

# SOCIAL INCLUSION TOOLKIT FOR URBAN TRANSPORTATION

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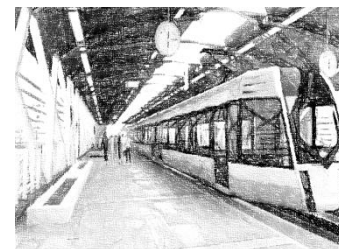
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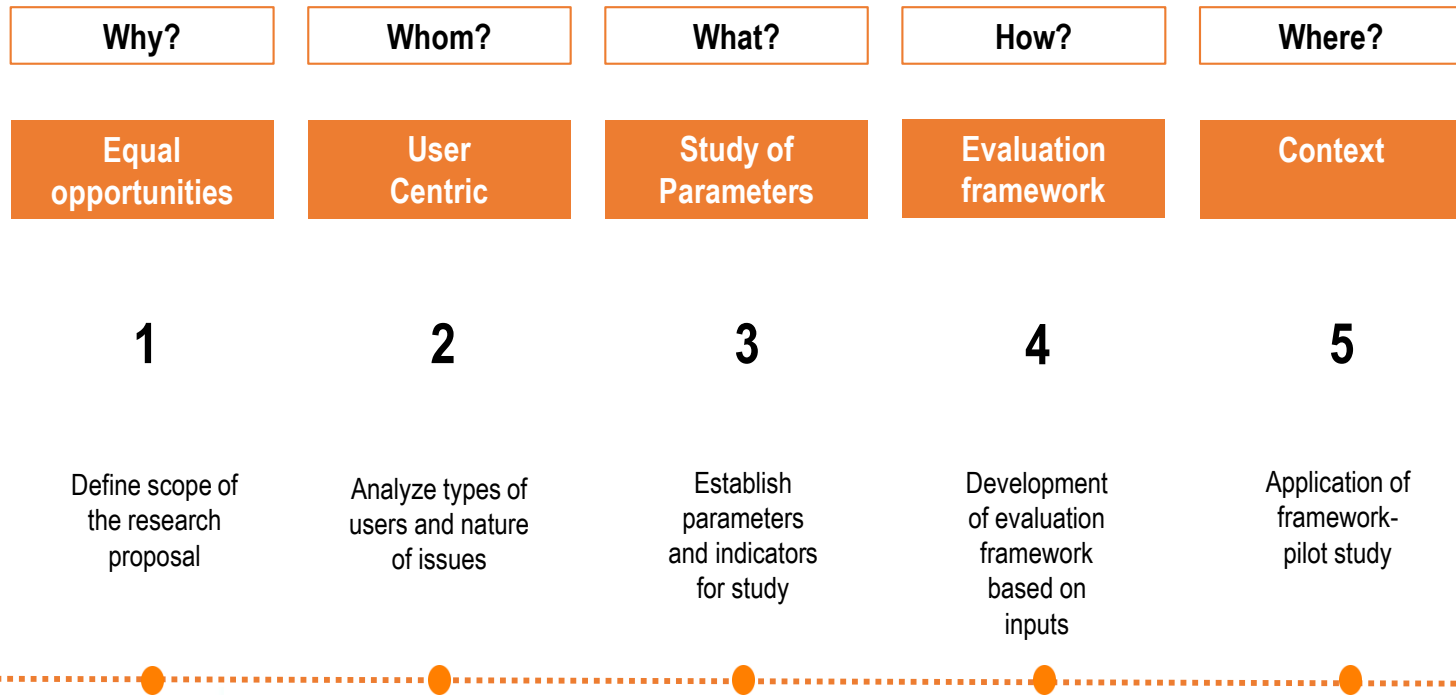
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# AIM

The research paper aims to design a mechanism for evaluation of inclusivity of our public transportation systems in the form of a toolkit which can be utilized by local authorities to monitor progress and make informed policy decisions.

## Inclusive Transportation system



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# Role of Social Inclusion in Transportation

## SOCIAL EXCLUSION---- **WHY?**

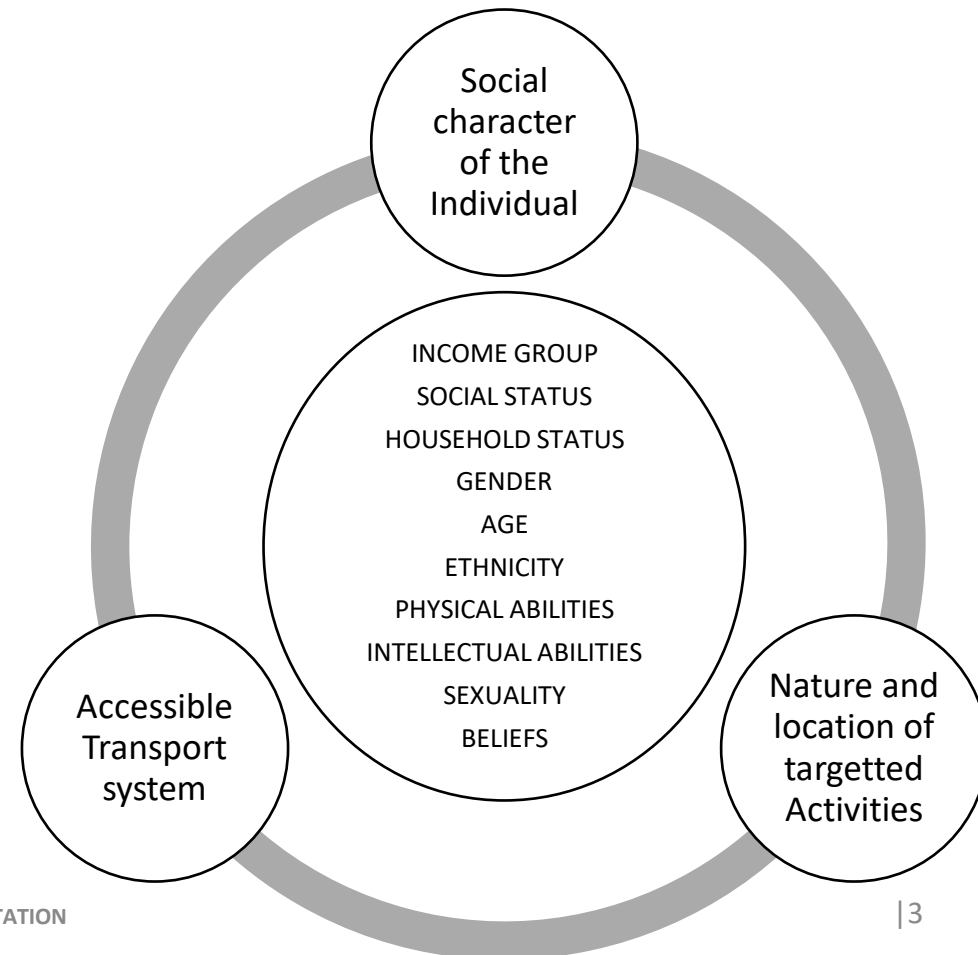
**Preston and Raje (2007)**- not due to a lack of social opportunities but a lack of access to those opportunities.

**Pickup and Guiliano(2005)**- poor access to services, places of employment, education, shopping, or amenities/recreation

**Boschmann(2008), Holzer (1991)**-Low-skilled, low-wage, and minority workers are often more likely to experience problems of inadequate transportation to overcome the spatial separations between their residential location and places of work opportunities, resulting in higher levels of unemployment and compromised wages

**A. Church et al, 2000** -personal and sociocultural characteristics of an individual determine his/her ability to access the transport systems for fulfilling their activity targets.

The World Bank defines social inclusion as  
***“ The process of improving the terms for individuals and groups to take part in society.”***



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# Social inclusion toolkit

Toolkits can aid in:

- ✓ Implementation of priority projects
- ✓ Uniform platform for management and governance
- ✓ Local government self-assessment tool
- ✓ Appropriate for financing mechanisms

Greed C. et al (2003)- Gender mainstreaming toolkit as a means to fulfill the equality standards in the planning process.

The toolkit aspires to cast a gender lens on proposed and existing policies by means of a compendium of questions applicable at every stage of the planning process.

ICCT's Transport policy toolkit- comprehensive information source on energy and environment regulations in transportation; stops short of providing any mechanism.

NISTO -toolkit for practitioners to evaluate small scale mobility projects. The toolkit operates at three levels of sustainability assessment, stakeholder preference assessment as well as suggesting alternative policy interventions. The toolkit however is more suitable for use at the early stages of project planning.



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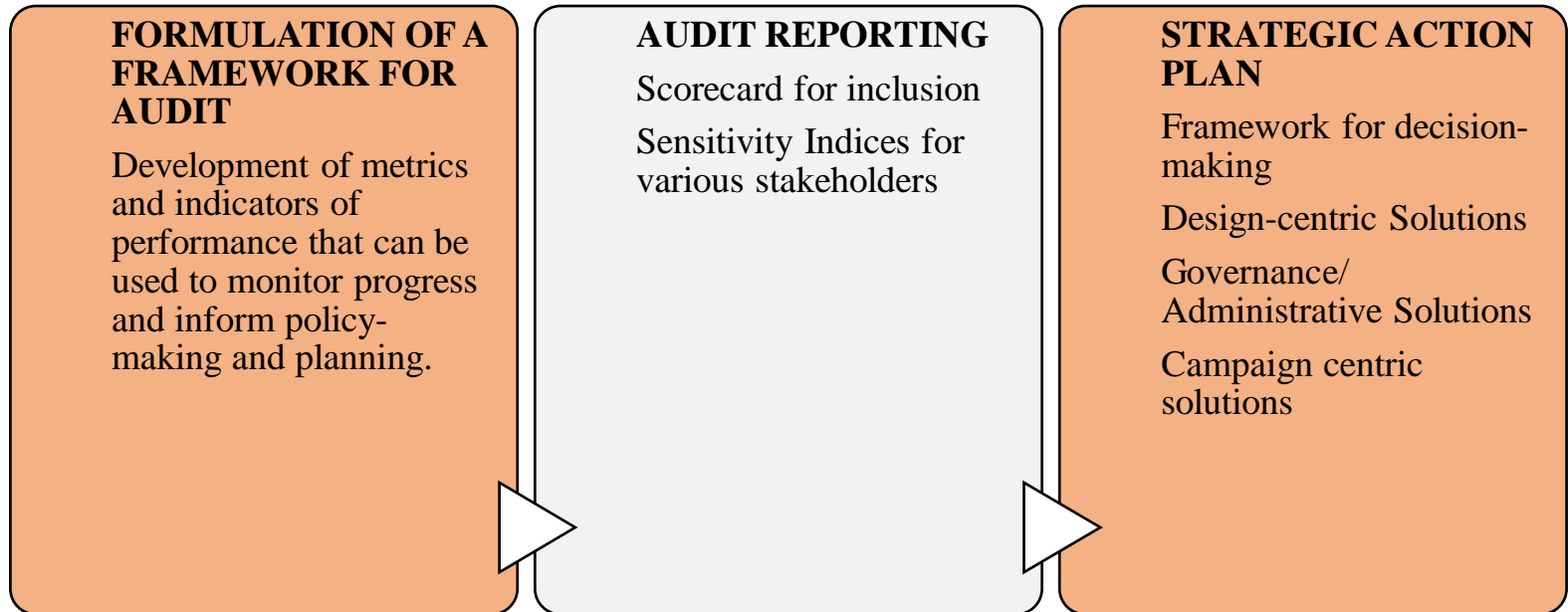
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# Social inclusion toolkit

| AIM                     | HOW TO ACHIEVE         |  |
|-------------------------|------------------------|--|
| What we want            | Vision                 | Socially Inclusive Transport system    |
| What we have            | Inventories Assessment | <b>Need to conduct an audit</b>        |
| How to get what we want | Strategic Plan         | Formulate Goals, Objective and Actions |
| How to work             | Implementation Plan    |  |
| How to maintain         | Monitoring Plan        |  |

The structure of the toolkit may be visualized as:



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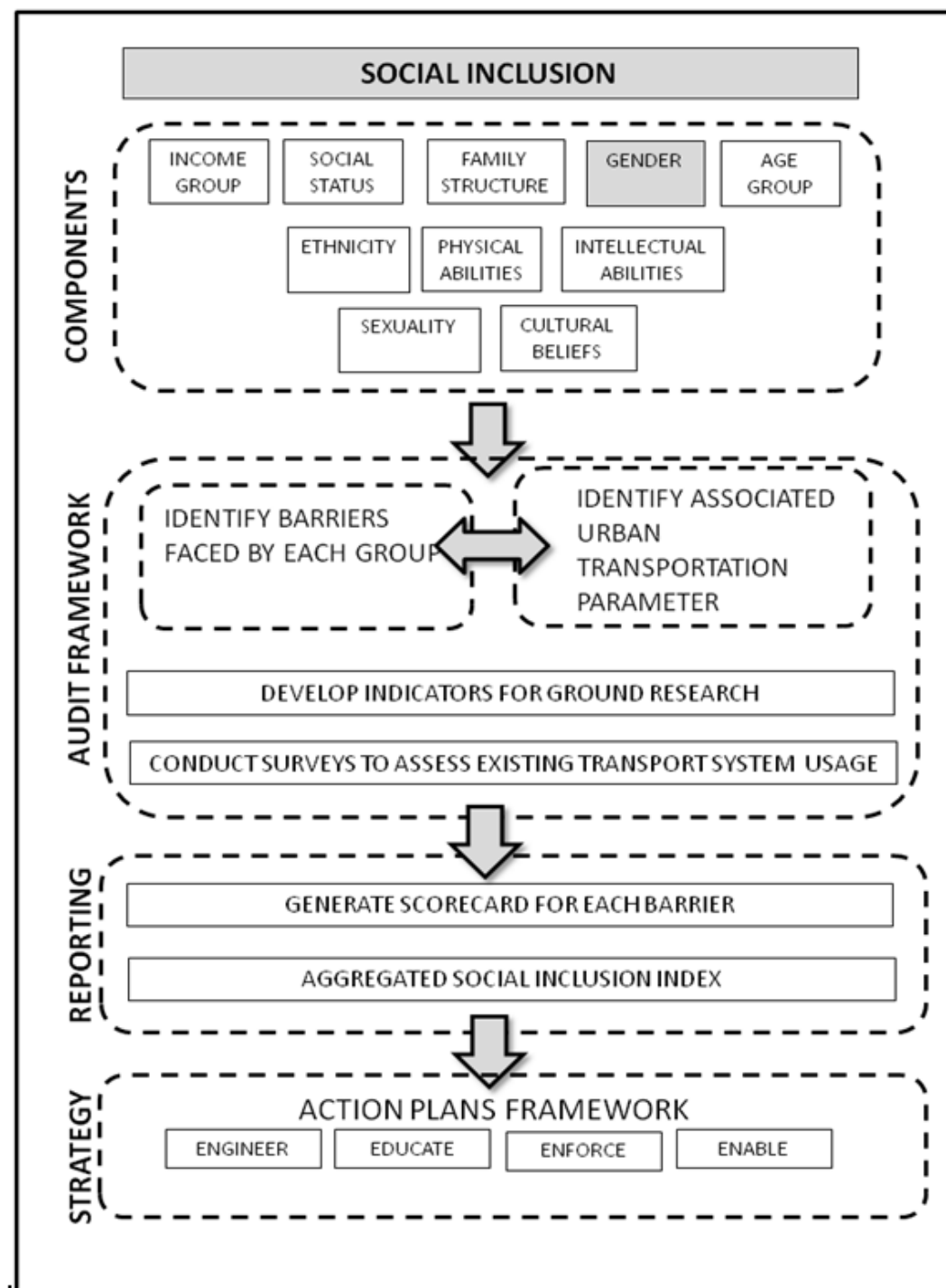
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# Social inclusion toolkit

The action plans fit in the generalized approaches of *Engineer, Educate, Enforce and Enable*.

- The *Engineer Approach* centres around design centric policy solutions including build construct and up gradation initiatives.
- The *Educate approach* will be mainly Campaign centric, such that programmes and campaigns are taken up to create awareness drives to enlighten the citizens and integrate them in the planning process
- The *Enable approach* looks at removing barriers to social inclusion which may stem from cultural, family based or economic issues.
- The *Enforce approach* will be Governance Centric calling for specific revision in policies or introduction of new policies controlled solely by administrative actions



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# Social inclusion toolkit

The social inclusion toolkit conceptualized above is an amalgamation of ten diverse components. For each component, a scorecard may be generated based on the selected indicators and actual conditions in the area. These specific scorecards when aggregated together can become a benchmarking tool for cities or identified zones within cities. It can become a basis for comparison, resource allocation and prioritization of planning projects across cities/zones.

We have,

Comprehensive Social inclusion (CSI) Score=

$$\frac{\sum_{i=1}^r (\text{Component sensitivity score})}{r}$$

Where,

*Component sensitivity score = Score achieved by a particular component in achieving social inclusion; calculated based on survey data on selected indicators*

*r = Total no. Of components included and operationalized in the overall social inclusion toolkit.*



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# GENDER inclusion module

The second part of the paper selects gender Inclusion as a primary target and develops an audit and evaluation module for the same. *This is a sample module which can be followed in principle for other components as well.*

|                                      |  |
|--------------------------------------|--|
| <b>Anand, A, Geetam T., 2006</b>     | Women's ability to contribute to the alleviation of their standard of living and their status in society is severely curtailed by their limited mobility and the constrained accessibility to the transport system of the city                       |
| <b>Kwan MP (1999)</b>                | Women have lower levels of access to urban opportunities than men, suggesting the significance of gender-based differences in domestic responsibilities, as well as unique individual constraints in travel behavior.                                |
| <b>Yael H ,Marianna P,2011</b>       | Women take more trips per day, but travel shorter distances. Women's travel is also characterized by trip chaining. Women travel more during off-peak hours and travel less after dark   |
| <b>Hamilton, Kerry, 2002</b>         | Overcrowding on public transport involves invasion of personal space which many find distressing, and which renders women vulnerable to sexual abuse. Fear of harassment and attack produces high levels of anxiety.                                 |
| <b>Andrew, Caroline, 2000</b>        | planning is one of the ways by which these boundaries imposed on women in the public sphere can be challenged. Examines the use of safety audits as a suitable planning process for the gender cause   |
| <b>Hamilton, Kerry, 2002</b>         | Public Transport Gender Audit  |
| <b>Viswanath, K, Surabhi T, 2007</b> | Jagori, a Delhi based women's rights campaigner conducted a series of safety audits across the city of Delhi during the period August 2005-July 2006.  |
| <b>Duchene, C. ,2011</b>             | Access to different modes of transportation, the cost of transportation, Trip characteristics (modes, frequency, distance, reasons for the trip); and Transportation quality- parameters which impact interactions between gender and transportation |



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# GENDER inclusion module

|                             |  |   |  |   |   |                          |   |
|-----------------------------|--|---|--|---|---|--------------------------|---|
| <b>Basic Question</b>       | <i>Do you travel alone? /<br/>Are you allowed to travel alone?</i> | <i>Is public transport available?</i>         | <i>Is public transport accessible?</i> | <i>How often do you travel by public transport?</i> | <i>Do you feel comfortable in public transport?</i> | <i>Do you feel safe?</i> | <i>Can you afford using public transport regularly?</i> |
| <b>Parameter identified</b> | Psychosocial barriers  | Infrastructure/<br>Mass transit accessibility | Ease of access                         | Usage pattern                                       | comfort   | Safety & security        | Economic s  |

## Identification of basic parameters for Gender Sensitivity score



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# GENDER inclusion module

| <b>PSYCHOSOCIAL BARRIERS</b> | <b>EASE OF ACCESS</b>                | <b>SAFETY AND SECURITY</b>         |
|------------------------------|--------------------------------------|------------------------------------|
| Social restrictions          | Waiting time at transit stop         | Driving at day/night               |
| Accompanied travel           | Mode/line changes required           | Walking on road                    |
| Police vigilance             | Routes available by bus              | Using bus/metro                    |
| Public vigilance             | Routes available by metro            | Using mass transit at night        |
| <b>INFRASTRUCTURE</b>        | Convenience of finding auto          | Using foot over bridge             |
| Footpaths                    | Distance to bus/metro stop from home | Using subways                      |
| Foot over bridge             | Distance to auto stand from home     | Crossing the road (level)          |
| Subways                      | <b>USAGE PATTERN</b>                 | Using public toilets               |
| Streetlights                 | Trip rate by women                   | At mass transit stop               |
| Street furniture             | <b>COMFORT</b>                       | In crowded streets                 |
| Toilets                      | Comfort levels in public bus         | In crowded bus/metro               |
| Ramps                        | Comfort levels in metro              | In empty streets                   |
| Weather shelters             | Comfort levels in auto               | In empty bus/metro                 |
| Signages                     | <b>ECONOMICS</b>                     | Walking towards bus/metro stop     |
| Parking lots                 | Bus/metro fare                       | Walking towards auto stand         |
| Electronic vigilance system  | Auto rickshaw fare                   | With co passengers in mass transit |
|                              | Vehicle ownership                    | Dealing with auto rickshaw drivers |
|                              | Average income of user groups        | Using parking lots(surface)        |
|                              |                                      | Using basement parking lots        |

# STUDY OF PARAMETERS

| Study Indicators         |                                  |                                 |  |                                  |
|--------------------------|----------------------------------|---------------------------------|--|----------------------------------|
| ECONOMICS                | LOCATION                         | ACCESSIBILITY                   | SAFETY PERCEPTION                            | INFRASTRUCTURE                   |
| Travel fare              | Distance to transportation node  | Waiting time                    | Night travel                                 | Footpath                         |
| Vehicle ownership        |                                  | Mode change                     | Footpath use                                 | Streetlighting                   |
| Average Household income | Average distance to destinations | Route to destination            | Mass transit use at night                    | Foot-over Bridge                 |
|                          |                                  | Trip rate                       | Road crossing                                | Toilets                          |
|                          | Frequency of travel              | Last-mile connectivity          | Public toilet use                            | Ramps                            |
|                          |                                  | Distance to transportation node | Walk / Last-mile connectivity to destination | Weather Shelters                 |
|                          | Time taken for travel            | Frequency of public transport   | Crowded Transit                              | Signages                         |
|                          |                                  | Time of travel                  | Crowded Street                               | Parking Lots                     |
|                          |                                  |                                 | Parking lot use With co-passengers           | Waiting zones/ seating           |
|                          |                                  |                                 | Travel comfort                               | Level Crossing                   |
|                          |                                  |                                 |  | Drinking water & basic amenities |
|                          |                                  |                                 |  | Electronic Vigilance             |
|                          |                                  |                                 |  | Seat Availability                |
|                          |                                  |                                 |  | Maintenance                      |
|                          |                                  |                                 |  | Barrier free design              |

## DATA COLLECTION SOURCES

|   |  |                                       |
|---|--|---------------------------------------|
| User Feedback and Perception Based System | Infrastructure Safety Perception Accessibility | Crowdsourcing App or Feedback devices |
| Survey based                              | Infrastructure Economics                       | Operators of Transport systems        |
| Mapping based                             | Location Connectivity                          | Operators of Transport systems        |



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# GENDER inclusion module

## Basis for satisfaction scores for selected attributes

| Survey Conducted                    | Parameter              | Indicator  | Scoring Scale        |               |
|-------------------------------------|------------------------|--|----------------------|---------------|
| Satisfaction survey                 | Infrastructure         | All  | Extremely Satisfied  | 5             |
|                                     | Comfort                | All  | Very Satisfied       | 4             |
|                                     | Safety                 | All  |                      | Satisfied     |
|                                     | Economic               | Bus/metro/auto fare  | Moderately Satisfied |               |
|                                     | Psychosocial barrier   | Police/ public vigilance   |                      | Not satisfied |
|                                     | Ease of Access         | Route Availability   |                      |               |
| Vehicular Ownership pattern study   | Economic               | Vehicle ownership  | 0-20%                | 1             |
|                                     |                        |  | 20-40%               | 2             |
|                                     |                        |  | 40-60%               | 3             |
|                                     |                        |  | 60-80%               | 4             |
|                                     |                        |  | 80-100%              | 5             |
| Yes/ No Pattern                     | Psycho-social Barriers | Social restrictions<br>Accompanied travel  | 0-20%                | 1             |
|                                     |                        |  | 20-40%               | 2             |
|                                     |                        |  | 40-60%               | 3             |
|                                     |                        |  | 60-80%               | 4             |
|                                     |                        |  | 80-100%              | 5             |
| Waiting time data from survey       | Ease of Access         | Average waiting time at transit stop   | > 15 mins            | 1             |
|                                     |                        |  | 10-15 mins           | 2             |
|                                     |                        |  | 5-10 mins            | 3             |
|                                     |                        |  | 2-5 mins             | 4             |
|                                     |                        |  | 0-2 mins             | 5             |
| Mode change data from survey        | Ease of Access         | Number of mode/ line changes to reach final destination (including last mile connectivity) | > 3 changes          | 1             |
|                                     |                        |  | 3 changes            | 2             |
|                                     |                        |  | 2 changes            | 3             |
|                                     |                        |  | 1 change             | 4             |
|                                     |                        |  | None                 | 5             |
| Mass transit – Accessibility survey | Ease of Access         | Distance to transit stop from home (km)<br>(A=Actual;<br>D=Desired)                        | A ≤ D                | 5             |
|                                     |                        |  | A-D < 1              | 3.75          |
|                                     |                        |  | 1 < A-D < 2          | 2.5           |
|                                     |                        |  | A-D > 2              | 1.25          |



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# GENDER inclusion module

*The Gender sensitivity Score (GSS) is devised as a measure which would reflect how close a city system is towards fulfilling the objectives of gender inclusiveness.*

$$\text{GSS}^3 = \text{Gender sensitivity score} = \frac{(\sum_{i=1}^n (W_i \times C_i))}{n}$$

*Where*  
*W<sub>i</sub>* = weightage of the attribute  
*C<sub>i</sub>* = satisfaction score for the attribute based on User perception surveys in the city calculated as per scales mentioned  
*N* = no. of attributes selected for study

➤ In a pilot survey conducted as a part of our ongoing work on Gender sensitivity scorecard for Hyderabad city, Users were asked to rate the importance of these factors on a scale of 1 to 5.

➤ It was found that users' response was ineffective in deciding the weightage for the critical factors

➤ Users' indecisiveness may be attributed to the fact that these are factors which affect each user in a different manner. Responses are greatly swayed by their experiences and expectations from the city transport system

➤ Rank order method in order to rate the importance of the factors under consideration. Under this method, the respondents were asked to rank their choices. The total ranks received by the factors were then transformed into numerical weightages using a defined scale.



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# GENDER inclusion module

*The Gender sensitivity score and its parameters can be used to devise a detailed action plan where key actions are listed based on the indicators.*

## Action Plan for Implementation of toolkit

| Parameter              | Indicators   | Key Actions based on sensitivity score (weightage x satisfaction)  | Data Sources/ Reporting Mechanisms  |
|------------------------|--|--|---|
| Infra-structure        | <ol style="list-style-type: none"> <li>1. Footpaths</li> <li>2. Footover Bridge</li> <li>3. Subways</li> <li>4. Streetlights</li> <li>5. Street Furniture</li> <li>6. Toilets</li> <li>7. Ramps</li> <li>8. Weather shelters</li> <li>9. Signages</li> <li>10. Parking lots</li> <li>11. Electronic vigilance</li> </ol> | <ol style="list-style-type: none"> <li>1. <b>Engineer</b>- Zone-wise mapping of defunct physical infrastructure</li> <li>2. <b>Engineer</b>-Proposals for restoration and fixing of infrastructure.</li> <li>3. <b>Engineer</b>-Mapping of zones without basic infrastructure amenities as per survey inputs</li> <li>4. <b>Engineer</b>-Proposal for new amenities in localities where absent</li> <li>5. <b>Enable</b> / <b>Engineer</b>-Develop financing mechanism for project</li> <li>6. <b>Engineer</b>-Planning for an Intelligent Transport System</li> </ol> | <p>Pilot routes and survey users</p> <p>Survey of Public perception of urban transport &amp; services</p> <p>Data on existing infra</p> |
| Psycho-social barriers | <ol style="list-style-type: none"> <li>1. Social restrictions</li> <li>2. Accompanied- Travel</li> <li>3. Public Vigilance</li> </ol>  | <ol style="list-style-type: none"> <li>1. <b>Educate</b>- Run campaigns to create awareness amongst general public and incorporate confidence-building measures</li> <li>2. <b>Enable</b>- Conduct neighbourhood audits together with the public</li> </ol>  | <p>Identify zones with less women capacity assessing public transport.</p> <p>Refer to project and progress reports</p>                 |
|                        | <ol style="list-style-type: none"> <li>4. Police vigilance</li> </ol>  | <ol style="list-style-type: none"> <li>1. <b>Educate</b>-Training for gender sensitivity / special attention to single female traveler.</li> </ol>   | <p>Existing crime reports</p>   |



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# GENDER inclusion module

*The Gender sensitivity score and its parameters can be used to devise a detailed action plan where key actions are listed based on the indicators.*

## Contd. Action Plan for Implementation of toolkit

| Parameter      | Indicators  | Key Actions based on sensitivity score (weightage x satisfaction)   | Data Sources/ Reporting Mechanisms                        |
|----------------|---|---|---|
| Ease of Access | <ol style="list-style-type: none"> <li>1. Waiting time at transit stop</li> <li>2. Mode change required</li> <li>3. Trip rate</li> </ol>  | <ol style="list-style-type: none"> <li>1. <b>Enable</b>-Plan for improvisation of accessibility and frequency of travel based on footfall calculations</li> <li>2. <b>Enable</b>-Propose for alternative</li> </ol>                                     | Pilot routes and physical mapping.                        |
|                | <ol style="list-style-type: none"> <li>1. Route available by bus</li> <li>2. Route available by metro</li> <li>3. Convenience of finding auto</li> <li>4. Distance to bus/ metro stop from home</li> <li>5. Distance to auto-stand from home</li> </ol> | routes wherever possible relying on traffic flow data and financing mechanism   | Pilot routes and survey users<br>Cordon surveys           |
| Economics      | <ol style="list-style-type: none"> <li>1. Comfort in public bus</li> <li>2. Comfort in metro</li> <li>3. Comfort in auto</li> </ol>   | <ol style="list-style-type: none"> <li>1. <b>Enable</b>-Identify zones and criteria causing discomfort (evaluate social causes or physical infra)</li> <li>2. <b>Enable</b>-Base plan on inputs and suggestions from users</li> </ol>                   | Survey of Public perception of urban transport & services |
|                | <ol style="list-style-type: none"> <li>1. Bus/ metro fare</li> <li>2. <u>Autorickshaw fare</u></li> <li>3. Vehicle ownership</li> <li>4. Average income of user group</li> </ol>  | <ol style="list-style-type: none"> <li>1. <b>Enable</b>-<u>Analyse</u> trends based on relationship between income, fare, method of transport and distance travelled.</li> <li>2. <b>Enable</b>-Propose for innovative methods for financing</li> </ol> | Survey of Public perception of urban transport & services |



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# CONCLUSIONS

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## **Operationalising the toolkit on a digital platform**

The GSS is one of the modules of the proposed social inclusion toolkits. A similar format may be used to develop indicators and indices for all other components of social inclusion. Such an exercise is possible only on a digital platform where data regarding all the components can be fed in to generate comprehensive results for policy making.

Further, the concept of the toolkit is feasible at the micro/ neighbourhood level, but larger areas and metropolitan regions require large datasets and uniformity across all density zones. Physical mapping and household / cordon survey can be a seemingly massive task. This task can be simplified by the use of crowd-sourcing techniques in data collection. One way of making this feasible is by an application that gathers inputs from smart-phone users accessing the websites of the local authorities.

Such a digital platform can be of immense use to urban local governments as the toolkit takes them one step closer towards the goal of social inclusion in urban transportation systems.

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## **CHALLENGES**

- Limited to the conceptual development of a framework for inclusive transportation systems.
- The analytical modeling of data and making predictions through analytics are open to further research.



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# SOCIAL INCLUSION TOOLKIT FOR URBAN TRANSPORTATION

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