universal design features common to all identified groups of people in the exercise
- inclusive design features to be fixed and installed during construction. This includes wider doors, level entrances, reachable controls that are permanently installed.
- adaptable features for other features to be adapted, such as closet rods, shelves, counter top segments made so that they can be adjustable in height, or the layout of a room adapted.

[17] Mace, R.L. 1990, p.50-51
and
Part M of the Building Regulations 1999 (UK) Extension to housing

- specific features that can be added or removed when needed by particular occupants: grab bars can be added or cabinets removed, nosings highlighted on steps or task lighting added

The exercise took into account the functional design needs of people with mobility impairments, elderly people, wheelchair users, people with AIDS, people with sight impairments, people who are deaf or hard of hearing, people with neurological problems, people with learning difficulties and children under the age of six.

It must be noted that for features to be made adaptable or for specific features to be added or removed the structural aspects of the house must accommodate for that. For example if grab bars or hoists are to be added the walls must in some places be sufficiently strong to support them.

THE ANALYSIS

Below is a summery of the outcome of this exercise, identifying the Universal, Inclusive, Adaptable and Specific design features. Other housing standards have been outlined.

Universal Design Features

1. Safety: protection from traffic/dangerous roads
2. Routes: adequate lighting
3. Routes: well-maintained, no litter, well-drained
4. Surfaces: smooth, flush junctions, firm, easy-to-grip
5. Surfaces: level threshold at entrance
6. Surfaces: no changes in level preferred
7. Secure from possible attack/theft
8. Proximity to neighbours for assistance in emergencies
9. Sheltered/safe outside spaces for play/leisure
10. Entrance door: weather cover
11. Entrance door: lighting at entrance
12. Exit doors: level for emergency egress
13. Exit: direct route for emergency egress, particularly from the kitchen
14. Ventilation in all rooms
15. Switches and sockets: easy to reach, identify and use
16. Door handles, taps &other faucets easy to use
17. Window catches: easy to use and low enough
18. Adaptability to accommodate further disability
19. Regard for the individuals ergonomic/functional requirements

These features are actually applicable to good design in general and to the needs of the whole population. They will not, however, allow for the accommodation of specific groups of disabled people. Therefore housing must be more than universal it must be inclusive as well.

Inclusive Design Features

1. Maximum of 50m travel distance without a vehicle
2. Kerbs: gentle drops to create level access
3. Clear and direct crossing points
4. Clear walking tunnel: from over-head objects
5. Routes: clearly defined and direct, no obstacles
6. Routes: wide enough for mobility aids
7. Routes: wide enough for circulation
8. Routes: no camber (1:40 max)
9. Ramps: level landings, wide and long enough (especially the top)
10. Ramps: gentle gradients with intermediate landings
11. Steps/stairs: no overhanging risers
12. Steps/stairs: even risers and treads

13. Steps/stairs: a short flight between landings
14. Parking: close to the entrance door
15. Parking: bay wide enough transfer space side/rear
16. Entrance: clearly identified
17. Entrance door: wide enough
18. Doors: minimum door pressure
19. Internal doors: wide enough
20. Doors opening towards the wall in internal rooms
21. Window catches: easy to use and low enough
22. Windows: low enough to see out of when sitting
23. Window: by front door
24. Windows: low in sleeping areas for emergency egress
25. Circulation space: enough space in circulation areas
26. Circulation space: enough space in all functional areas
27. Functional areas: separated from circulation areas
28. Bedroom: circulation space for carer around bed
29. Lighting: consistent and adequate levels of luminance
30. Adequate provision of sockets and switches at an accessible height
31. Easy to use door handles
32. Easy to use taps
33. Safety: protection from contact with hot pipes
34. Thermal comfort and ventilation
35. A combination of natural light and artificial light in each room
36. Storage: enough store assistive & mobility devices
37. Kitchen : minimal, easy - to - remove fixtures to allow future adaptation
38. Kitchen: carrying of objects minimised
39. Floors: slip-resistant surfaces in wet areas
40. Bath: board at the head to ease getting in and out
41. Bath: side approach permitted
42. Bath: easy access to taps possible
43. Bath: circulation space for carer and wheelchair user
44. Shower: totally level access with the surrounding floor
45. Shower: controls within easy reach and adjustable
46. Shower: walls strong enough to take rails/fixed seat
47. Shower: circulation space for shower chair
48. Toilet/Bathroom door opening outward
49. Toilet/Bathroom: close proximity to bedroom
50. Toilet: close proximity to reception rooms
51. Toilet: walls strong enough to take rails
52. Toilet: space on walls to accommodate rails
53. Toilet: circulation space for transferring for wheelchair users
54. Toilet: circulation space for carer
55. Over-head hoist: ceilings strong enough to support it
56. Mobile hoist: circulation space available
57. Lift: platform/stair/passenger- wheelchair accessible

If careful design allows the inclusion of the above functions in housing and if such housing is constructed by professionals who understand the issues, then it can be further adapted to accommodate people with access needs following the construction of the building shell:

Adaptable Features

1. Tactile hazard warnings
2. Rails in wide open spaces or on long routes
3. Supportive external seating: benches with armrests
4. Clear walking tunnel: from over-head objects
5. Ramp: guard on edge
6. Steps/stairs: rails on each side, at a suitable height
7. Steps/stairs: nosings highlighted
8. Keys and security locks: easy to manipulate
9. Door bells/ knockers/ key holes easy to reach
10. Low level or adjustable level lighting to permit the changing of light bulbs
11. Switches and sockets: protected from misuse
12. Rails: easy to grasp, in suitable places, such as each side of steps and stairs
13. Furniture /fixtures with smooth corners, reaching floor
14. Colour and luminance contrast between surfaces
15. Colour and luminance contrast between fittings
16. Lighting/surfaces: non-reflective surfaces
17. Shower: controls within easy reach and adjustable

Specific features can be included in the overall design of the house if it is to be used by certain groups of disabled people:

Specific Features

1. Entrance door: vision panel to check for visitors
2. Visual/tactile alarm for emergency egress/entrance
3. Chairs with arms, height to suit individual
4. Kitchen designed to suit individual requirements
5. Bathroom and toilet designed to suit individual requirements
6. Bedroom designed to suit individual requirements
7. Specific rail placement by toilet, shower or bath, or other places as requested, at a suitable height
8. Storage: adjustable to suit user access
9. Storage: clearly identified, logical position
10. Storage: cupboards on wheels to enable easy cleaning
11. Storage: open shelving
12. Storage space: enough to maintain clear surfaces
13. Safe storage of dangerous household chemicals

Interim Standards in the United Kingdom

It is not necessary for all housing to be designed to fully accommodate wheelchair users if it is to suit the access requirements of the majority of the population and to conform to cost restraints. It is possible to develop an interim band of housing design. In the UK, the concept of 'Lifetime Homes has been established by the Joseph Rowntree Foundation, within the private housing market. The social housing sector and the government has been active in encouraging the building of these houses, to cut down welfare spending on adapting current housing for elderly and disabled people. Lifetime homes are homes with 16 key features that allow the house to adapt through the life and functional needs of the people within it.[18]

These 16 key features have been included in the above functional exercise, but are listed here for reference:

JRF Lifetime Homes Standards

1. Where car parking is adjacent to a home it should be capable of enlargement to attain a 3.3m width
2. The distance from the car-parking space to the home should be kept to a minimum and should be level or gently sloping

[18]Evans, B. 'Homes for a lifetime' Architects Journal, August 1997

3. The approach to all entrances should be level or gently sloping. Gradients for paths should be the same as those for public buildings in the UK Building Regulations
4. All entrances should be illuminated and have level access over the threshold, and the main entrance should be covered
5. Where homes are reached by a lift, that should be wheelchair accessible.
6. The clear widths of doorways and hallways should be 750mm minimum width for the internal doors and 800mm minimum for the entrance door
7. There should be space for the turning of wheelchairs in kitchens, dining areas and sitting rooms, and adequate space for wheelchairs elsewhere
8. The family room should be at entrance level
9. In houses of two or more stories there should be space o the ground floor that could be used as a convenient bed space
10. There should be a downstairs WC that should be wheelchair accessible, with drainage and services provisions enabling a shower to be fitted at any time
11. Walls in bathrooms and WCs should be capable of taking adaptations such as handrails
12. The design should incorporate provision for a future stairlift and a suitably identified space for the potential instillation of a through floor lift from the ground floor to the first floor
13. The bedroom/bathroom ceiling should be strong enough or capable of being made strong enough to support a hoist at a later date
14. The bathroom layout should be designed to incorporate ease of access, probably from a side approach, to the bath and WC. The washbasin should also be accessible
15. The Family room window glazing should be at 800mm and windows should be easy to open. Windows should not be behind kitchen sinks and other fixtures
16. Switches, sockets and service controls should be at a height accessible by all

Visibility Standards

The private housing market has also been stirred by inclusive design issues to the extent that 'visibility' standards have now been included in all newly built housing, whether in the private or social housing market. These standards allow wheelchair users to visit someone in their home, will enable most elderly people to stay at home longer, and will protect elderly people and young children from falling.[19]

1. Ramped or level approach from edge of boundary or car parking facility
2. Stairs and lifts to conform to a safe access standard
3. Level threshold
4. Adequate front door width
5. Adequate circulation space at reception room level
6. Wide enough internal doors at reception room level
7. Toilet access form reception room: restricted, but possible, wheelchair use

As can be seen from this analysis, there are various ways in which the design of inclusive housing can be approached. Obviously the amount of features that are built into all housing, as opposed to the construction of a specified number of 'special' houses in a particular development is a legal/policy issue.

[19] Part M of the Building Regulations 1999. Extension to Housing

Possible application of the above guidelines in the South African context

It must be noted that some of the aspects above are already a part of the National Building Regulations. Yet, some things are still unclear- or not given enough emphasis in policies or regulations. Most of the criteria are simply an assessment of good design principles that should inform any design process.

The way forward with the above would be more research into design that would also include some cost comparisons between housing as it is being built today and housing designs modified to incorporate some basic accessibility features as indicated above.

In our research for this paper we attempted to make alterations to the basic RDP model to make it more accessible and adaptable. We note the following:

- A slight increase in the width of the building would allow for more space in the bathroom as well as the bedroom. This would allow for a built-in storage unit.
- By careful articulation of the structure and supporting walls, this increase would also allow for opening another access to the bathroom if it ever becomes necessary.
- These supporting walls must also be placed in such a way as to allow for the fixing of grab-bars or hoists in the future. This can be designed in such a way as to allow for a direct line linking the bed with the shower and toilet.
- The door openings can be adjusted and two more windows added to allow for cross-ventilation and views out near the main door.
- The height of the building needs to be raised and the threshold made 100mm extended beyond the building to allow for ease of adaptations.
- Orientation needs to be carefully considered for each house INDIVIDUALLY.
- Appropriate space can be provided for a complete open plan kitchen.

In our investigation we found that these aspects can be modified with little change to the size of the building through proper internal planning. Additional windows and stronger walls, for example, will add somewhat to the cost. Yet, as mentioned above some features don't need to be built into the unit from the outset.

Re-designing the Process of Housing Delivery to Accommodate for Diversity

To encourage further investigations into the internal design of house units to accommodate for diverse needs we suggest the following:

- Professionals need to be advisors to clients and building users, including the disabled people they serve.
- Multi-disciplinary networking is essential- in our experience working on this paper we discovered how vital that would be to the process.
- The role of local authorities as enablers needs to be emphasised.
- The role of housing associations in encouraging good design principles is vital- as well as the kind of relation and communication structures put in place with the different professions.
- Investigation of possible funding options:

Grants, home repair assistance, social services, housing associations, health organisations, employment service, charities. Options need to be explored according to the tenure status.

- Policy development and the subsequent development of guidelines need to be investigated. Guidelines as prescription, possible interpretation and freedom and creativity in the process are aspects that need to be researched. How these guidelines are conveyed to communities in comprehensive formats is a challenge for the professions.
- Achieving quality in housing throughout the design process and the construction phase: Design quality = Quality of life = community presence, relationships, choice, competence, respect.
- The quality control process starts with education: achieving quality assured professionals.
- The design decision making process and communication techniques throughout will determine the success or failure of the attempts at achieving more accessible and adaptable buildings.