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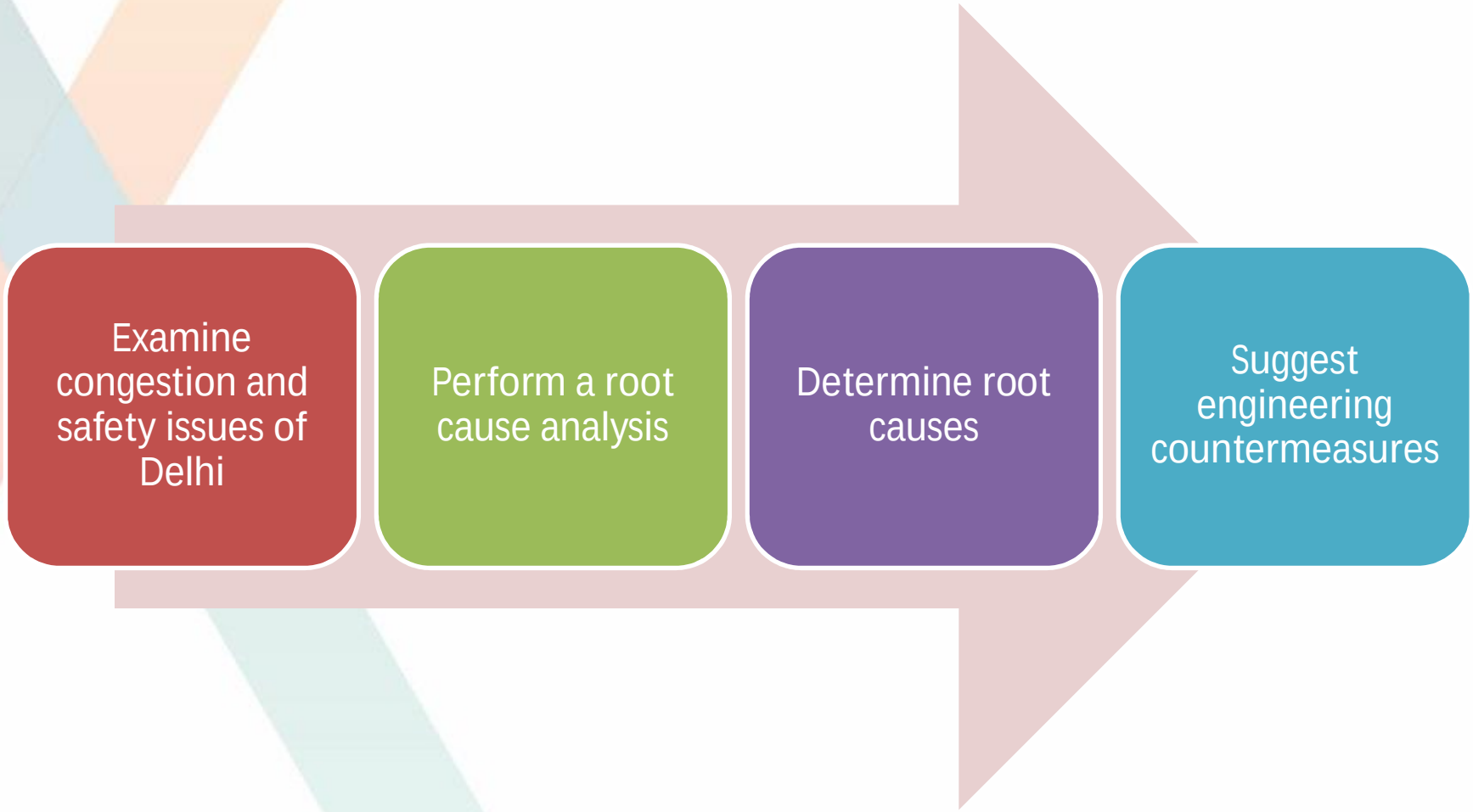
Urban network congestion and road safety issues in Delhi: A Root Cause Analysis

Dibyendu Sengupta & Dr. P.K. Sikdar
Traffic/Road Safety Specialist
ICT Pvt Ltd
d_Sengupta@yahoo.com

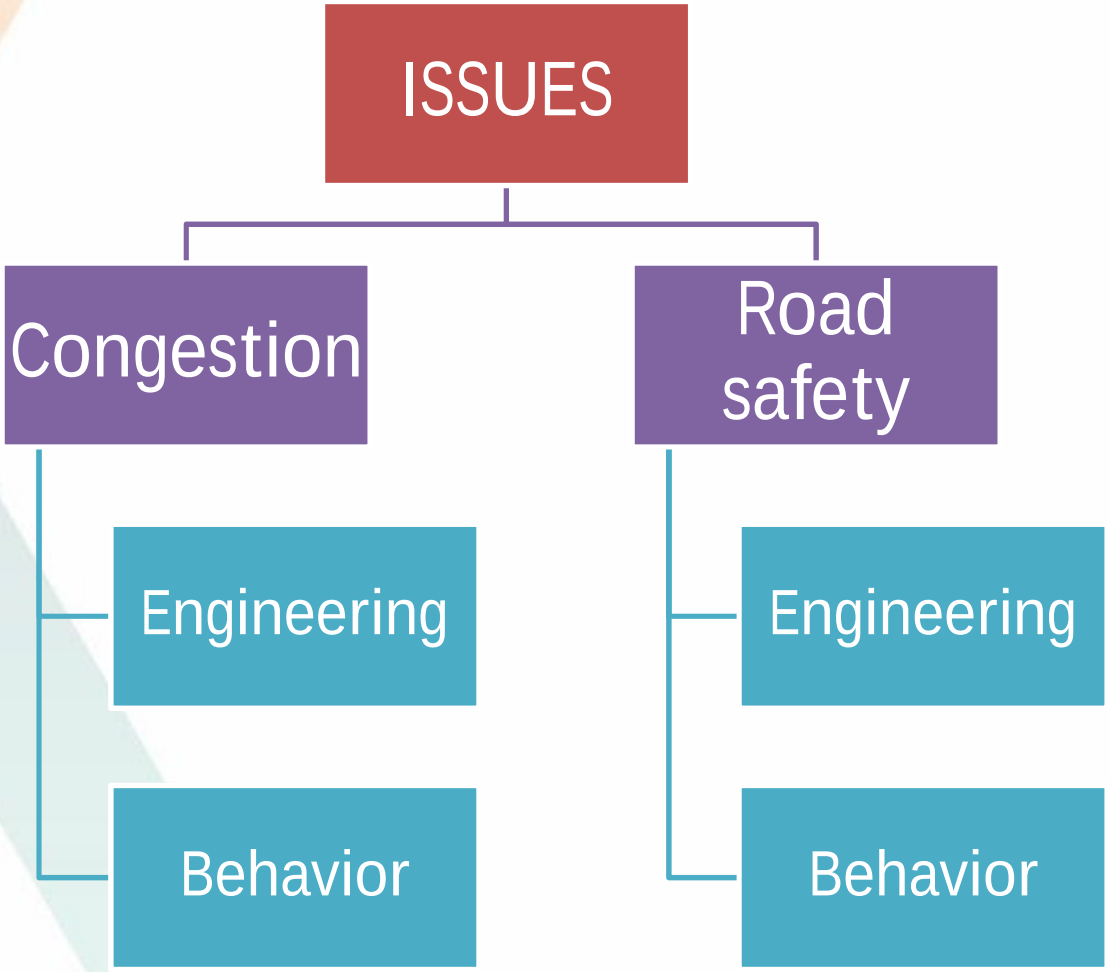
Agenda

- Transport Issues of Delhi
- Root Cause Analysis framework
- Root Cause Identification
- Solutions
- Final Recommendations

Methodology



Transport Issues of Delhi



Transport Issues of Delhi (cont'd)

- Engineering issues
  - Traffic signal related issues
  - Junction geometry design
  - Encroachment from construction activities
  - Access issues due to grade-separation
  - Encroached and unusable NMT and pedestrian facilities
  - Poor bus bay infrastructure and

Source: The Hindu

Transport Issues of Delhi (cont'd)

- Behavior issues
  - Speed differentials between high-speed and low-speed/NMT/2-3
  - Violations at junctions
  - Turning movement, Signal, Lane usage and Priority
  - Mid-block pedestrian violations or jaywalking
  - Violations and unruly behavior of two-wheelers
  - Erratic parking
  - Bus violations

Root Cause Analysis

- 5 Whys technique
  - Business troubleshooting, quality improvement and problem solving
  - No data segmentation, hypothesis testing, regression or other advanced statistics

- DMAIC (Define, Measure, Analyze, Improve, Control)

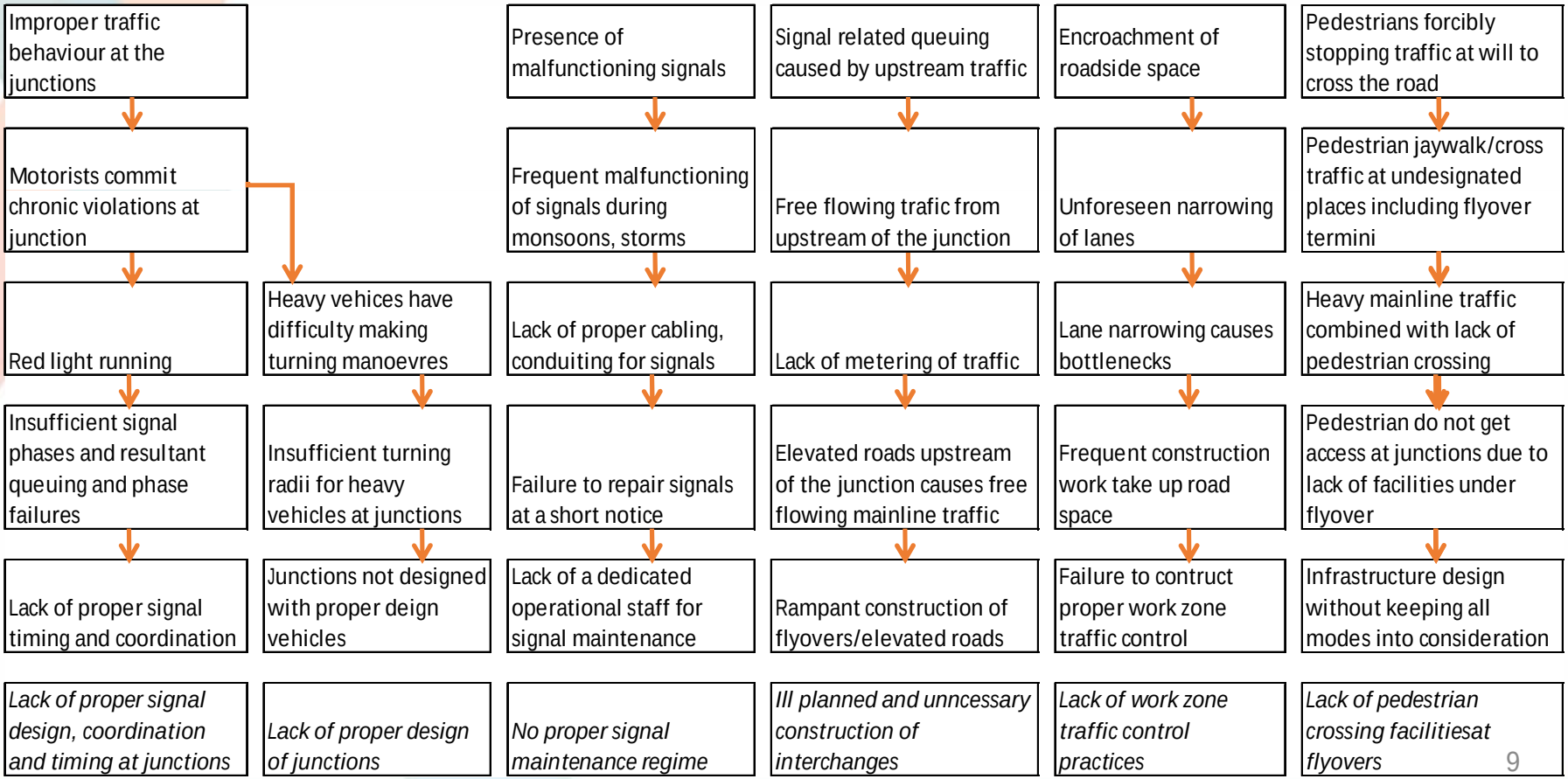
- Why this technique?
  - When problems involve human factors or interactions
  - Transport problems discussed have human factors – behavioral issues, enforcement etc
  - Effects on everyday user are symptoms of hidden issues
  - Revealed by intuitive and critical thinking

Root Cause Analysis (cont'd)

- 3 basic issues
  - Congestion and chaotic traffic behavior at junctions
  - Congestion and bottleneck of traffic on road stretches between junctions
  - High accident and resultant fatalities on roads

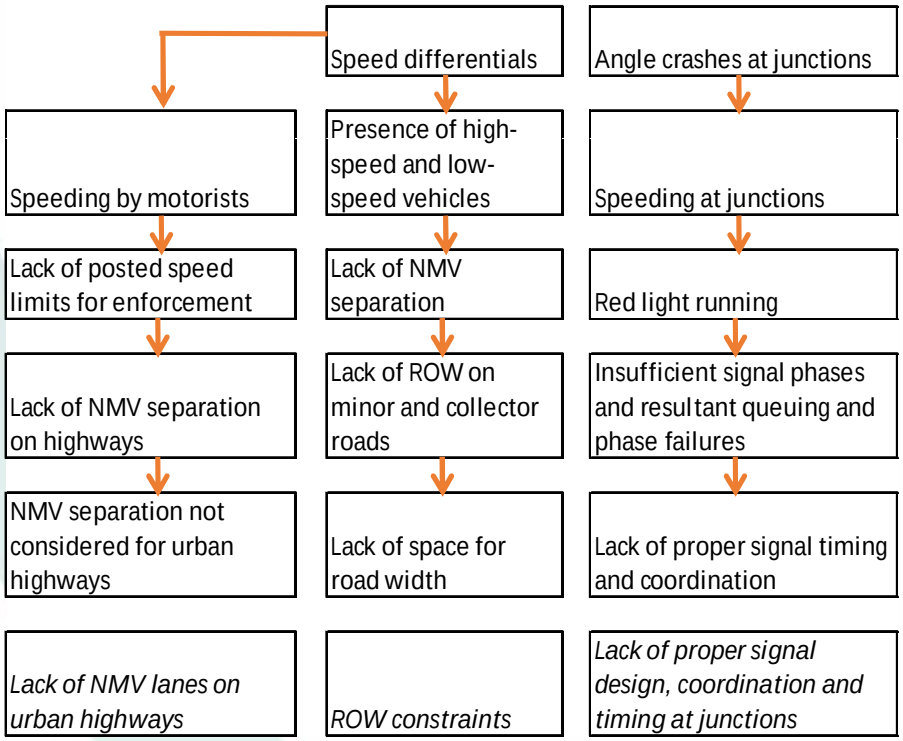
Root Cause Analysis (cont'd)

- Congestion

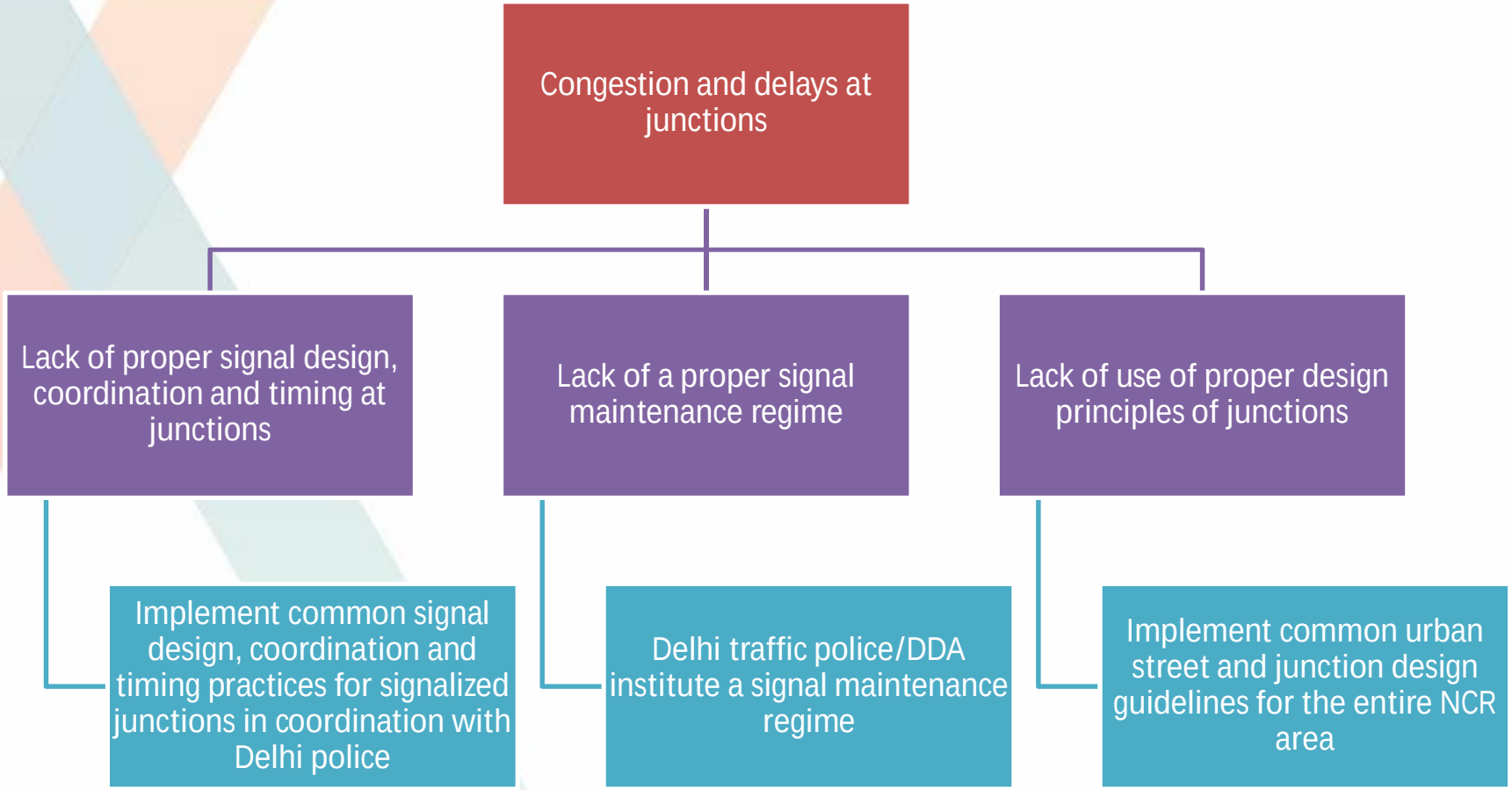


Root Cause Analysis (cont'd)

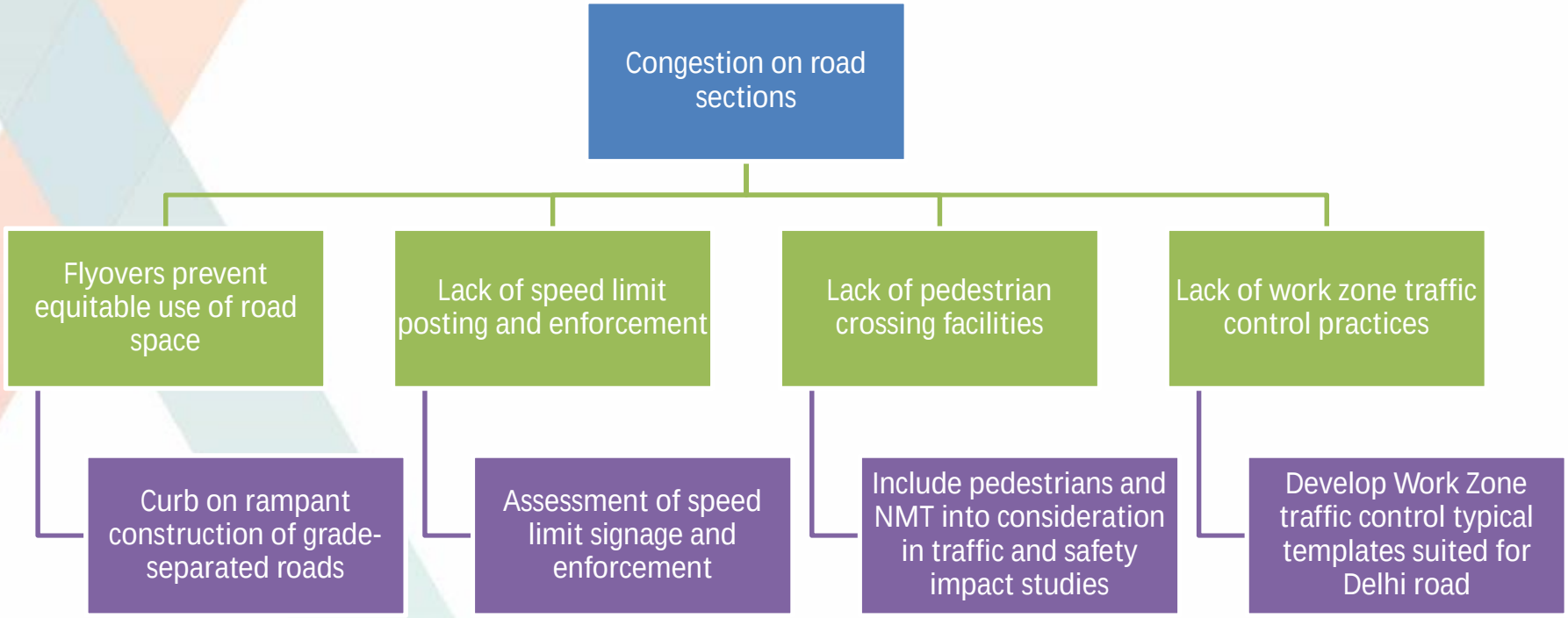
- Safety



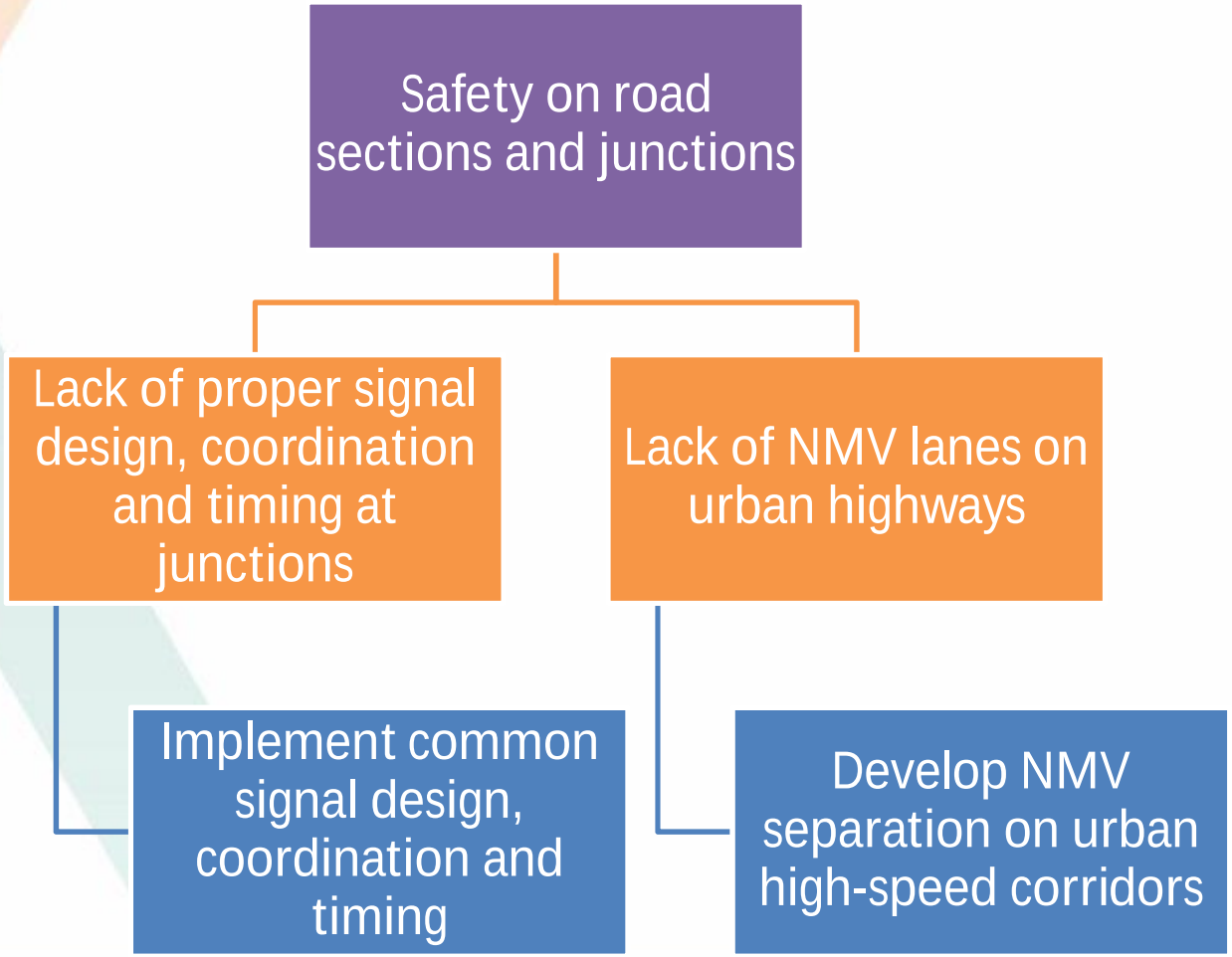
Framework Analysis



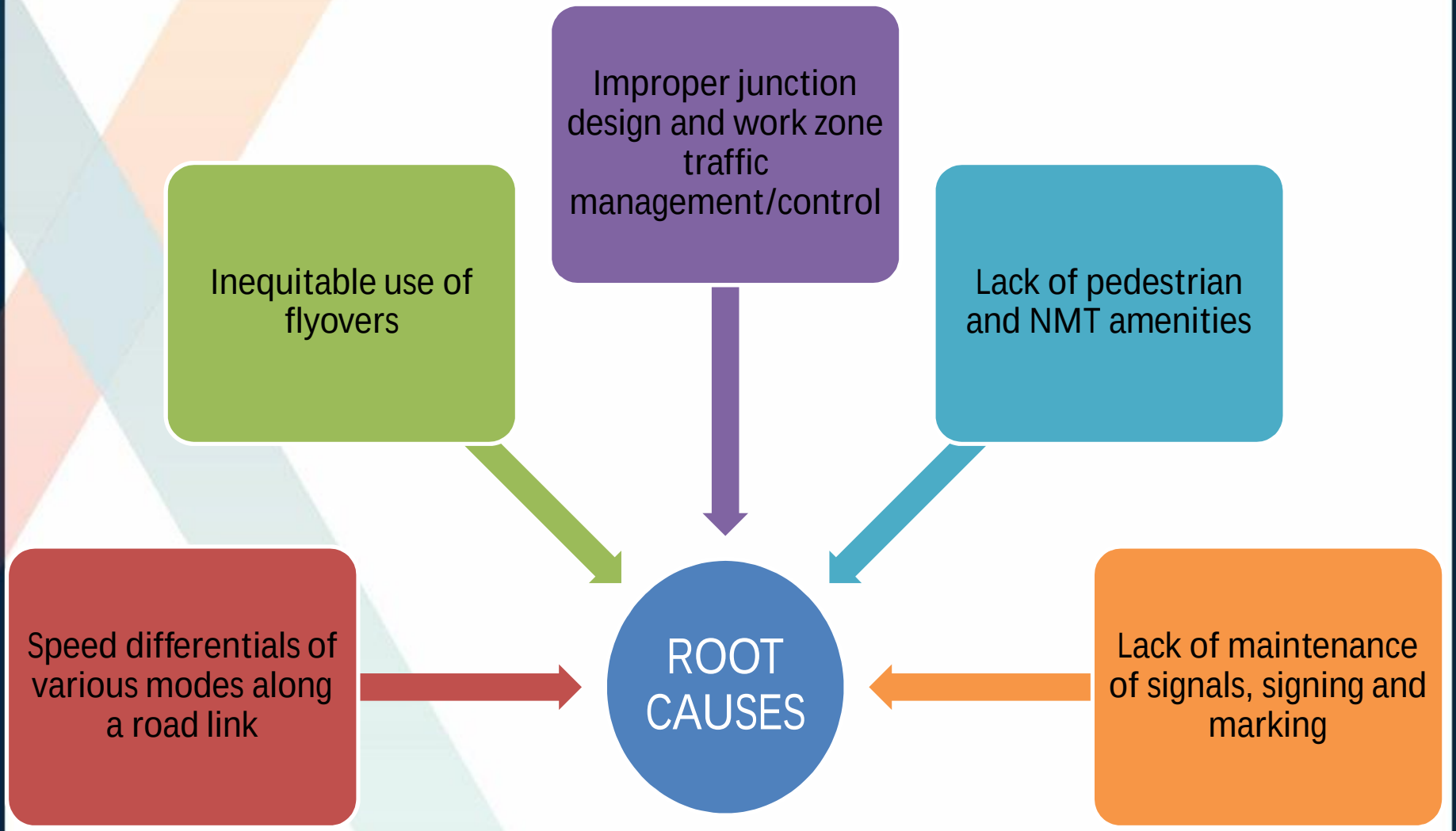
Framework Analysis (cont'd)



Framework Analysis (cont'd)



Findings


Improper junction design and work zone traffic management/control
Inequitable use of flyovers
Lack of pedestrian and NMT amenities
Speed differentials of various modes along a road link
ROOT CAUSES
Lack of maintenance of signals, signing and marking

Findings – Speed Differentials

- Speed differentials
  - Known cause in congestion and road accidents.
  - Removal of speed differentials has a high potential of crash reduction

- Implementation:
  - Corridors of Delhi with several flyovers – Ring Road and Outer Ring Road are good candidates
  - Eliminate slow-moving and NMT vehicles
  - Flyovers
    - Devise better pedestrian, cyclist and NMT access in the signalized junction under the flyovers.
    - Signalized junctions under the flyovers would be used by slow moving traffic for all movements (including the through movements) and high-speed traffic for turning movements.
  - On high-speed corridors
    - NMV separation to separate two/three-wheelers and other slow-moving vehicles, with signage

Findings – Pedestrians and Cyclists

- Current scenario
  - Signalized junctions below flyovers suffer from congestion, vehicle queuing and difficulties for pedestrians and NMT
  - Construction of flyovers causes plenty of access management issues to pedestrians and NMT transport

- Recommendation:
  - Signalized junctions below flyovers be given better pedestrian and NMT facilities including signal phases
  - The area below the bridge can be utilized as pedestrian refuge
  - If needed, pedestrian phases could be split to accommodate the different turning movements

Findings – Grade Separation

- Current scenario
  - Construction of flyovers produce pockets of improvement and done nothing to improve the overall traffic situation
  - given rise to higher private vehicle ownership and resulted in slow moving vehicles and NMT getting penalized with restrictions and hazards

- Recommendation:
  - Detailed traffic studies be undertaken, taking into consideration the modal share of the city
  - Adequate consideration for pedestrians and NMT at the specific locations

Findings – Work Zone traffic

- Current scenario
  - Constant construction activities for the past two decades – metro expansion and other works of Corporation/DDA
  - Congestion due
    - Road constrictions, sudden diversions and restrictions to movement

- Recommendation:
  - Following proper work zone control engineering measures
    - Signing and marking, advance warning signs, buffer zones and pedestrian control measures with the use of traffic control devices like DMS
  - Prior information about diversion
    - Affected areas, stakeholders

Findings – Speed Limits

- Current scenario
  - Pockets of areas with speed limit posting
  - Rare enforcement – no correlation of enforcement with posting

- Recommendation:
  - Install speed limit posting on all except residential roads
  - Supplemented by regular enforcement on violations for speeding

Findings – Signal O & M

- Current scenario
  - signal maintenance is outsourced to companies and often malfunctioning signals are unchecked and unresolved for days and weeks.
- Recommendation:
  - Institutionalize traffic signal O&M

Countermeasures

- Speed differentials
- Pedestrian and NMT accommodation at flyovers
- Curb on flyover construction
- Work zone traffic control
- Speed Limit
- Junction and Signal design
- Signal Operation and Maintenance System

Q & A