Dr. Sandeep Sankat

Dr. Sandeep Sankat Associate Professor, School of Planning and Architecture, Bhopal (PhD, M. Ekistics, B.Arch.) Dr. Sandeep Sankat is an Associate Professor and Head Department of Architecture, School of Planning and Architecture, Bhopal (M.P.) India. Before this, he was a senior lecturer in F/O Architecture and Ekistics, Jamia Millia Islamia, New Delhi. Beginning his career in the mid-nineties he practiced as an Architect having his own office "Design Innovations" in Indore, Madhya Pradesh, India.

His specializations are in Architecture, Ekistics, Human Centric Design, Universal Design, Inclusive Design, Enabling Environments and Elderly and Built-Environment. He did his PhD in the area of Elderly and Built-Environment on the topic "Creating Inclusive Living Environments in Urban Residences for Indian Elderly", from the School of Planning and Architecture, Bhopal, Masters in Ekistics from Faculty of Architecture and Ekistics, Jamia Millia Islamia, New Delhi and Bachelors of Architecture from Madhav Institute of Technology and Science, Gwalior, (M.P.).

For his proposal for the concerns towards the success of "Sugamya Bharat Abhiyaan" through Universal Design Education, he received Erasmus + Global mobility funding in 2016 and is an Erasmus Fellow.

He has been awarded the prestigious National "NCPEDP MPHASIS Award 2016" for his work in accessibility and disability studies and Universal Design. Recently he has been awarded with the national "Design Educators Award 2023" for teaching Universal Design. He has been awarded at various platforms for his concerns and work in the area of Universal Design and Accessibility. He has published research papers in journals and conference proceedings focused on accessibility and disability studies. He has secured first position and distinction in the Bachelors and Masters Courses. He has been a recipient of Gold Medal for the Masters Course of Ekistics from F/O of Architecture and Ekistics, Jamia Millia Islamia, New Delhi. Awarded, for the design of accessible toilet (designed following Universal Design Principles) in the category "The Urban Individual Toilet" in the San- Sadhan Hackathon organized by the Department of Empowerment of Persons with Disabilities (Divyangjan) and Ministry of Jal Shakti in association with Atal Innovation Mission, Niti Aayog, Bill & Melinda Gates Foundation.

He has also represented SPA, Bhopal on various administrative posts, including, Dean Academics, Dean Student Affairs, Controller of Examinations etc. And at present he is Head of the Department at the Department of Architecture, School of Planning and Architecture Bhopal.

Smart Accessibility based on Universal Design Principles to achieve Innovative Solutions for Accessible Toilet for "All".

Dr. Sandeep Sankat

Abstract

An inclusive society can be achieved when "All" inhabitants of the society enjoy the social, cultural, and economic assets of the society. Through the concept of "Universal Design", an attempt to design the "Built Environment" for the diversity of mankind can result in accessible, inclusive, and enabling environments. In an attempt to create an accessible built environment for "All" a nationwide competition, conducted as a hackathon titled "San-sadhan hackathon", organized jointly by the Ministry of Jal Shakti (Government of India) and the Department of Empowerment of Persons with Disabilities, Ministry of Social Justice and Empowerment (GOI) in collaboration with Atal Innovation Mission, NITI Aayog, and Bill and Melinda Gates Foundation [1]

For the competition, under the category of "Urban Individual Toilet", the attempt is to design a fully accessible toilet for an Indian urban family house. It is a stepwise process; following the problem-solving approach, and understanding the problems to arrive at solutions. First, it is the problem identification for the diverse population of an Indian urban family, focusing on their problems while using a toilet. To evaluate and identify the problems of these users, a system of the matrix has been used in which the user is taken on the X-axis and the protocol for the toilet has been taken on the Y-axis. Now comparing

with the standards of toilet design the problems of the users of an urban Indian family house, using a full-scale simulation model, environmental observation tools, and information through interviews with the diverse users the problems faced by all users have been identified. For identification, the "Usability Rating Scale"(URS), a 7-point bipolar scale, has been used for quantification of qualitative usage aspects in the use of toilets. Following a methodology based on the identified problems faced by the diverse users, the "Guidelines" for the design development for a fully accessible toilet were framed. Based on the prepared guidelines the toilet as a whole has been designed with innovative ideas for the improvisations in its usage and in the usage of the various areas of the toilet. The developed toilet design is an outcome of research-based identification of users, the problem of the users following which research-oriented, evidence-based guidelines for the spaces/ areas of the toilet have been developed. There can be various solutions with different innovative ideas, designers can develop following these developed guidelines for the "Urban Individual Toilet". The concept of "Universal Design Principles" [3] and the "Universal Design India Principles" [4], facilitated the equitable, flexible, simple, appropriate in size and shape with perceptible information along with a tolerance for error and low physical effort with additional considerations of aesthetics, usability, and economy the whole "Urban Individual Toilet" has been designed to achieve comfort and accessibility for "All intended Users" of an urban Indian family house. A systematic, evidence-based approach for the whole design is followed to achieve the final design solutions.

Keywords - *Universal design principles, universal design India principles, urban individual toilet, design guidelines.*

Introduction

An inclusive society can be achieved when "All" inhabitants of the society enjoy the social, cultural, and economic assets of the society. Through the concept of "Universal Design", an attempt to design the "Built Environment" for the diversity of mankind can result in accessible, inclusive, and enabling environments. The project was a nationwide open to all designers, a competition project conducted as a hackathon (San-sadhan hackathon) organized jointly by the "Ministry of Jal Shakti" (Government of India) and the "Department of Empowerment of Persons with Disabilities", "Ministry of Social Justice and Empowerment" (GOI) in collaboration with "Atal Innovation Mission", "NITI Aayog and Bill and Melinda Gates Foundation"[1]. The competition had four categories of accessible toilets to be designed for the urban and rural areas. The categories were; 1. Urban individual toilet, 2. Urban public toilet 3. Rural individual toilet, and 4. Rural public toilet.

Background

Out of the four categories, "Urban Individual Toilet" of an Indian urban family house has been chosen and designed. Attempting the toilet design for a specific individual having a particular disability would have been an attempt for barrier-free design. Barrier-free now is an old story. Thus, the challenge taken up is to design a fully accessible "Urban Individual Toilet." accessible to the diverse people living in Indian urban residences, based on the "Universal Design Principles" and "Universal Design India Principles", and the "Goals of Universal Design"

Aim

The aim is to design an accessible "Urban Individual Toilet" for an Indian urban family house.

Objectives

- To identify the diverse users and the problems they face while using a toilet.
- Following a research-oriented methodology, to identify the issues the diverse users face while using a toilet.
- To prepare guidelines based on the identified issues for the development/ guidance for design ideas to attempt the design solutions.
- To develop innovative design ideas following UDP and UDIP, based on the guidelines for an effective, efficient, and innovative solution for the design of a fully accessible "urban individual toilet".

Methodology

The methodology adopted for the design of fully accessible, "Urban Individual Toilet" is a research oriented stepwise process. As shown in the methodology diagram in figure 1.
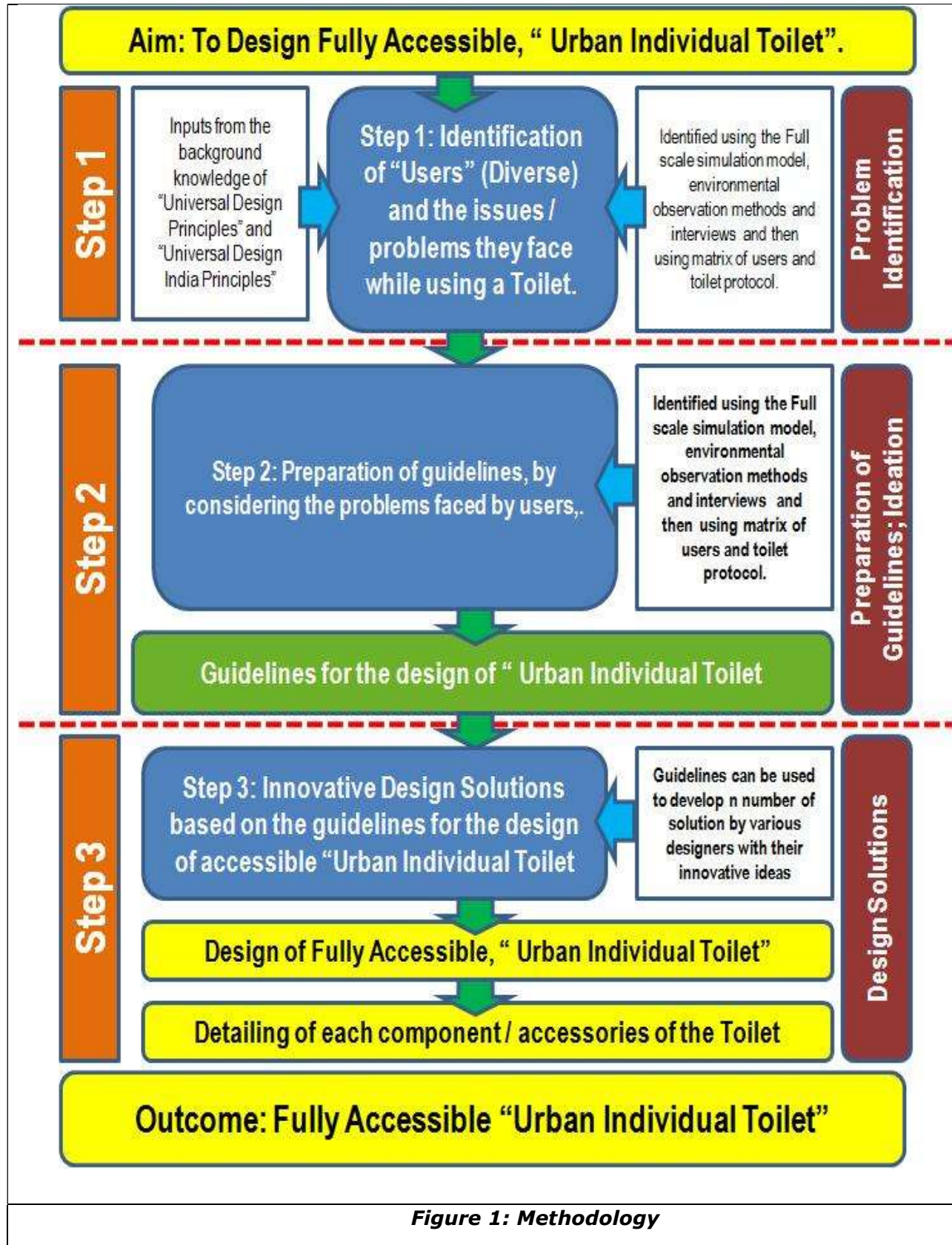
A. Deciding the Target users

- It has been observed that in Indian situations the toilet in urban residences is not only used by a single person rather by the family members. Thus the target users will be, Able bodied, (male and female), "the elderly", and "the children". Now among the family members, the people may have disabilities therefore the target users are;

- **Able bodied (male, female and transgender), elderly, children.**
- **Person with mobility impairment, wheel chair user, crutch user, person using calipers (polio effected), stick (elderly using stick),walker user.**
- **Person with vision impairment, no vision, blur vision, low vision, partial vision, person with hearing impairment.**
- **Person with cognitive disabilities (addressed only for soft surfaces and no provision of sharp edges).**
- **Person suffering from conditional disabilities such as; pregnant women, fracture in hand or limb, lost spectacles (blur vision), Colour blind. etc.**

B. **Problem Identification**

For the problem identification all the above identified diverse users were considered. A protocol for toilet users has been decided based on the way a toilet is used. The protocol for every process and usage of the toilet is being detailed as shown in the figure 2, now considering this protocol on the Y-axis and the diverse user population on the X-axis an attempt has been made to identify the problems of the intended user.
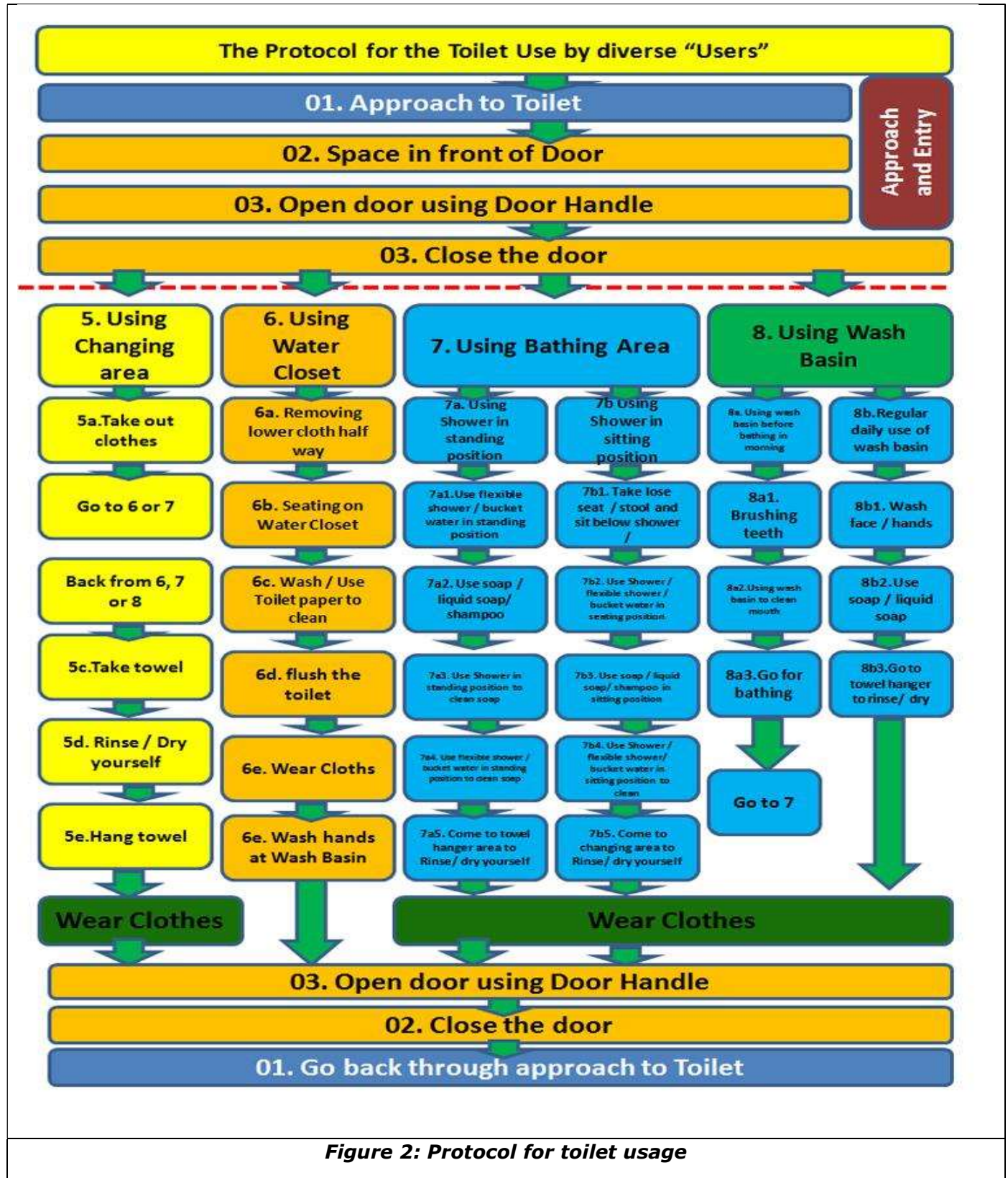
Aim: To Design Fully Accessible, " Urban Individual Toilet".

Step 1

Inputs from the background knowledge of "Universal Design Principles" and "Universal Design India Principles"

Step 1: Identification of "Users" (Diverse) and the issues / problems they face while using a Toilet.

Identified using the Full scale simulation model, environmental observation methods and interviews and then using matrix of users and toilet protocol.

Problem Identification

Step 2

Step 2: Preparation of guidelines, by considering the problems faced by users,.

Identified using the Full scale simulation model, environmental observation methods and interviews and then using matrix of users and toilet protocol.

Guidelines for the design of " Urban Individual Toilet

Preparation of Guidelines; Ideation

Step 3

Step 3: Innovative Design Solutions based on the guidelines for the design of accessible "Urban Individual Toilet

Guidelines can be used to develop n number of solution by various designers with their innovative ideas

Design Solutions

Design of Fully Accessible, " Urban Individual Toilet"

Detailing of each component / accessories of the Toilet

Outcome: Fully Accessible "Urban Individual Toilet"

Figure 1: Methodology

Figure 2: Protocol for toilet usage

The Matrix for Problem Identification

A matrix for problem identification has been used to evaluate and identify the problems of users, in which the user is taken on X-axis and the protocol for the toilet has been taken on the Y-axis. Now comparing with the standards of toilet design the problems of the diverse users, using a full-scale simulation model, environmental observations tools, and information through interviews with the diverse users the problems faced by all users have been identified.

For identification the Usability Rating Scale (URS), a 7-point bipolar scale has been used for quantification of qualitative aspects. It is a sequential 7-point bipolar scale. It is a subjective response to an individual experience during the functional performance of activities in physical environments through a two-step process [2] (Danford & Steifeld, 1999).

Figure 3: Usability Rating Scale (URS)

The Matrix for Problem Idnetification
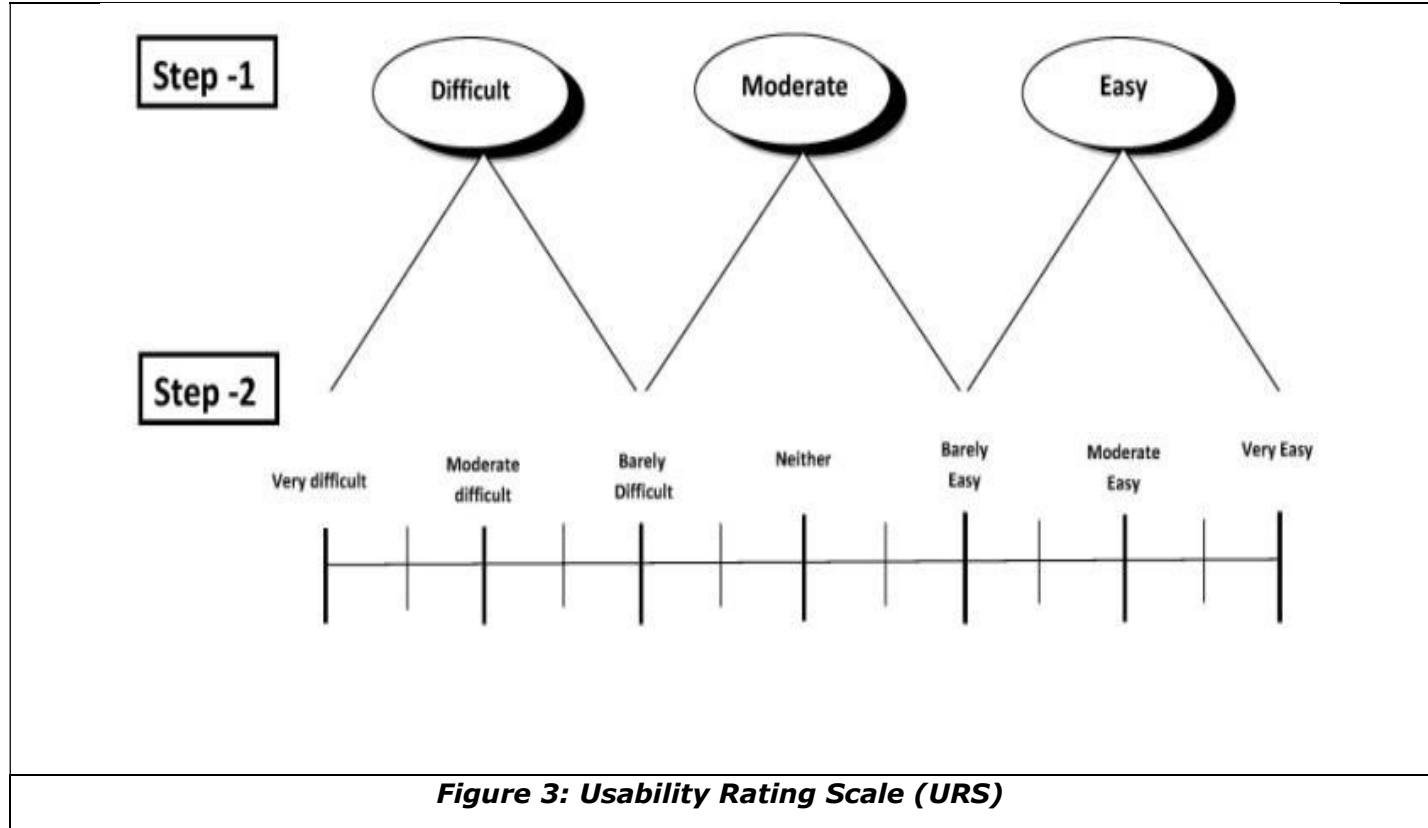
Figure 4: Matrix for Problem Identification
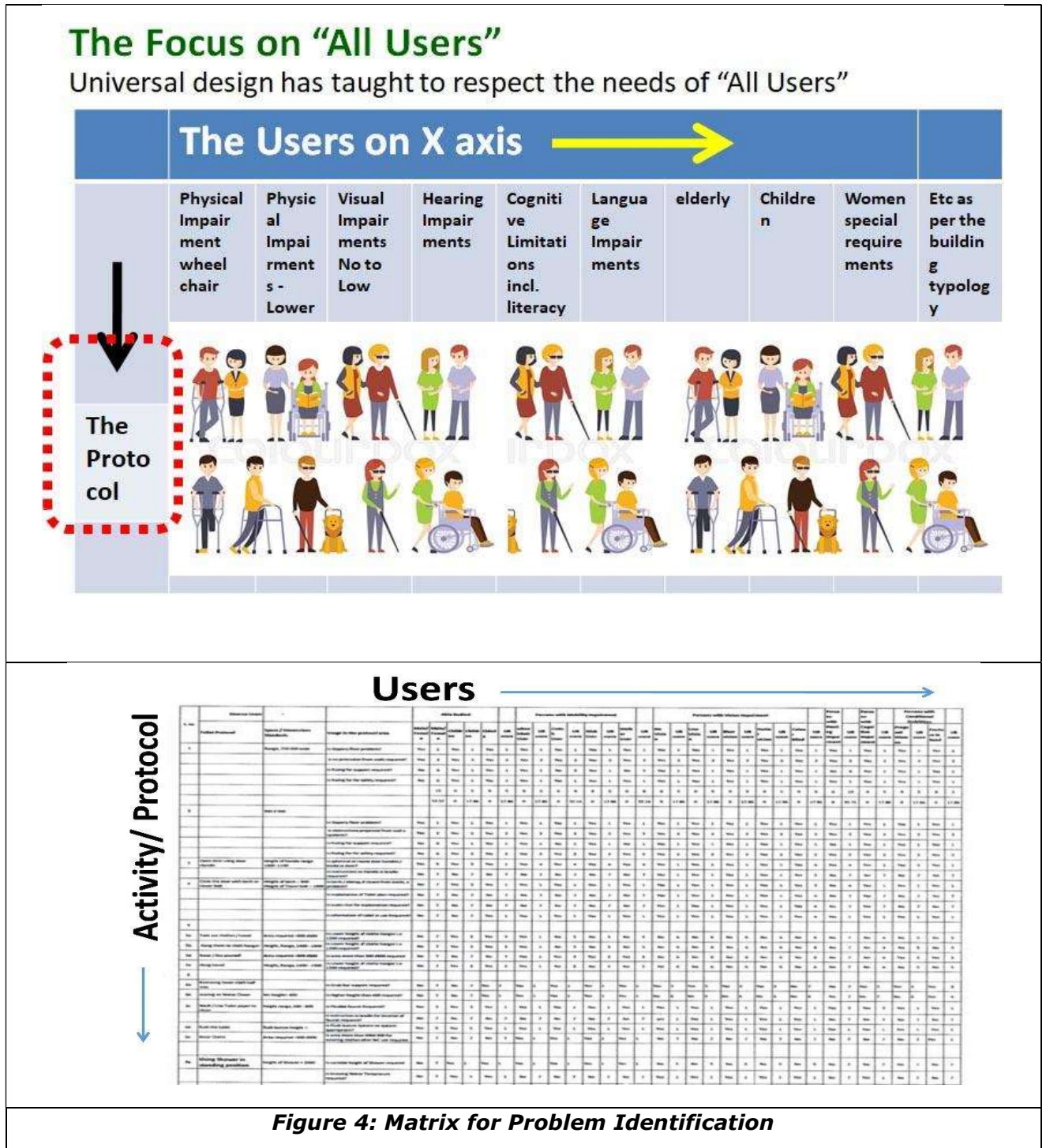
The problems in the specified areas have been plotted for graphs to represent the problems faced by all users in percentage. Below

mentioned are the graphs showing the problems in various space usage of the toilet.
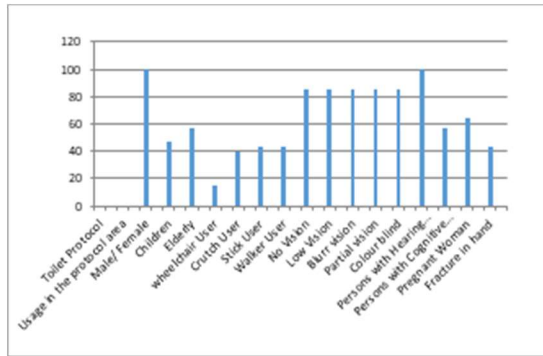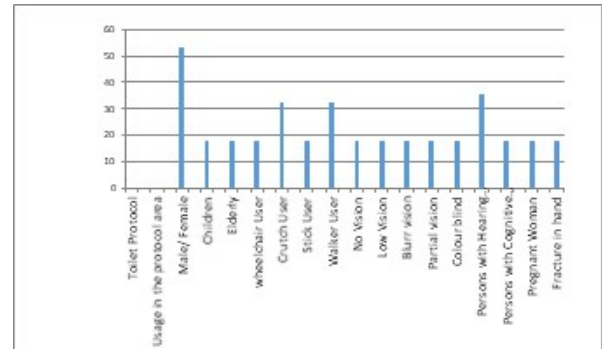
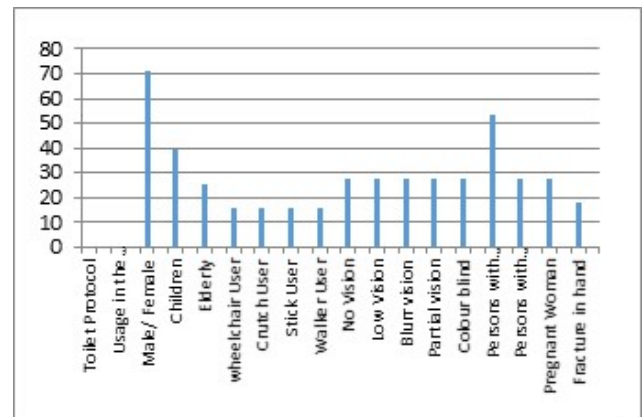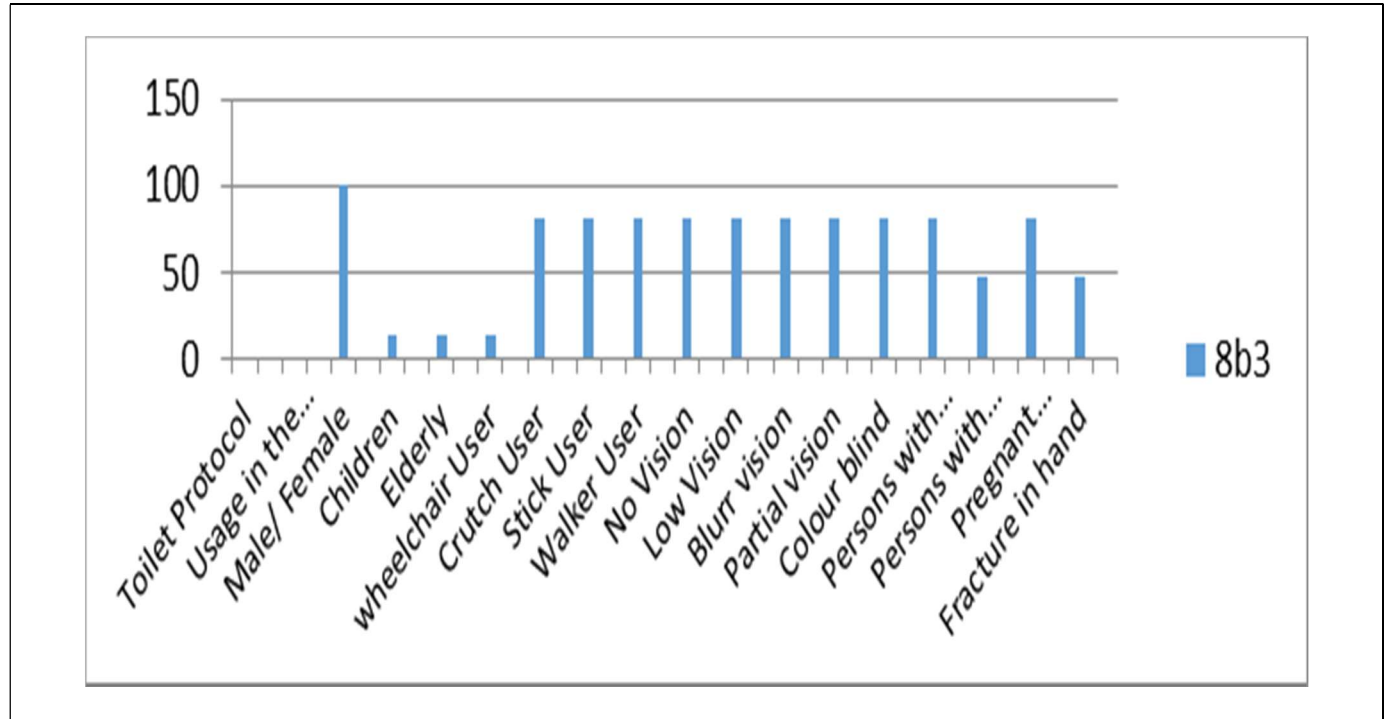|	
Figure 5: Open door using handle	*Figure 6: Approach to the Toilet*
Figure 7: Space in front of door	*Figure 8: Using water closet*
Figure 9: Using shower in standing position.	*Figure 10: Using shower in seating position.*
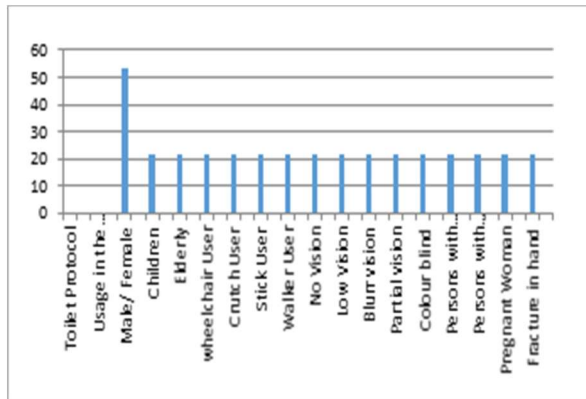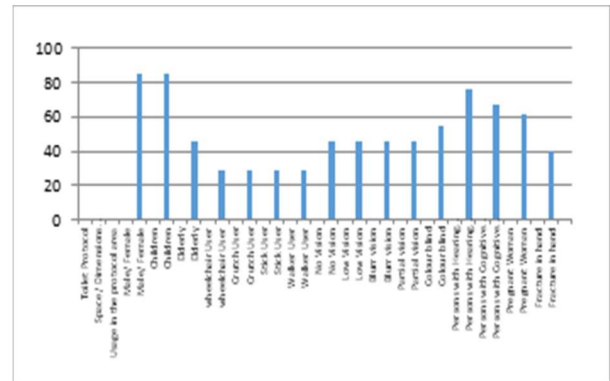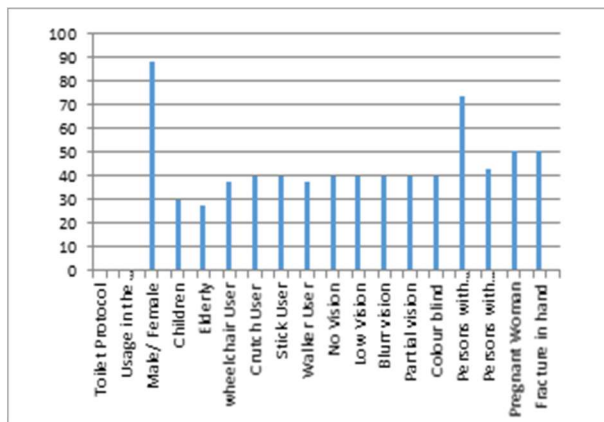
Figure 11: Using wash basin

Preparation of Guidelines

The analysis of the problems identified gave guidelines for the design of Divyangjan (Persons with Disability) accessible, "Urban Individual Toilet", the below-mentioned problems in the "Urban Individual toilet for the above listed diverse users; (Additionally, the Harmonized Guidelines has been followed for the design and space standards).

S. N.	Toilet Area	Problems in the area	Design Guidelines
1	The walls, floor and	•The present popular construction system of toilet is to have tiles / artificial	Design for/to;

| | roof of the toilet | stone etc. permanently fixed to the walls and all the pipelines for supply of water and drainage his embedded in walls and floors. This makes it a permanent construction.

• This does not permit any change in toilet layout and additions and alterations if desired.

• For any change the toilet has to be reconstructed and the fixtures and pipelines need to be laid again.

• The toilets have sunk and incase of poor water proofing / leakage / and accumulation of water in sunk results in seepage / leakage in toilets at lower floor.

• Aesthetics has been improved by use of artificial stone and long artificial sheet finishes but more functional, simple and contrasting surfaces are needed for comfort to "All". | › Flexibility of changes to be done in toilet whenever required.
› Provide improvised sanitation and services even if leakage / seepage etc. occurs. (Tolerance for error.)
› Ease of cleaning.
› Aesthetics.
› Contrast for the vision impaired. |
| 2 | Approach to toilet | • The need to meet level differences (if any) with Ramp. | Design for/to; |

		•Door operation to open door outside for ease of operation to all users. •The need of space in front of the door when a wheelchair user opens the door outside. •At the approach (if required) ramp should be provided with gradient not steeper than 1:15 •A space in front of door for the proper movement of wheelchair is essential as the door opens outside, accommodate smooth operation and entry.	› Appropriate standards for comfort and ease. › Safety. › Equitable use by all shall be targeted for all user by different methods of touch, audio and visibility through contrast. › Ramp if provided to meet out level difference shall not steeper than 1:15. • A railing along the ramp should be provided with hand rails at two levels of 800 and 600 › Comfortable space for wheelchair entry.
3	Toilet Door and Space in front	•Need to provide appropriate width of the door for ease of entry to all. •Need to provide appropriate height of fixtures on door(door handle, and latch •The vision impaired person need to get an idea about toilet layout prior to usage else otherwise he finds it by touching the toilet fixtures and tries to understand wht it is.	Design for/to; › Appropriate standards for comfort and ease. › Door width not less than 815 mm for wheelchair entry shall be provided. › Prior information to all through the possibilities of touch, hearing, vission shall be provided for the prior idea of the toilet.

			• Prior information with all possible comfortable and essential modes.
4	The Grab bars	• Need to provide support for usage of all spaces in toilet for all users. • Need to give information to person with vision impairment.	Design for/to; • Safety and support. • Information about the space through touch.
5	The Changing Space	• Need to address reach and range for diverse users • Need of proper space for changing cloths. • Need of reach and range, for cloths, towel to be used by all the diverse users.	Design for/to; • Reach and range so that all users will be able to use it comfortably. • Appropriate space standards for changing clothes.
6	Water Closet Area	• Right, left and front transfer to the water closet. • Support required for transfers. • Variable height of seat required. • Comfort to arms and support with arms required while	Design for/to; • Proper transfers to WC. • Proper and appropriate support for transfer and usage. • Reach and range to accommodate all users

		seating and getting up from water closet. ● Operation of flush button at back on cistern.	while using the water closet. ● Ease of operation for all usage while using the toilet.
7	The Bathing Area	● Area 900X 900 required. ● Additional area required for transfers from wheel chair. ● For shower taken in standing and seating positions required ● Seating required for Persons with disabilities and children. ● Flexible height for shower required for comfort to all users. ● Flexible/ hand held shower required. ● Support while using shower required for persons with disabilities and elderly.	Design for/to; ● Appropriate standards. ● Ease and comfort as per usage. ● Flexibility of use for shower, faucet and use of bathing seat usage. ● Safety and support. ● Ease of operations.

8	The Wash Basin Area	• Variable heights required for usage by addressed diverse users. • Space below the basin required for wheelchair users. • Need of support required while using the wash basin. • Need of contrast for clarity.	Design for/to; • Accommodate usage by all intended diverse users. • Appropriate standards for usage by intended diverse users. • Ease of operations. • Support and safety. • Contrast for clarity of spaces for vision impaired and all intended users.
9	The Floor Matt/ sheet	• Slippery floor. • Cleanliness in all areas of toilet. • Need of safety while walking on floor.	Design for/to; • Safety and security to prevent fall while using toilet. • Cleanliness.
10	Light and Ventilation in toilet	• Adequate light without glare is required in every area of the toilet. • Proper ventilation is required to avoid foul smell.	Design for/to; • Appropriate light and ventilation.

11	Water temperature from Shower and faucet	•Access water temperature causes in case of elderly, where the sense of touch or to feel the temperature is reduced with aging	Design for/ to ; Information for safety

Table 1: The problems and guidelines identification for the urban individual toilet

Design Solutions and the Details

The Design of "Urban Individual Toilet" has been prepared to keep into consideration the toilet of a house of a family in an urban area. The users and problems have been identified as stated in point no 7. The design was an attempt to cater to the major functions of the toilet in a simplified way. Luxuries of the bathtub and additional accessories are not considered for this toilet design.

The design of the toilet followed the research oriented method to achieve the guidelines and the guidelines, guided to achieve the accessible toilet to the identified diverse users following the "Universal Design Principles" and "Universal Design India Principles" as the foundation concepts to achieve accessibility for the diverse Indian people.

The Design Solutions

The major part of the exercise was to develop the design guidelines for the design of the urban individual toilet. Although the design solution for a fully accessible toilet has been presented, but there can be n number of designs following the design guidelines for the provision of accessibility to the identified diverse people of the Indian urban family.
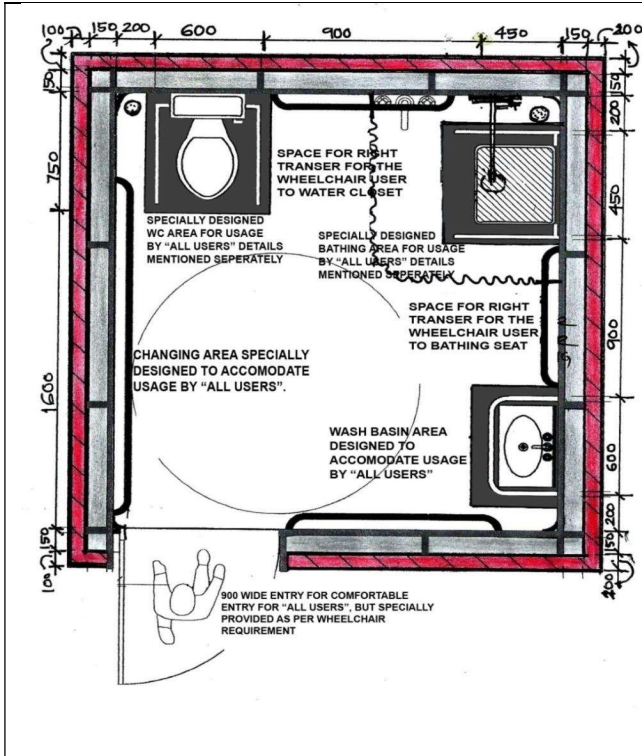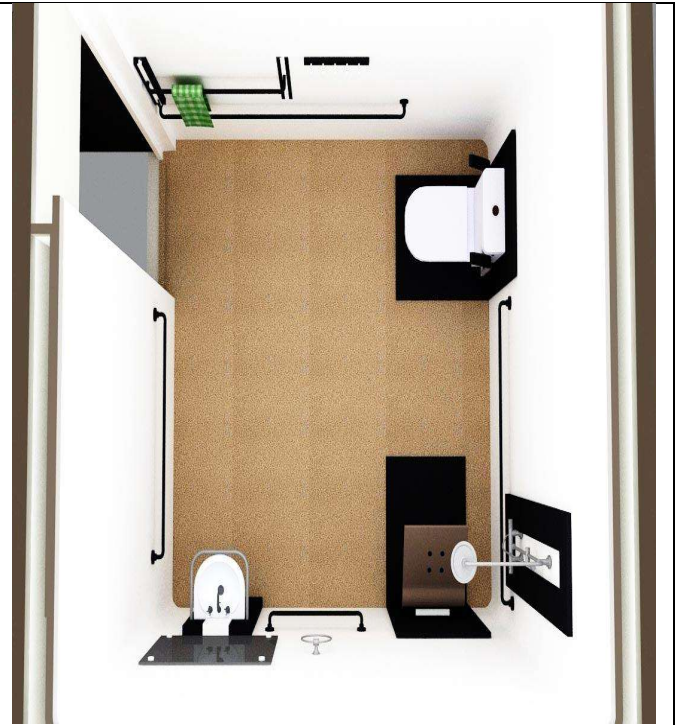
Figure 12: Plan of the urban individual toilet
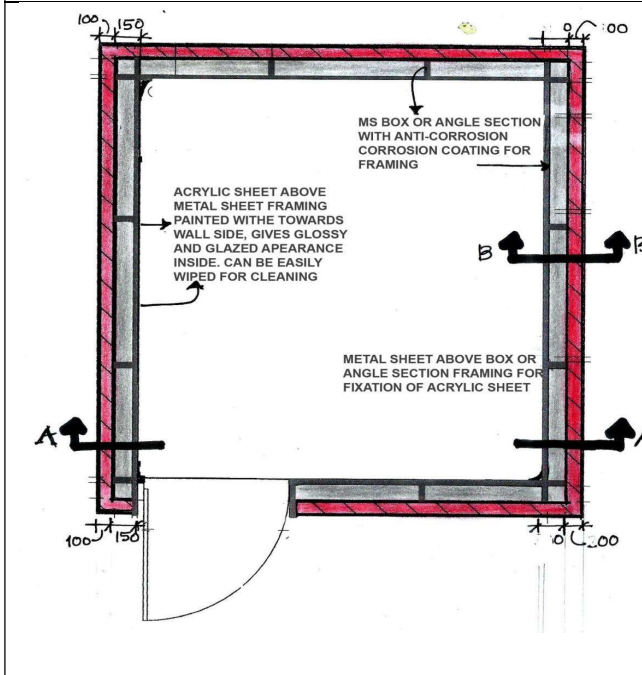

Figure 13: 3D view shoing details of toilet

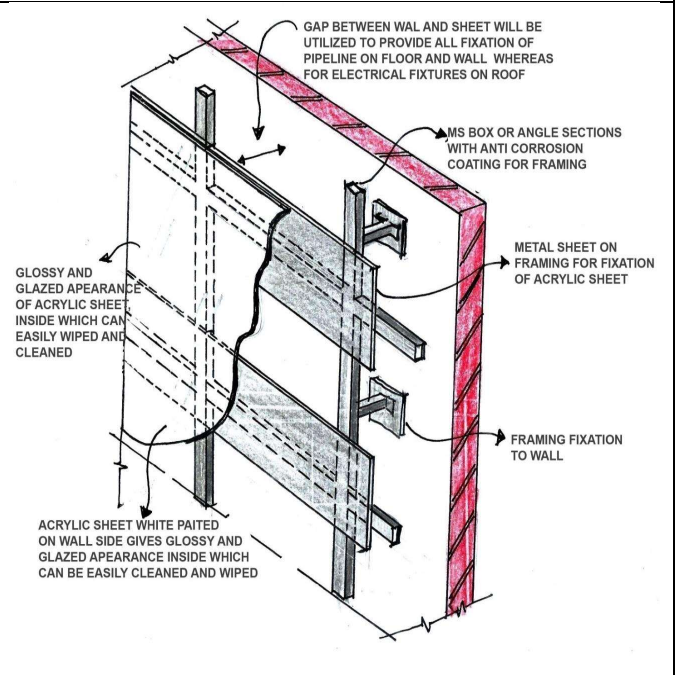**Figure 14: System of metal framing for the roof, walls and floor**

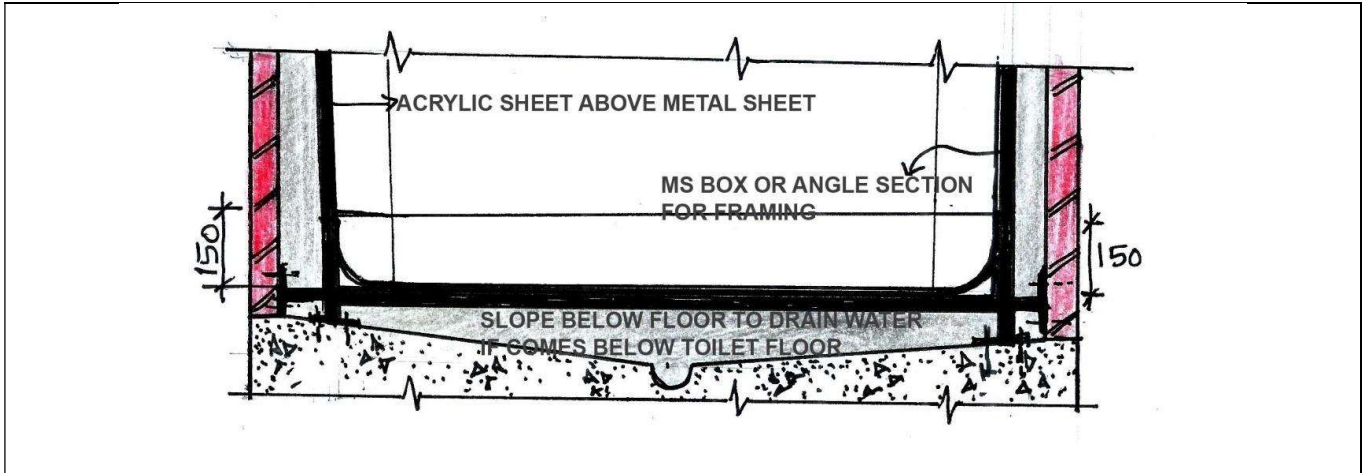**Figure 15: System of metal framing (Sketch)**

Figure 16: Section showing details of metal framing.
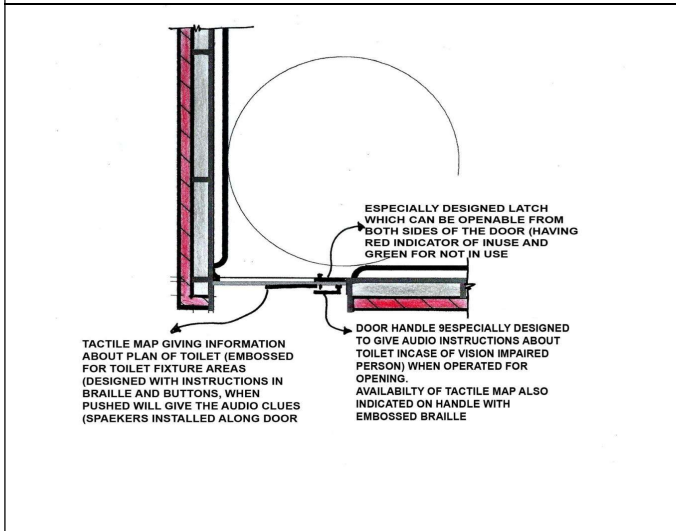
Figure 17: The Approach door of the toilet
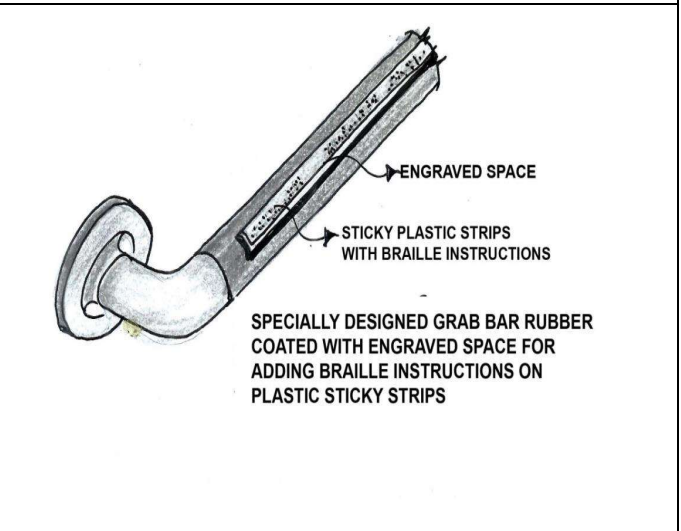
Figure 18: Sketch showing details of grab bar
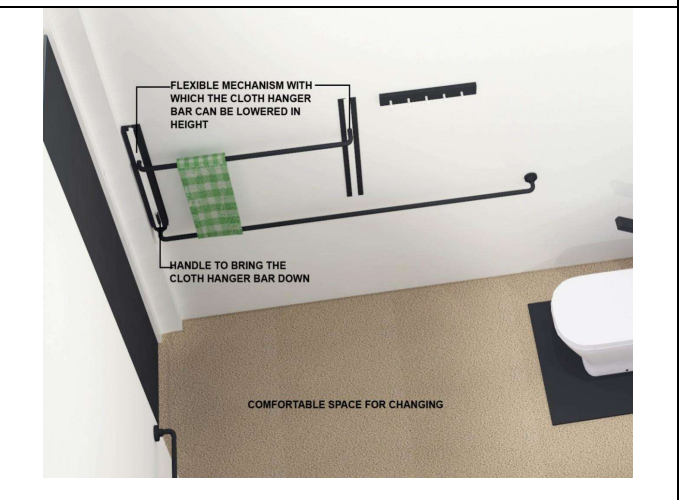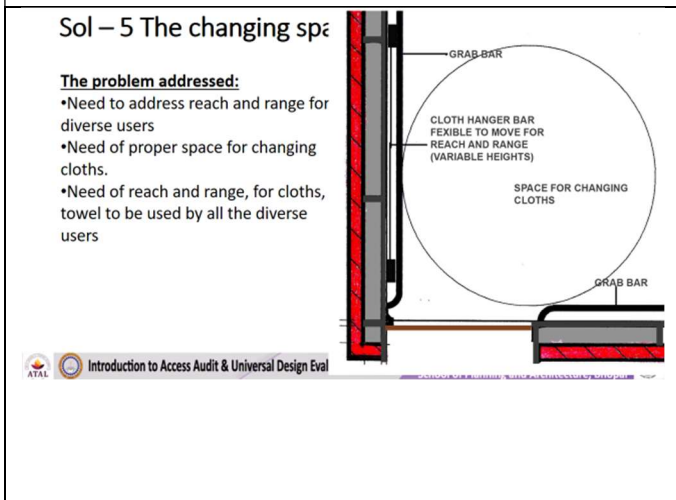
Figure 19: Plan showing details of changing area providing reach and range	Figure 20: 3D view showing details of changing area providing reach and range
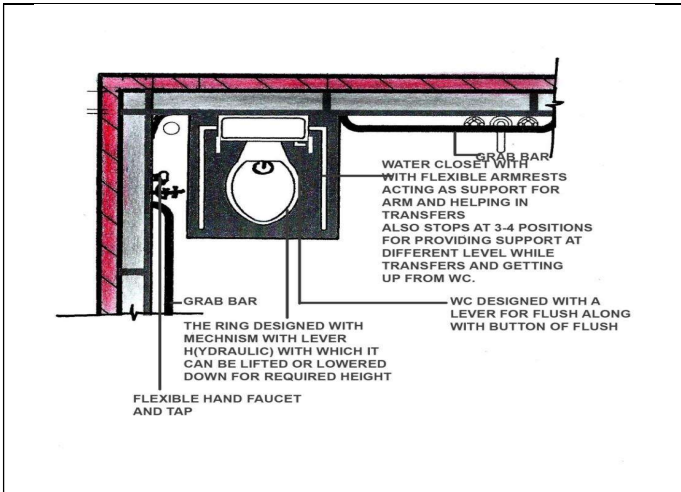
Figure 21: Plan showing water closet	Figure 22: Plan showing details of bathing area
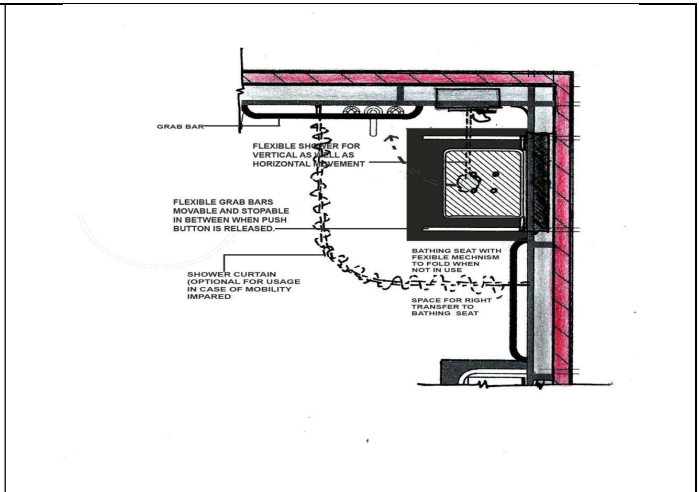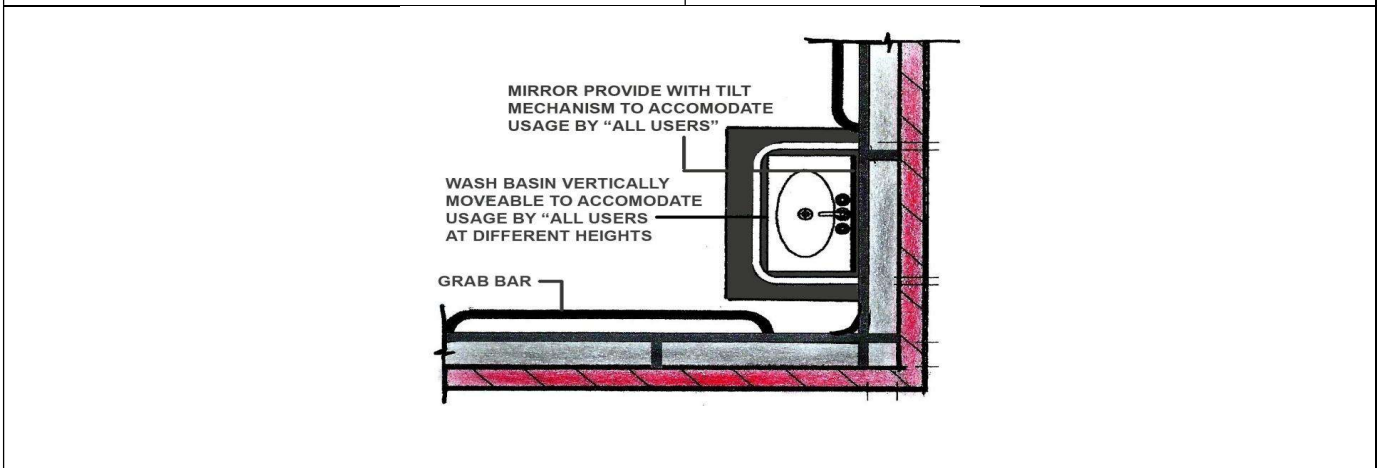
Figure 23: Plan showing details of wash basin area.

Conclusions

- **A systematic, evidence based approach for the whole design is followed to achieve the final design solution.**

- **The design process is a stepwise process of; Identification of Users, their problems following the protocol, framing of guidelines and based on these guidelines the solutions were designed.**

- **Every space in the toilet and its component has been detailed out for provision of comfort, safety and accessibility in its usage by "All" intended "Users".**

- **In totality it is an attempt to create and design a comfortable and accessible "Urban Individual Toilet" for "All Users".**

References

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[2] **Danford, G. S., & Steifeld, E. (1999). Enabling Environment; Measuring the Impact of Environmenton Disability and Rehabilitation. New York: Kluwer Academic/ Plenum Publishers.**

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Vishakha Verma, *Assistant Professor*

Vishakha Verma is an Assistant Professor in the Department of Architecture at the School of Planning and Architecture, Bhopal, MP. She began her career with hands-on experience in architectural and landscape projects across pan India including her hometown, Dewas, Madhya Pradesh, before moving into academia. She previously held a faculty position at the National Institute of Technology, Hamirpur, Himachal Pradesh, for two years.

She holds a Master of Architecture with a specialization in sustainable architecture. Her Post-graduation thesis was titled "Restorative Environment and Well-Being in a Hospital through Landscape Design-A Case of M.Y Hospital, Indore MP." Vishakha's research interests include User Centric Design, Built Environment and Human Behavior, Biophilic Architecture, Architecture and Well-Being, Climate Responsive Architecture, Inclusive Environment, Neuroarchitecture, and Healing Architecture, aiming to enhance user experience and create healthier, more livable environments. She is equipped with materials like mud and bamboo and strives to explore more sustainable materials.

She supports the idea that the resources we have are not inherited from our forefathers but borrowed from future generations. Therefore, it is our responsibility to use them wisely and, as a designer, to create built environments that foster inclusion for diverse user groups.

Dr. Sandeep Sankat

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For his proposal for the concerns towards the success of "Sugamya Bharat Abhiyaan" through Universal Design Education, he received Erasmus + Global mobility funding in 2016 and is an Erasmus Fellow. He has been awarded the prestigious National "NCPEDP MPHASIS

Award 2016" for his work in accessibility and disability studies and Universal Design. Recently he has been awarded with the national "Design Educators Award 2023" for teaching Universal Design. He has been awarded at various platforms for his concerns and work in the area of Universal Design and Accessibility. He has published research papers in journals and conference proceedings focused on accessibility and disability studies. He has secured first position and distinction in the Bachelors and Masters Courses. He has been a recipient of Gold Medal for the Masters Course of Ekistics from F/O of Architecture and Ekistics, Jamia Millia Islamia, New Delhi. Awarded, for the design of accessible toilet (designed following Universal Design Principles) in the category "The Urban Individual Toilet" in the San- Sadhan Hackathon organized by the Department of Empowerment of Persons with Disabilities (Divyangjan) and Ministry of Jal Shakti in association with Atal Innovation Mission, Niti Aayog, Bill & Melinda Gates Foundation.

He has also represented SPA, Bhopal on various administrative posts, including, Dean Academics, Dean Student Affairs, Controller of Examinations etc. And at present he is Head of the Department at the Department of Architecture, School of Planning and Architecture Bhopal.

Beyond Binary: Inclusivity and Diversity in the Built Environment

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Abstract

As architects and urban planners, our role extends beyond creating aesthetically pleasing and functional spaces; it is also about designing environments that are inclusive and respectful of the diversity of all individuals. This paper explores the historical context of transgender existence, highlighting their presence in various cultures throughout history, and examines the contemporary challenges they face, including social stigma, violence, and barriers to economic opportunities and healthcare. By analyzing both global and Indian perspectives, and defining key concepts related to gender diversity, the paper aims to emphasize the responsibility of designers in fostering environments that are safe, welcoming, and accessible for everyone. It offers practical recommendations for incorporating inclusive practices, such as gender-neutral facilities, community engagement, and flexible design solutions. Ultimately, this study aims to guide architects and planners in their efforts to create spaces that honour the dignity and rights of all users, ensuring that the built environment becomes a tool for positive social change.

Keywords: Inclusive *Design, Transgender, Universal Design, Built Environment.*

1) Introduction

When I was born, our home overflowed with joy and celebration. People danced, clapped, and laughter filled the air. My childhood was rich with my mother's delicious cooking, cozy hand-knit sweaters, enchanting bedtime stories, and the toys my father brought home while returning from office with a warm smile. I loved riding on his bike, arms wrapped around him, or sitting on his shoulders, feeling like I could see the whole world at lively fairs.

On my 13th birthday, my aunt asked what I wanted to be when I grew up. Glancing at my mother, I said, "I want to be like her—wear beautiful sarees, match my bindis, and fill our home with the aroma of my cooking, while the tinkling of my anklet dances in the air." Everyone burst into laughter, and I stood there, confused. Was my dream truly so funny? My aunt touched my arm gently and said, "Dear, this is what a woman is supposed to do." Her voice was kind, but her words hit me hard. I was born a boy, and society had its rules. Yet, I had always known I was a girl inside, refusing to let others dictate my feelings.

At 17, I finally shared my truth with my family, voice trembling with hope. But their faces turned cold, and silence filled the room. My father looked away, and my mother's eyes brimmed with confusion and sadness. Their rejection, shaped by societal pressure, left me feeling lost and alone. That night, I left our home, realizing that I was not just without a place to stay but also without hope.

This story reflects the struggles of countless transgender individuals in our country, all seeking acceptance and the freedom to be themselves.

Over the past few decades, Universal Design has gained prominence as an approach to making spaces accessible to a broader population without requiring post-design adaptations. Ronald Mace, a key advocate of Universal Design, argued that spaces and products should be inherently accessible to everyone, regardless of ability (Mace, 1997). While Universal Design aims to create accessibility for the general population, it has certain limitations when it comes to addressing the full spectrum of human diversity, particularly in terms of gender, age, and abilities.

Recognizing these limitations, researchers and designers introduced the concept of Inclusive Design, championed by Roger Coleman and the Helen Hamlyn Centre. Inclusive Design expands beyond the physical barriers to ensure environments are designed to meet the needs of all users, regardless of gender, age, ability, or cultural background (Coleman, 1994). This shift toward inclusivity highlights the importance of understanding diverse user requirements and ensuring that design is not only accessible but also equitable.

Further, The IDEA framework, which stands for Inclusion, Diversity, Equity, and Accessibility, broadens the conversation around design by emphasizing the need to create environments that cater to the full spectrum of human experiences. IDEA promotes a holistic approach, ensuring that design practices consider not only accessibility but also the social, cultural, and economic dimensions of diversity. By incorporating IDEA principles, designers ensure that spaces are not just physically accessible, but also welcoming and inclusive for all, regardless of background or identity (American Alliance of Museums, 2020). This framework aligns closely with Inclusive Design but emphasizes the intersectionality of various factors—ensuring that equity is at the forefront of design decisions.

Despite the growing recognition of the importance of inclusivity in design, its practical implementation in the built environment has been lagging. While accessibility has become a regulatory requirement for approval in many projects, inclusivity remains overlooked in many cases. For example, projects commissioned by large private companies, government bodies, and NGOs often emphasize inclusivity, whereas smaller projects tend to focus solely on meeting accessibility standards (Kreukels & Guillamon, 2016). This gap may stem from a combination of factors, including limited awareness (Fig.1) of the diverse needs of users, as well as the perceived cost and complexity of implementing truly inclusive design. (Fig. 2) Provides a concise overview of the attitudes held by various stakeholders toward IDEA within the built environment.

Figure 1 Understanding of IDEA among stakeholders (Source: Matteo Zallio et. al 2021)
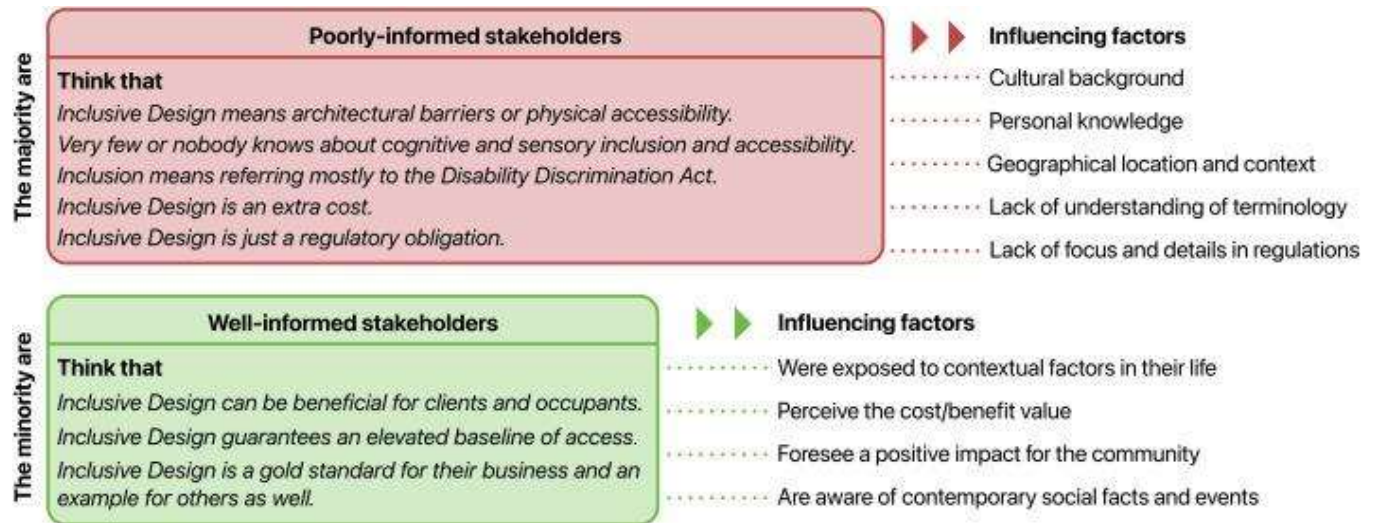
Poorly-informed stakeholders

The majority are

Think that
Inclusive Design means architectural barriers or physical accessibility.
Very few or nobody knows about cognitive and sensory inclusion and accessibility.
Inclusion means referring mostly to the Disability Discrimination Act.
Inclusive Design is an extra cost.
Inclusive Design is just a regulatory obligation.

Influencing factors
Cultural background
Personal knowledge
Geographical location and context
Lack of understanding of terminology
Lack of focus and details in regulations

Well-informed stakeholders

The minority are

Think that
Inclusive Design can be beneficial for clients and occupants.
Inclusive Design guarantees an elevated baseline of access.
Inclusive Design is a gold standard for their business and an example for others as well.

Influencing factors
Were exposed to contextual factors in their life
Perceive the cost/benefit value
Foresee a positive impact for the community
Are aware of contemporary social facts and events

Figure 2 Lack of awareness among stakeholders (Source: Matteo Zallio et. al 2021)

Inclusive design benefits not just a specific group, but a wider range of users. For instance, creating accessible pathways initially aimed at assisting wheelchair users has also proven valuable for parents with strollers, travellers with heavy luggage, and people with temporary or permanent mobility issues. In the same way, designing spaces that accommodate transgender individuals does not solely benefit them— it also creates safer and more accessible environments for other vulnerable or marginalized groups.

By moving beyond a narrow focus on physical accessibility, inclusive design addresses broader societal goals, such as those outlined in the Sustainable Development Goals (SDGs). The SDGs emphasize the right of every individual, regardless of their gender, age, race, or background, to access public spaces and resources (United Nations, 2015). Achieving these goals is not solely the responsibility of governments or social workers. Architects, designers, and urban planners play a vital role in ensuring that spaces are inclusive and equitable, extending their influence beyond physical structures to foster social inclusion and cohesion.

The inclusion of marginalized communities, such as transgender individuals, is a critical aspect of this approach. Globally, estimates suggest that approximately 0.3% to 0.6% of the population identifies as transgender (Budge et al., 2013). In India, the 2011 Census reported over 490,000 transgender individuals, though community estimates suggest the actual number could be much higher, possibly reaching 2-3 million (Jha et al., 2019). The invisibility and underreporting of this population highlight the urgent need for inclusive policies and practices.

While there is debate about giving special recognition to transgender people, some argue that this could lead to the exclusion of other groups. However, historical precedents—such as the fight for women's rights—demonstrate the opposite. When society recognized the need to challenge patriarchal structures, movements for gender equality led to special provisions for women, such as reservations in education and the workplace, without excluding them from broader society. Instead, these measures provided women with opportunities to contribute to societal progress (Murray, 2012).

2) Literature Review

2.1) Understanding Trans community

For designers and policymakers, it is crucial to thoroughly understand the needs of their end users—whether these are physical, psychological, or social requirements. Just as a designer draws on their own experiences or studies to design spaces like schools, offices, hospitals, hotels, or public parks, they must also consider the specific functional needs of different user groups, such as men, women, children, adults, and the elderly. In the same way, it is essential to

understand the diverse and unique needs of transgender individuals to create truly inclusive spaces. A thoughtful, inclusive design requires recognizing the specific challenges and preferences of the transgender community, ensuring that the built environment reflects the full spectrum of human experience.

To engage effectively with the topic, it's essential to define several key terms:

- **Transgender**: An umbrella term for individuals whose gender identity differs from their assigned sex at birth (Budge et al., 2013).
- **LGBTQIA+**: An acronym representing Lesbian, Gay, Bisexual, Transgender, Queer/Questioning, Intersex, and Asexual, referring to individuals who identify as non-heterosexual or non-cisgender (GLAAD, 2020).
- **Cisgender**: Individuals whose gender identity aligns with their sex assigned at birth (Budge et al., 2013).
- **Sex and Gender**: Sex refers to biological attributes, while gender is a social construct that encompasses identity, expression, and societal roles (Butler, 1990).

2.2) Neuroscience Perspective

From a neuroscience perspective, transgender identity can be understood as the result of complex interactions between brain structure, function, and hormonal influences, which contribute to a person's experienced gender not aligning with their biological sex. For instance, studies have shown that certain brain regions may differ in volume between cisgender and transgender individuals, indicating a

potential biological basis for gender identity (Swaab & Garcia-Falgueras, 2009). Understanding these nuances is critical for architects designing inclusive spaces.

2.2.1.) Neurobiological Basis of Gender Identity:

Research suggests that gender identity is influenced by how certain brain regions develop and respond to sex hormones (testosterone and estrogen) during critical periods such as prenatal stages. Hormones play a key role in shaping areas like the hypothalamus and amygdala, which are involved in gender-related behaviours and identity formation (Smith et al., 2015).
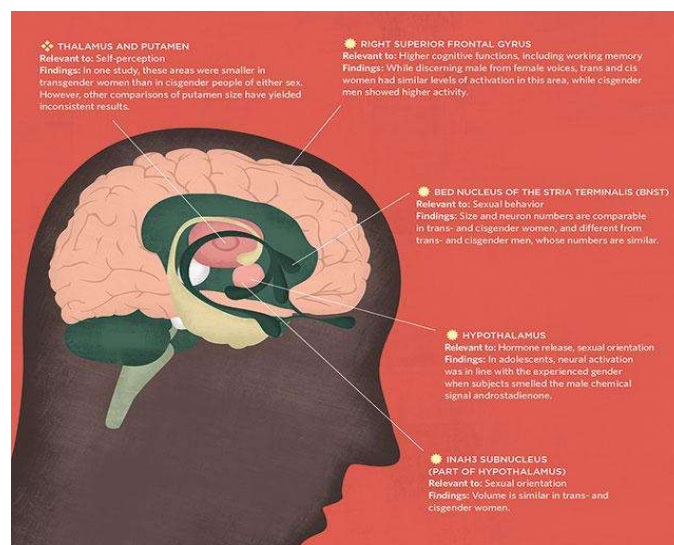

Figure 3 Brain functioning of transgender and cisgender (Source: Ana Yael, 2018)

2.2.2.) Brain Structural and Functional Differences:

Neuroimaging studies reveal that the brains of transgender individuals often show characteristics more similar to their experienced gender than their assigned sex at birth. For example,

trans women have been found to have brain structures, such as the bed nucleus of the stria terminalis (BNST), that align more closely with cisgender women than cisgender men (Zhou et al., 1995). (Fig-3)Similarly, trans men exhibit brain patterns more typical of cisgender men in areas related to body perception and identity (Kreukels & Guillamon, 2016).

2.2.3.) Hormonal Influence and Brain Plasticity:

Hormonal treatments, such as testosterone for trans men and estrogen for trans women, influence brain structure and function, bringing certain brain characteristics in line with their gender identity. This demonstrates the brain's ability to adapt (Nieder & Richter-Appelt, 2011). Hormone replacement therapy has been shown to affect brain volume, connectivity, and emotional regulation in ways consistent with the experienced gender.

2.2.4.) Psychological and Social Influences:

The brain is also shaped by external factors, including social environments and stress. Transgender individuals, due to societal stigma, often experience heightened stress, which affects brain regions involved in emotional regulation, such as the amygdala (Smith et al., 2015). This highlights the role of social acceptance in shaping neural pathways associated with identity.

2.3) Historical Context of Gender Diversity

While awareness of transgender identities has grown significantly in recent years, it is important to recognize that these identities are not new. Transgender individuals have existed throughout history, with

their presence evident in ancient civilizations across the world. Many cultures, including Indigenous cultures in North America, South Asian societies, and Polynesian communities, recognized and respected gender diversity long before contemporary understandings emerged.

2.3.1)Two-Spirit People in Indigenous Cultures

Among many Indigenous cultures in North America, the concept of Two-Spirit refers to individuals who embody both masculine and feminine qualities, often holding significant cultural roles within their communities (Fig.4). This term encompasses a wide range of gender identities and expressions. For example, among the Lakota people, the concept of "Winkte" describes a male-bodied individual who identifies as female, serving as a healer or spiritual leader (Jacobs et al., 1997). Two-Spirit individuals were historically respected for their unique perspectives and contributions to their societies.
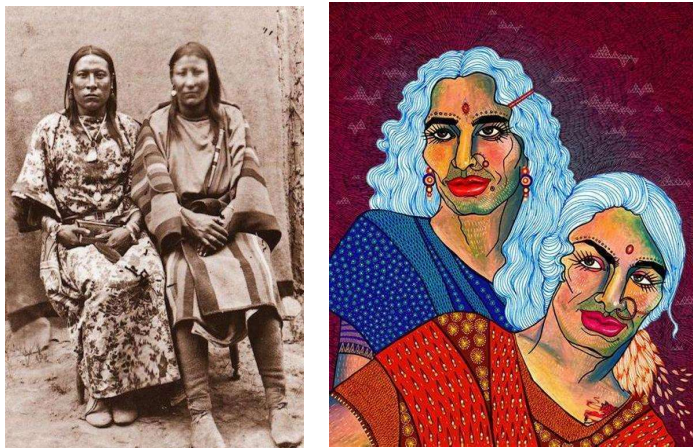

Figure 4 (Left) Celebrated Lakota Two-Spirit Osh-Tisch (left) with his wife. (Source: The Numinous). (Right) Featured Artwork of the Hijra (transgender) community (Source: Reclamation- Madhura Kamat)

2.3.2) Hijras in South Asia

The hijra (transgender) community in India and other parts of South Asia has a rich history, often recognized as a third gender (Fig.4). Historical references, such as those in the Mahabharata, mention hijras as having unique roles within society. Additionally, the figure of Ardhanarishvara, a composite deity that represents both Shiva and Parvati, symbolizes the merging of masculine and feminine energies, illustrating the fluidity of gender within Hindu mythology (Reddy, 2005). This acknowledgement of gender diversity reflects a longstanding cultural recognition of non-binary identities in South Asia.

2.3.3) Fa'afafine in Samoa

In Samoa, fa'afafine describes individuals assigned males at birth who embody both male and female traits. The fa'afafine have long been integral to Samoan culture, often serving as caregivers and taking on roles traditionally associated with women. Their presence demonstrates a societal understanding and acceptance of gender diversity, which has been a part of Samoan life for centuries (Meleisea, 1998).

2.3.4) Gender Diversity in Mythology

Gender diversity is also evident in ancient mythologies, where figures with both masculine and feminine attributes are often revered:

- Inanna, the Sumerian goddess of love and war, is depicted with both masculine and feminine qualities, underscoring the complexity of gender in ancient Mesopotamian beliefs.

- **Hermaphroditus, from Greek mythology, is the child of Hermes and Aphrodite and is known for having both male and female physical characteristics, symbolizing the blending of genders.**
- **In ancient Egyptian society, some deities, like Horus, were depicted as androgynous, and historical texts reference individuals who may have identified beyond the binary gender norms.**

These historical examples highlight that gender diversity and non-binary identities have been integral to various cultures throughout history. However, contemporary challenges such as societal prejudice and systemic discrimination continue to create barriers for transgender individuals. Recognizing this deep-rooted history of gender diversity emphasizes the importance of designing inclusive environments that respect and accommodate all identities.

3) Discussions

3.1) Challenges Faced by Transgender Individuals

Transgender individuals are at a disproportionately high risk of violence. In 2022 alone, 327 transgender people were murdered globally, reflecting the severe threat to their safety (Transgender Day of Remembrance, 2022). The Human Rights Campaign (2021) reported at least 44 murders of transgender or gender non-conforming individuals in the U.S., with most victims being Black and Latinx trans women. Similarly, in India, the murder of activist Shabnam Mausi in 2016 exemplifies the rampant violence faced by the community (Sharma, 2017). This violence is not confined to physical attacks; 60% of transgender individuals in the EU reported harassment in a single year, with trans people being four times more likely to experience violence than the general population (EU LGBT

Survey II, 2019). Fig.6 highlights the country where the third gender is legally recognised.
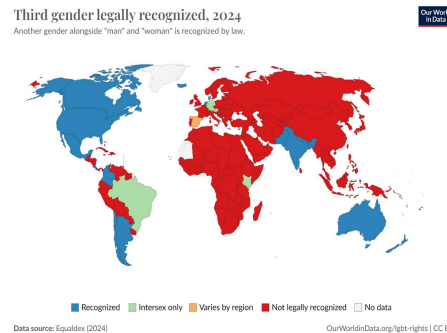

Figure 5 The worldwide scenario of legal recognition of third gender. (Source: Our World in Data)

3.1.1) Barriers to Healthcare

Access to healthcare is another critical challenge. Transgender individuals frequently encounter discrimination within healthcare settings, leading to inadequate or denied medical care. A significant number report being refused care or facing mistreatment from providers due to their gender identity (James et al., 2016). This discrimination not only affects physical health but also contributes to poor mental health outcomes, with many experiencing anxiety, depression, and social isolation.

3.1.2) Economic Marginalization

Economic participation remains a significant barrier for transgender people, contributing to widespread poverty within the community. Despite the Transgender Persons (Protection of Rights) Act (2019) in India, which aims to protect transgender rights, 92% of transgender individuals struggle to find stable employment due to workplace discrimination (National Human Rights Commission, 2018). In the

U.S., nearly 30% of transgender respondents reported job loss directly linked to their gender identity (Budge et al., 2013). This economic exclusion compounds the challenges of social stigma and limits access to opportunities, further marginalizing the community.

3.1.3) The Impact of Social Stigma

The social stigma surrounding transgender identities contributes to widespread isolation and marginalization. The persistent lack of understanding and acceptance often translates into rejection from family, community, and broader society. This rejection can lead to severe mental health challenges, exacerbating the already high rates of depression and suicide within the community (Drescher, 2015). For many, the combination of societal rejection and systemic barriers makes it difficult to access the support networks that are vital for well-being.

3.1.4) High-Profile Cases and Societal Neglect

The neglect and violence against transgender individuals are further highlighted through high-profile cases. The unresolved death of Marsha P. Johnson in 1992, a key figure in the LGBTQIA+ rights movement, underscores systemic disregard for violence against transgender individuals (Duberman, 1993). Similarly, the death of Tiwonge Chimbalanga in Malawi, following her arrest due to her gender identity, brought international attention to the extreme vulnerability of transgender people in many parts of the world (Khomani, 2013).

3.2) Government Initiatives: Promoting Rights and Inclusion for Transgender Individuals

In recent years, the Indian government has made considerable efforts to safeguard the rights of transgender individuals, recognizing the need for social inclusion, legal protection, and economic empowerment. These initiatives encompass legislative actions, social support programs, and education reforms, aiming to address systemic inequalities and create a more inclusive society for transgender people.

3.2.1.) Legislative Efforts: Strengthening Legal Protections

- **Transgender Persons (Protection of Rights) Act, 2019**: This landmark legislation represents a crucial step toward the protection of transgender rights in India. It prohibits all forms of discrimination against transgender individuals in education, employment, healthcare, and access to public services. A key feature of the Act is the provision for the registration of transgender persons, enabling them to obtain a certificate of identity. This certificate serves as an essential tool for accessing social welfare schemes and other government benefits, ensuring legal recognition and support (Government of India, 2019). Despite its significance, effective implementation remains a challenge, requiring continuous efforts to translate policy into practice at the grassroots level.

- **National Council for Transgender Persons:** Established under the Transgender Persons (Protection of Rights) Act, 2019, this statutory body is tasked with advising the government on policies and programs that affect transgender individuals. The Council plays a vital role in overseeing the implementation of rights and welfare measures, addressing community grievances, and advocating for improvements in legislation and policies. It acts

as a bridge between the government and the transgender community, aiming to ensure that the community's concerns are heard and addressed effectively (Ministry of Social Justice and Empowerment, 2020). In 2016, BuzzFeed News, IPSOS and William Institute surveyed 23 countries to understand how they feel about transgender rights. Fig. 6 represents one of the questions from the same survey.
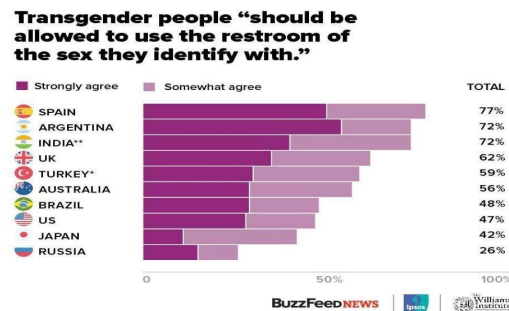

Figure 6 Acceptance of restrooms based on the preference of transgender.

(Source: BuzzFeed News, IPSOS, William Institute)

3.2.2.) Social Support and Legal Aid

- **JALSA (Justice Access for Legal Support and Assistance):** Recognizing that access to legal resources is a significant barrier for marginalized communities, the JALSA initiative focuses on providing legal aid and support to transgender individuals. It offers training programs for legal professionals to better understand the unique challenges faced by the transgender community, thus enhancing the overall access ?to justice. Additionally, JALSA conducts awareness programs aimed at informing transgender individuals about their legal rights and the resources available to them, empowering them to seek justice and protection when needed (Ministry of Social Justice and Empowerment, 2021).

- **SMILE Scheme:** Garima Greh: The Support for Marginalized Individuals for Livelihood and Enterprise (SMILE) Scheme includes the Garima Greh initiative, which focuses on providing shelter, food, and rehabilitation services to transgender persons. This initiative aims to offer a safe and supportive environment for transgender individuals who are often excluded from traditional support networks. By addressing the immediate needs of housing and sustenance, Garima Greh lays the foundation for long-term social and economic inclusion, helping transgender people rebuild their lives with dignity (Ministry of Social Justice and Empowerment, 2021). However, more such shelters need to be designed as Fig.7 shows the current geotagged Garima Greh in 2024.
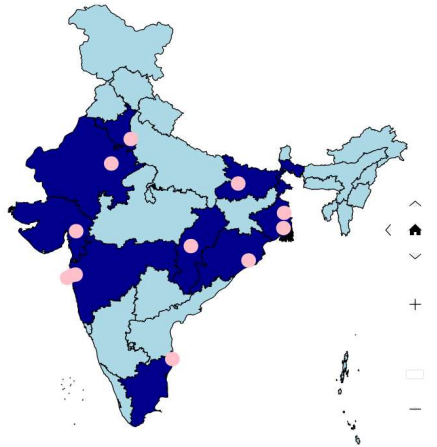

Figure 7 Geotagged Garima Greh in India. (Source: Ministry of Social Justice and Empowerment)

3.2.3.) Inclusive Education and Skill Development

- **NISHTHA (National Initiative for School Heads' and Teachers' Holistic Advancement):** To create a more inclusive educational system, NISHTHA focuses on training educators to address the

needs of all students, including transgender and gender-diverse individuals. The initiative aims to sensitize school heads and teachers to the challenges faced by marginalized students, encouraging practices that foster acceptance and inclusivity within classrooms. By integrating inclusive education principles into the broader school framework, NISHTHA ensures that transgender students are supported in their learning environments, helping them reach their full potential (National Council of Educational Research and Training, 2020).

- **Samagra Shiksha Abhiyan**: As part of India's commitment to ensuring quality education for all, this integrated education scheme emphasizes the inclusion of marginalized students, including those from the transgender community. The program provides targeted support systems such as scholarships, counseling, and inclusive curricula that address the diverse needs of transgender students. Through Samagra Shiksha Abhiyan, the government seeks to remove educational barriers and create a learning environment where every student can thrive (Ministry of Education, 2020).

- **PM-Daksh (Pradhan Mantri Dakshta aur Kushalta Sampann Hitgrahi Yojana):** Aiming to enhance the employability of marginalized groups, including transgender individuals, the PM-Daksh program offers skill development and vocational training opportunities. By providing specialized training in various trades and industries, the initiative empowers transgender persons to gain the skills needed for sustainable livelihoods. This focus on economic independence helps reduce the community's dependence on traditional and often stigmatized means of income, enabling transgender individuals to secure

meaningful employment and integrate into the broader workforce (Ministry of Skill Development and Entrepreneurship, 2021).

3.3) International Examples of Transgender-Inclusive Policies

Globally, several countries have implemented progressive policies to enhance the rights and protections of transgender individuals. These examples illustrate how policy frameworks can create more inclusive societies:

Canada: With the passage of Bill C-16, gender identity and expression were added to the list of prohibited grounds for discrimination. This law offers enhanced protections in employment, housing, and services for transgender individuals (Government of Canada, 2016).

Malta: The Gender Identity, Gender Expression, and Sex Characteristics Act (2015) allows individuals to change their gender on official documents without medical requirements, providing a model for inclusive gender recognition (Government of Malta, 2015).

Argentina: The Gender Identity Law (2012) grants individuals the right to change their gender on official documents based solely on self-identification, emphasizing the importance of respecting each person's right to define their gender identity (Government of Argentina, 2012).

4) Recommendations

Transgender individuals are a vital and diverse part of society, yet their needs and identities have often been overlooked in the design of

public spaces. Architects and urban planners have a unique role in influencing social attitudes and fostering inclusion through thoughtful design. Creating spaces that accommodate the needs of transgender individuals is not only a matter of equity but also a reflection of a progressive and empathetic society. International guidelines emphasize the importance of gender-neutral facilities, accessible healthcare, and anti-discrimination policies in public spaces (UN Free & Equal, 2016). Examples like San Francisco's gender-neutral bathrooms in public buildings and the New York City Department of Education's gender-neutral restrooms in schools illustrate the potential for creating inclusive spaces (NYC Department of Education, 2016).

4.1.) Designing Gender-Neutral Facilities

Public restrooms, changing areas, and other facilities should be designed to be accessible and welcoming to individuals of all gender identities. Gender-neutral restrooms with clear signage and adherence to universal design principles are critical. These facilities should offer full-length doors for privacy and consider features like diaper-changing stations for caregivers, ensuring a broad range of users feel comfortable. For large scale projects, the layout should reflect the expected footfall, balancing privacy with accessibility.

4.2.) Creating Inclusive Gender-Neutral Spaces

In spaces where gender segregation is common—such as security lines at airports, government offices, and hospitals—designs should include a third option for individuals who prefer not to be categorized within binary gender roles. For example, hiring transgender staff or introducing automated scanning can reduce discomfort during

security checks. Such measures respect user preferences and promote a more inclusive experience.

4.3.) Implementing Inclusive Signage

Inclusive signage goes beyond binary representations of gender, using symbols that reflect the function of the space rather than gender-specific icons. Signs could depict plumbing fixtures or intended activities, such as "toilet" or "shower," allowing individuals to choose without fear of judgment. This approach reduces the stress associated with choosing the "correct" facility.

4.4.) Ensuring Safe and Well-Lit Public Spaces

Safety is paramount in public spaces, especially for vulnerable groups like transgender individuals. Visibility, strategic lighting, and thoughtful design can reduce opportunities for harassment. For example, well-lit transport hubs and parks should strike a balance between providing visibility and maintaining privacy. This approach benefits not only transgender individuals but also women, children, and other vulnerable users.

4.5.) Mandating Gender-Neutral Facilities in Public Buildings

In 2014, the Supreme Court of India ruled that public spaces must provide appropriate washroom facilities for transgender and third-gender individuals, making this a mandatory requirement. However, the reality falls short, with many public spaces still lacking accessible and inclusive facilities. Therefore, Government policies must mandate the inclusion of gender-neutral restrooms in all public buildings and workplaces as a condition for construction approval. Even after

announced as part of Such buildings could be incentive with financial support or subsidies. Further, similar to green rating systems, a new rating system focused on social inclusivity or adding points for inclusive design in existing systems would encourage widespread adoption of these practices.

4.6.) Inclusive Housing Policies

In housing projects, measures should ensure non-discrimination and preference-based room sharing, allowing occupants to choose based on gender identity rather than assigned sex. Strict actions should be taken against discrimination or violence in housing settings, fostering safe living environments for transgender individuals.

4.7.) Community Engagement in Design

Engaging transgender individuals during the design process ensures that their unique needs and preferences are understood and addressed. Whether designing schools, offices, or hospitals, involving community representatives can result in more thoughtful and inclusive spaces. Understanding the specific needs of transgender people is as crucial as understanding those of any other user group.

4.8.) Designing Flexible and Adaptive Spaces

Given the diverse needs of the transgender community, flexible and adaptable spaces are essential. Such spaces can be adjusted to accommodate varying requirements, allowing different users to occupy the same space without compromising privacy or comfort. This approach is particularly effective in environments like workplaces or community centre, where multiple user groups may have different needs.

4.9.) Awareness Training for Design Professionals

Training design teams on gender diversity and inclusive practices is vital for creating environments that respect all identities. Partnerships with transgender advocacy groups or NGOs can provide valuable insights into the needs of the community. Hosting design competitions for projects like gender-neutral restrooms or community shelters can also promote greater awareness and innovation.

5) Conclusion

The path to a more inclusive society requires architects to actively engage with the transgender community, advocate for policy changes, and ensure that design reflects values of diversity and respect. While some argue that special provisions for transgender individuals could lead to exclusion, this perspective overlooks the necessity of addressing their unique challenges—similar to the existence of orphanages and old age homes that provide specialized care to those in need. While no one wishes for a child to become an orphan or for an elderly person to be abandoned, these institutions exist to address specific needs that arise due to various circumstances. Similarly, designing inclusive environments for transgender individuals acknowledges their need for tailored support and accommodation, serving as a crucial step toward achieving broader societal equity and acceptance.

The role of architects and planners extends beyond building infrastructure; it includes promoting social inclusion. By collaborating with communities, stakeholders, and governments, we can create spaces that welcome everyone. This effort goes beyond physical accessibility—it requires opening our minds and hearts. Inclusion of

transgender individuals in architectural and planning processes is essential for creating equitable, safe, and welcoming spaces. As architects, we have the opportunity to lead in promoting diversity and ensuring that all people, regardless of gender identity, feel valued and respected in the environments we design.

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