

# WALK THE TALK ON THE MAINSTREAMING OF NON-MOTORISED TRANSPORT IN SOUTH AFRICA

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## ABSTRACT

In South Africa, the integration of Non-Motorised Transport (NMT) facilities into spatial development and the streetscape has not yet received sufficient attention by the different spheres of government and their implementation agencies. Therefore, urban development and structure has significant deficiency with regard to the provision and quality of NMT infrastructure, facilities and services. As a further consequence, NMT users are at risk using the road network and pedestrian and cyclist fatalities, leading to a major proportion of the road casualties in South African cities, towns and villages. The authors' point of view is that the 'rhetorical' paradigm shift in the planning, implementation and operation of NMT-relevant infrastructure needs to be revolutionised. This is necessary to effect rapid change of the status quo in South Africa by practicably mobilise the proverbial "walk the talk". Various international examples of good practice exist where conceptual thinking and renewed focus on the needs of NMT users have led to a paradigm shift in major cities with regard to NMT policy formation and infrastructure provision; and in the process creating more friendly NMT environments. This includes design concepts that can assist in NMT and public transport implementation opportunities such as 'Universal Design', 'Complete Streets', 'Road Diets', 'Modal Hierarchy', 'Last Mile', 'Liveable Communities', 'Walkability Indices and Greenways, amongst others. The paper covers the various concepts; and show how they may assist in reshaping planning and implementation strategies, policies and operational frameworks in South Africa over the short-, medium- and long term. NMT is formally recognised as an independent and primary transport mode in transport planning circles, but it also serves as feeder system to public transport services. The paper highlights the different opportunities that currently exist in South Africa to include and integrate NMT conceptual thinking into transport planning practice. Firstly, this includes the current process of implementing BRT systems and optimally linking the surrounding communities to these routes. Secondly, the need exist to provide much needed and well-designed NMT feeder systems from communities to other existing public transport operations including municipal bus, rail, Gautrain, BRT, future light rail and minibus taxi operations. Thirdly, the Strategic Land Transport Frameworks, e.g. Integrated Rapid Public Transport Network and Integrated Development Plans are to be updated on a five yearly cycle. Fourthly, NMT infrastructure still needs to be provided in many instances where NMT serves as a primary transport mode between destinations. The paper concludes that the above-mentioned transport planning processes and planning documents must reflect and support the NMT-relevant conceptual thinking that will embrace Universal Design and Complete Streets principles to its fullest practicable extent with particular reference to integration with IRPTN 2030 planning. In addition, the institutional and financial means to implement, monitor and evaluate the implementation of these concepts are considered as an essential and integral component of the process.

# 1. INTRODUCTION

## 1.1. Status quo: Challenges facing NMT users in the road environment

The challenges NMT users experience in the road environment in South African cities can be summarised as follows:

- The NMT road environment is inadequate, lacking infrastructure to provide safe passage of roads or moving alongside roads. Generally, there is limited or no space for cyclists on the road network.
- NMT infrastructure is not continuous. Many examples exist where networks are incomplete, leaving pedestrians and cyclists stranded along roads.
- Transport and land use planning processes do not always take NMT user needs into account, and more often than not, give priority to the needs of private car users.
- Funding is limited to provide for and to maintain NMT infrastructure.
- Crossing of freeways, urban arterials and major road junctions present major challenges to NMT road users, predominantly pedestrians and cyclists.
- Intermodal transport planning practices are deficient, particularly with regard to NMT infrastructure at, or in the vicinity of, public transport facilities, including railway crossing facilities.
- Many NMT users sense a lack of security in the road environment, because of inadequate street lighting on roads, in subways or footbridges; and poor vegetation management.
- NMT infrastructure is poorly maintained, making it inconvenient to use.
- Universal Design principles are generally not applied, and consequently disabled users, elderly pedestrians and children find it difficult to freely move around within the road environment.

Although a lack of facilities deters cycling, cycling also does not have high status among a large segment of the population, and this perception needs to be changed. The challenge, however, is not only about the provision and maintenance of accessible, convenient and safe NMT infrastructure.

As traffic volumes and traffic density increase NMT users find it more difficult to cross roads and to share the road; and as a result higher number of NMT casualties is experienced on the road network. The Road Traffic Management Corporation (RTMC) reported that currently pedestrians account for just below 40 per cent of all road fatalities in South Africa (RTMC, 2013). Although at a lower casualty rate than pedestrians, it is often reported in the press that a cyclist was killed or injured in traffic. The Automobile Association of South Africa indicated that in 2010, 252 cyclists were killed on the road network and an estimated 800 more injured (<http://www.aa.co.za/about/press-room/commentary/aa-vulnerable-road-user-project-handover-2014.html>).

## 1.2. Changing the paradigm

The authors suggest that a 'rhetorical' paradigm shift is required in the planning, implementation and operation of NMT-relevant infrastructure. A paradigm refers to the basic assumptions used to define a problem and to evaluate solutions; a shift in the paradigm would force practitioners to examine their basic assumptions and analysis methods (Lipman, 2013).

Many road authorities do not consider NMT as an actual mode of transport and thus do not consider it in determining expenditure frameworks and allocating the necessary funding and technical resources to address the challenge. Although some pockets of excellence do exist, generally there seems to be a lack of fundamental thinking in addressing the NMT infrastructure issue properly in transport and land-use planning and development planning practices. In some instances, NMT is part of the initial planning process but it is often the first item to be cut because of budgetary constraints. This paper highlights ways in which this paradigm shift could be brought about, such as:

- Revisit the current transport planning thinking and process among transport planners, developers and officials in South Africa, through:
  - Prioritise NMT user needs in transportation planning, then provide for public transport and lastly accommodate the private car – the *Modal Hierarchy* concept;
  - Redesign roads and streets to accommodate all road users – the *Complete Streets* concept;
  - Entrench these principles in institutionalised planning processes;
  - Focus on the needs of NMT users at public transport facilities and new developments.
- Use the current opportunities and initiatives in public transport provision in South Africa to expand NMT infrastructure, such as:
  - Along BRT systems and BRT catchment areas;
  - Gautrain network and its envisaged extensions;
  - PRASA infrastructure expansion programmes (including station upgrades);
  - Scheduled bus services and minibus taxi routes;
  - Business centres.

## 2. **INTERNATIONAL GOOD PRACTICE TO ENHANCE NMT ENVIRONMENTS IN CITIES**

### 2.1. Introduction

Examples of NMT practices and conceptual thinking to change the urban NMT environment exist in many major American and Europe cities and also in South America in cities such as Santiago, Bogota and Curitiba. In many instances, this has led to greater dedication and diligence in addressing backlogs and establishing comprehensive NMT infrastructure through *context sensitive solutions*. Some of these concepts are not new in South Africa, such as traffic calming, pedestrianisation of city centres, pedestrian and transit malls, accessibility measures, and Dignified Places. More recent international thinking includes concepts such as Universal Design, Complete Streets, Road Diets, Modal Hierarchy, Last Mile/First Mile, Liveable Communities, Walkability Indices, and Greenways, amongst others. These concepts should be evaluated to understand which ones could assist in reshaping current planning and implementation strategies, policies and operational frameworks in South Africa to effect the mainstreaming of NMT facilities and services provision.

## 2.2. Liveable Communities

Donald Appleyard was the pioneer in advocating that the urban road environment should be more susceptible to the needs of all users of the road environment (Appleyard, 1981). In 1981, he compared three streets of similar morphology in San Francisco, which each had different levels of car traffic per day: 2,000; 8,000 and 16,000 vehicles. His research demonstrated that residents of the street with low volumes had three times more friends than those living on the street with high volumes. The question is how should the current road hierarchy in South Africa be reshaped in order to reduce traffic volumes on lower order streets and make them more NMT friendly? Collarte states that the European *Woonerf* concept - which views the street as a social space, rather than just a channel for vehicular mobility - is becoming increasingly popular in many parts of the world (Collarte, 2012). Also in South Africa, the concept has already find implementation opportunities. Instead of remaining an artery for the usual flow of traffic, Lower Main Road in Observatory and Salt River is being transformed into a car-free meeting place for residents (<http://rideyourcity.wordpress.com/tag/woonerf/>).

## 2.3. Walkability

Abley defines walkability as the extent to which the built environment is walking friendly. This enables the opportunity for a subjective or qualitative assessment against specific criteria. These criteria may be characteristics such as the "5 C's" i.e. connected, convivial, conspicuous, comfortable and convenient, or other criteria specific to a particular (Abley, 2005). Factors affecting walkability include: street connectivity; land use mix; residential density (residential units per area of residential use); the presence of trees and vegetation; frequency and variety of buildings, entrances and other sensations along street frontages, "transparency" which includes amount of glass in windows and doors, as well as orientation and proximity of homes and buildings to watch over the street; plenty of places to go to near the majority of homes; place making, street designs that work for people, not just cars and retail floor area ratio. The Federal Highway Administration's Bicycle and Pedestrian Program (FHWA, 2013) provides a Walkability Checklist to assist communities in rating the walkability of their residential neighbourhoods. The Western Australian Walkability Audit is another good example of a tool for use by officials, consultants and community groups to identify issues to improve pedestrian safety, accessibility and amenity, identify appropriate countermeasures, and document the findings of the situation in an audit report to develop action plans for implementation by the local municipality (Western Australia Department of Transport, 2011). The Walkability Audit Tool consists of 7 checklists that are used to evaluate walkability with regard to general information and overall impression; pathways; crossings; street furniture and signage; personal safety; and adjacent traffic.

## 2.4. Universal Design

The term "universal design" was coined by the architect Ronald L. Mace to describe the concept of designing all products and the built environment to be aesthetic and usable to the greatest extent possible by everyone, regardless of their age, ability, or status in life. However, it was the work of Selwyn Goldsmith, author of *Designing for the Disabled: A New Paradigm* (1963), who really pioneered the concept of free access for disabled people. His most significant achievement was the creation of the dropped kerb - now a standard feature of the built environment. In the road environment in South Africa, for example, sidewalk ramps, essential for people in wheelchairs but also for use by other NMT users, are nowadays a common example of this practice.

## 2.5. Complete Streets

*Complete Streets* is a broad term that incorporates various planning concepts to make the road environment friendlier to all road users. Complete Streets incorporate sidewalks, bicycle lanes, crosswalks, pedestrian medians, bus lanes and shelters, and other features to encourage all means of transportation. Adoptions of Complete Streets policies have also contributed to a reduction of carbon emissions, dependency on crude oil, and a reduction in obesity rates as people cycle and walk more rather than drive (AARP, 2009). The classic roadway reconfiguration, commonly referred to as a "road diet," involves converting an undivided four lane roadway into three lanes made up of two through lanes and a centre two-way left turn lane. The reduction of lanes allows the roadway to be reallocated for other uses such as bicycle lanes, pedestrian crossing islands, and/or parking. Road diets have multiple safety and operational benefits for vehicles as well as pedestrians (U.S. Department of Transportation, 2012). The result of a Road Diet is that ROW can be reclaimed for design elements that are supportive of non-motorised users, such as bicycle lanes; new or wider sidewalks; or street trees. (Tennessee Department of Transportation, 2009).

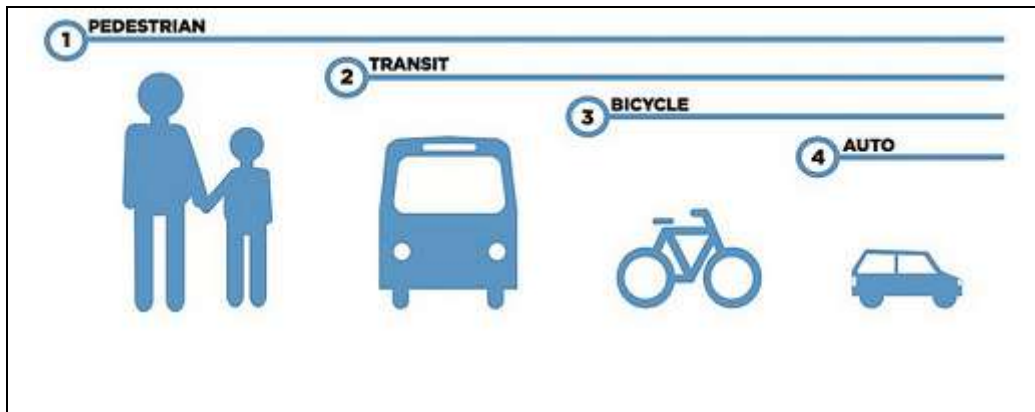
## 2.6. Last Mile

The Last Mile refers to the difficulty in getting people from a transport hub, especially railway stations and bus depots, to their final destination. When users have difficulty getting from their starting location to a transport network, the scenario may alternatively be known as the "*First Mile*" problem. These issues are, especially, acute in countries where land-use patterns have moved more jobs and people to lower-density suburbs that are often not within walking distance to existing public transport options. Therefore public transport use in these areas is often less practical. This promotes a reliance on cars, which results in more traffic congestion, pollution, and urban sprawl (Mineta Transportation Institute, 2009).

Traditional solutions to the *Last Mile* problem in public transit have included the use of feeder buses, bicycling infrastructure, and urban planning reform. Other methods of alleviating the *Last Mile* problem such as bicycle sharing systems, car sharing programs, pod cars (personal rapid transit), and motorised shoes have been proposed with varying degrees of success. Bicycle sharing programmes have been widely successful in Europe and Asia, and are beginning to be implemented on a large scale in North America (Shaheen and Guzman, 2011).

## 2.7. Modal Hierarchy

To create *Complete Streets*, the Chicago Department of Transport has adopted a pedestrian-first *modal hierarchy* policy as reflected in Figure 1. The policy entails that all transport projects and programmes, from the planning, design, construction to maintenance stages, favour pedestrians first, then public transport passengers, cyclists, and lastly cars. In addition, street design conducted in a manner that supports context and modal priorities and is not limited by rigid engineering standards. This allows staff to develop innovative solutions that meet the overarching goal of a *Complete Street* (Chicago Department of Transport, 2013).



**Figure 1: Modal hierarchy, as illustrated in the Chicago Complete Streets Guide.**

## 2.8. Greenways

The European Greenways Association defines the concept as "communication routes reserved exclusively for non-motorised journeys, developed in an integrated manner which enhances both the environment and quality of life of the surrounding area. These routes should meet satisfactory standards of width, gradient and surface condition to ensure that they are both user-friendly and low-risk for users of all abilities." (Lille Declaration, European Greenways Association, 2000). The term *Greenway*, implies a recreational or pedestrian use rather than a typical street corridor, as well as an emphasis on introducing or maintaining vegetation, in a location where such vegetation is otherwise lacking. The concept has also been widely implemented in cities across the world, for example:

- Boise, Harrisburg, Raleigh, Vancouver, Denver, Essex County, Detroit, Boston, San Francisco, Minneapolis and others (North America)
- Guangdong Province (China)
- South East London Green Chain, a set of connected parks and open spaces in London (United Kingdom)
- Gold Coast Ocean Way (Australia)
- Various other international applications in semi-urban and rural areas.

The expansion of the Greenway concept in South African cities, by using public open spaces as NMT corridors, has met several constraints in recent years because of crime risk. A study conducted regarding the usage of parks and open spaces in Pretoria (Tshwane Open Space Framework, 2005) indicated that crime and other unwanted practices exist in parks and open spaces such as littering, loafing/idling, squatting, misuse of alcohol/drugs, theft on adjacent properties, public indecency, yard sneaking, theft from motor vehicles, illegal trade (alcohol/drugs), murder, rowdiness/loud music, robbery, rape, prostitution, urinating, fighting, assault, vandalism and other anti-social activities. In recent years, many public open spaces in South African cities have therefore been fenced in to reduce crime risk and other anti-social practices.

## 2.9. Other international lessons learnt

Servaas (Interface for Cycling Expertise I-CE, 2000), lists a number of lessons learnt from NMT infrastructure implementation exercises in many parts of the world. These are:

- Experience in countries such as the Netherlands, Denmark and Germany has shown that the development and promotion of a comprehensive and operational NMT network requires consistent and substantial funding sustained over extended planning and implementation horizons. The planning and construction of the current national bicycle network across the Netherlands, for example, has been on-going since the early 1970s.
- The involvement of all relevant role players (politicians, officials and consumers) is necessary to promote the NMT case.
- In cities without an established cycling culture, the construction of a network of separate bicycle tracks has a high chance of resulting in failure. Construction on NMT cycle networks must go hand in hand with establishing a cycle culture, awareness and training. Furthermore, drivers normally pay very little attention to the rights of cyclists on the road and this attitude must be corrected.

### 3. CURRENT APPLICATIONS OF NMT PLANNING AND DESIGN CONCEPTS IN SOUTH AFRICA

#### 3.1. Introduction

The question is, how can the above-mentioned NMT planning and design concepts reshape planning and implementation strategies, policies and operational frameworks in South Africa, to mainstream the provision of NMT facilities and services over the short-, medium- and long term? Even more important, what processes and measures should be instituted to ensure the fast tracking of NMT infrastructure provision in a sustained manner?

- Some textbook examples exist of efforts to improve NMT infrastructure in South African cities. A more general application of the abovementioned planning concepts, however, is required to fast track the mainstreaming of non-motorised transport. Examples are listed below: Johannesburg recently initiated various processes to advance NMT infrastructure provision. Examples are:
  - A Draft Complete Streets Guideline Manual (Jo'Burg: Rea Vaja, JDA and JRA, 2013).
  - Feasibility study for NMT facilities around Johannesburg's BRT stations, Rea Vaya (Phases 1A, B and C).
  - A Pre-feasibility study to enhance a Cycling Programme in the City (COWI, 2013).
  - NMT network design and stakeholder engagement: University campus precincts in central Johannesburg.
- Cape Town provided facilities in conjunction with its MyCiti BRT route from Table View, Milnerton to Central Cape Town and plan to do so with other extensions of the BRT network.
- Tshwane is in the process to commission several studies to undertake the planning and implementation of NMT facilities in the City, amongst others are:
  - The Bus Rapid Transit (BRT) Line 1 NMT Plan to integrate non-motorised user needs with the Areyeng BRT system that is under development in the City.
  - Strategic Framework for Non-Motorised Transport.
  - Integrated Rapid Public Transport Network for Tshwane.
- eThekweni review of designs, and audit of the City of eThekweni's cycle and pedestrian 'connections' project, which aimed to improve NMT infrastructure, signage and other facilities, and facilitate better NMT connectivity and movement within the central city, particularly for leisure and business tourism (including conferencing).
- The Ekurhuleni Integrated Rapid Public Transport Network (IRPTN) – North/South Corridor, that includes a comprehensive NMT infrastructure audit along the designated route in Tembisa.
- Rustenburg Rapid Transport (RRT) NMT facilities, including recommendations regarding NMT micro-enterprise, signage, street furniture (including bicycle parking) and lighting.
- In Polokwane, a cycle track has been provided from Seshego to the Polokwane City Centre.
- The South Africa Road Safety Audit Manual (RTMC, 2010) is a comprehensive guide for the formal road safety audit of road and traffic designs before they are built, and for the road safety appraisal of existing roads. This manual describes the road safety audit process, together with practical guidance for road safety practitioners and also covers the needs of vulnerable road users such as pedestrians and cyclists.



### 3.2. Current implementation of BRT systems

Some examples of cities implementing BRT systems have been listed above. Other cities also busy implementing BRT systems are: Buffalo City, Mangaung, Nelson Mandela Bay, George, Mbombela, Msunduzi, Polokwane and Rustenburg. NMT feeder infrastructure, linking the surrounding catchment areas to these BRT networks, is an important design consideration to be included in the planning and design processes by all the participating cities.

### 3.3. NMT feeder systems to all public transport operations

The need exists to provide well-designed NMT feeder systems for communities to existing public transport operations including bus, rail, Gautrain and minibus taxi operations. In South Africa, a 500 m radius is generally regarded as the standard distance for walking to public transport (Department of Transport, 2003). In 2013, however, Guerra and Cervero questioned the half-mile radius as the de facto standard for rail-transit catchment areas. They pointed out that there is surprisingly little evidence to justify any particular catchment area. Why a half mile? Why not a quarter mile or two-fifths of a mile? They questioned the standard and asked if there is anything special about a half mile or is this simply a convenient figure that has become an industry standard? A half mile roughly corresponds to the distance someone can walk in 10 minutes at 3 miles per hour and is a common estimate for the distance people will walk to get to a rail station. The half-mile ring is a little more than 500 acres in size (Guerra and Cervero, 2013).

Various opportunities exist in South Africa within the public transport realm to improve NMT feeder systems. In March 2014, the Gautrain Management Agency announced a number of network extensions for the Gautrain (<http://www.gautrain.co.za/newsroom/2014/03/gautrains-capacity-enhancement-plan/>). An essential part of the network planning should be to do a need analysis of NMT users as well as the catchment areas surrounding the future stations and NMT facilities required at the future stations. Currently, cyclists are locking their bicycles to poles and other street furniture at Gautrain stations. This practice was observed, for example, at the Hatfield Gautrain station. The addition of the Areyeng BRT station next to Hatfield Gautrain station will justify the provision of a joint bicycle parking facility. In February 2012, PRASA announced that it is to spend R136 billion to acquire about 7,000 new trains and upgrade and modernise railway stations. The upgrading of railway stations should be complemented with by catering for the needs of NMT users on the premises, the access areas and direct vicinity of the stations.

### 3.4. Updating of Strategic Planning Tools

Provinces are legally required to update their Strategic Land Transport Frameworks on a five yearly cycle, and so are municipal authorities compelled by law to update their Integrated Transport Plans (ITPs) and Integrated Development Plans (IDPs) on a similar time scale. A recent analysis of these planning tools in Gauteng Province, for example, revealed that there was a fragmented approach or insufficient provision made with regard to NMT planning in most of the plans analysed (Gauteng Province, 2013). Furthermore, it was observed that NMT as a component of the multimodal planning process is not fully understood, and as such not recognised in planning practices (Gauteng Province ITMP 2037). In addition, there are very few NMT Development Frameworks in place in the country, as a result of which NMT infrastructure is planned and provided on an ad-hoc basis.

The current pedestrian and bicycle facility guidelines seem to rather support a segregated approach to NMT infrastructure development and operations. The current revision of the Pedestrian and Bicycle Facility Guideline Manual, 2003 (DoT, 2003), is underway to expand the Manual to cover additional aspects not currently addressed. This includes the addition of the latest international best practice on pedestrian and bicycle design guidelines; and the addition of sections on NMT facilities on rural roads and animal drawn transport.

### 3.5. Providing a comprehensive NMT infrastructure network across cities

Finally, there are numerous opportunities for NMT infrastructure to be provided where NMT is, or can be, the primary transport mode between destinations. This includes the needs of pedestrians and cyclists, scholars and people with special mobility needs for a variety of trip purposes. Furthermore, although the walking component of NMT is always part of the trip between destinations, the “half mile” planning paradigm has constricted the more expansive and integrative use of the full complement of NMT over longer distances in trip-making between destinations. Currently, no city in South Africa can claim that its NMT connectivity is comprehensive enough to cover the needs of all NMT users.

## **4. A PRAGMATIC APPROACH TO THE MAINSTREAMING OF NMT IN INSTITUTIONAL, PLANNING AND OPERATIONAL FRAMEWORKS**

### **4.1. Introduction**

The discussion above shows that a number of NMT initiatives are already taking place across the country. Many NMT infrastructure plans are, however, still implemented in the absence of an overall strategy and can therefore be considered as add-ons to the road network.

The question, therefore, how to elevate NMT infrastructure and promotional practices into the main stream of transport planning in South Africa? Furthermore, what are the triggers and “quick wins” to accelerate the mainstreaming of NMT in South Africa?

The first priority would be to get NMT policy frameworks and plans on the different government levels in place. The National Draft NMT Policy, 2009 (DoT, 2009) needs to be finalised. There should be a gap analysis of the current policy and what policy directives are actually required. All provinces have to conclude their respective NMT policy frameworks and NMT master plans. Subsequently, metropolitan areas, cities and district municipalities have to follow suit.

There are numerous other relevant issues to be addressed to ensure that NMT is mainstreamed, not only as an independent transport mode, but also as part of an intermodal transport system. These aspects are discussed below:

### **4.2. Coordination of intermodal planning and implementation processes**

The question is who should coordinate the intermodal planning and implementation processes in the provinces and municipalities, for NMT infrastructure provision and promotion, to ensure consistency and continuity? If there is more than one adjoining metropolitan area in a province, it seems feasible that the respective province could coordinate the institutional and planning processes among itself and the metropolitan areas. In Gauteng Province, for example, the Gauteng Transport Commission, representing all the municipal authorities, is to oversee the process. In other metropolitan areas, the province in collaboration with the cities could take the lead. Each solution, however, should be tailor-made for the local circumstances. Furthermore, there is the possibility to enhance the NMT networks by means of road/rail intermodal transport planning, for example, the interface between the PRASA infrastructure expansion programme (including station upgrades) and road authorities.

### **4.3. The roles of SLTFs, ITPs and IDPs in the mainstreaming of NMT**

Equally important is the question about how should the existing planning policies and tools (SLTFs, ITPs and IDPs) be administered and adjusted to support the mainstreaming of NMT? Currently, these planning tools most often deal with NMT in a superficial manner only. They do refer to NMT as part of the overall transport planning objectives, but limited or no guidance is provided on how to take the process forward. A more concerted effort is, therefore, required in these planning documents to elevate the role of NMT in the specific jurisdictions.

#### 4.4. Financing of NMT infrastructure implementation programmes

The question is how should NMT infrastructure expansion programme be financed to ensure the long-term implementation of a coherent and sustainable network? International best practice in major cities show that their current extended NMT networks are the result of a deliberate effort over many years to expand the NMT networks year on year through funding. In South Africa, the solution could be to have dedicated NMT infrastructure funding as a way to lay the foundation for the development of a transport system with fully integrated NMT. Such funding must be supported by all tiers of government with incentivised guidance and control from the national level over a fixed period of time (over at least 25 years) with specific objectives to be achieved. The main objective should be for NMT to be in the main stream of land development and transport system planning and investment as well as operations which include maintenance – negating the need to consider NMT as a separate issue. Sending out a clear message of intent by Government will concomitantly encourage greater Public Private Partnership (PPP) participation to invest in NMT infrastructure, promotion of NMT usage as mode of transport for commuting and also recreational use.

#### 4.5. Monitoring and measuring NMT infrastructure and promotional programmes

Planning and operational plans must set targets for NMT infrastructure network expansion plans in cities and district municipalities. This could include performance measurement indices such as annual kilometres of pedestrian and cycle network added annually, growth in NMT traffic volumes, NMT risk analysis on the specific road section, traffic offences monitoring, and so on.

Furthermore, coherence and value of the NMT network need to be monitored and measured to show progress with the overall implementation of NMT infrastructure in cities. The major challenge currently in South Africa, however, is the lack of information of mode shares for walking and cycling in cities and this aspect must be addressed urgently in the National Household Travel Survey or city household travel surveys. In April 2014, for example, the USA Census Bureau, issued statistics and trends on cycling and walking volumes in the fifty largest American cities for the period 2008 to 2012.

#### 4.6. NMT infrastructure and the road hierarchy

What should be considered as the minimum requirements for NMT infrastructure for new road developments, the upgrading of existing roads and the different road classes? Road classification should be used to inform road network planning in South Africa. Sustainable road networks should clearly distinguish between the mobility and access functions. In South Africa, access roads must clearly and more generally provide for NMT users, whereas mobility roads must also acknowledge specific NMT requirements, such as crossing major intersections or freeways. NMT facilities need to be part of the cross-section for each road classified according to the road hierarchy.

#### 4.7. Impact of land use development on NMT infrastructure

How should land use developments, generating significant NMT traffic, contribute to the NMT network expansion programme? It is, generally, accepted that major land use developments such as shopping centres, are generating not only vehicular traffic (e.g. private and public transport traffic), but also large numbers of NMT users. Various transport planning techniques are available, such as pedestrian route directness (PRD), and space syntax that could be used to determine network routing and priorities.

An important measure to expand the NMT infrastructure at major land uses is that city governments should also charge a development contribution, not only for expansion of the road networks around new shopping centres and other land uses generating vehicular traffic, but also for NMT infrastructure provision. This must, however, be focussed on establishing NMT integrated infrastructure - a move away from an after-the-effect separate NMT-accommodative exercise. In 2014, the City of Johannesburg (CoJ, 2014), published its Policy for Engineering Service Contributions for Roads and Stormwater and Methodology for the Calculation of Engineering Service Contributions for Road and Stormwater. Engineering service contributions are financial or equivalent contributions made by the developer towards the capital and related cost of the City of Johannesburg of providing external services. Road services that are provided for by the contribution include NMT facilities such as paved sidewalks and bicycle lanes, and on-street public transport facilities.

#### 4.8. Role of NMT infrastructure provision as part of job creation and poverty relief

The question is how could NMT infrastructure provision and operations provide economic opportunities to create jobs and ultimately contribute to alleviate poverty? The construction of NMT infrastructure and facilities has huge potential for creating high skill level decent jobs. Examples of practices that could be implemented include community involvement in a number of ways such as:

- The construction and maintenance of cycle routes and pedestrian walkways.
- Security services at subways, foot-bridges and bicycle parking at rail and bus stations.
- Operation and maintenance of bicycle rental schemes, and other initiatives.

#### 4.9. Promotion of NMT modes

NMT infrastructure provision goes hand in hand with the promotion of the mode. The question therefore is what measures should be instituted to ensure that NMT modes promoted and that the NMT infrastructure provided will be used as planned? Examples include:

- Training of cyclists groups as road users and sensitising of motorists on cyclist rights on the road.
- Creation of lobby groups and NMT Forums and getting all role players (politicians, officials and communities) involved.
- Promotional and Awareness-raising events and campaigns.

## 5. CONCLUSIONS

The need is clearly demonstrated in the paper for transport and land use planners to look differently at NMT infrastructure provision and the promotion of a NMT culture in South Africa. Current, pedestrian and bicycle facility guidelines do not address the need for the development of a NMT integrative transport system to the extent that NMT can be effectively promoted as mode of transport. Land and transport system development and operation officials and practitioners will have to walk the extra mile to ensure that NMT infrastructure provision is elevated to a level where road users will consider it as a safe alternative mode to travel over shorter distances in cities, but also over longer distances as part of a trip using other modes of transport. The NMT mode can serve as an alternative mode for commuting and scholar transport but there is a huge demand for recreational and tourism uses with regard to cycling. Gauteng Province has recently provided cycle facilities along roads in the Cradle of Humankind World Heritage Site.

Lately, there has been an increase in the number of NMT frameworks, policies, guidelines and strategies in South Africa. Unfortunately, limited data is available to monitor the effect of the current interventions. The major challenge currently in South Africa is the lack of information of mode shares for walking and cycling in cities to measure impact and this aspect must be addressed urgently.

Moving towards a fully NMT integrative land and transport system development paradigm will require fundamental reviews of current development and planning practices with the aim to define what obstructs the mainstreaming of NMT in transport system development and operation and to guide the development of clear policy and support tools with incentivised investment strategies to develop NMT as a fully integrated mode of transport. Due cognisance should be given to the South African context as much of the current guidelines had been develop from international practices and standards with limited research based adaptation for local conditions and behaviours.

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