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# The SMART review of non-motorised transport

## BACKGROUND

Based on the latest global industry focus on non-motorised transport (NMT), various government institutions (local and abroad) updated their transport master plans to ensure adequate focus and approach to the planning, integration and design of NMT infrastructure. To this end, the South African National Department of Transport recently updated their NMT Facility Guidelines. Local provincial governments and other institutions also included and/or expanded on NMT as part of their planning initiatives.

With NMT facilities becoming a rising trend in South Africa, it is important to keep in mind that these facilities will present their own new challenges. It is for this reason that innovative strategies and ideas are needed in the planning phases in order to implement these facilities in the best possible manner. One of these innovative solutions, Sustainable non-Motorised trAnspoRT (also known as SMART), has been developed in-

house by Royal HaskoningDHV (Figure 1).

SMART is a holistic, yet flexible, sustainable NMT assessment tool. The rationale for developing SMART was to:

- accurately and easily interpret documentation to analyse and review NMT facilities;
- promote the implementation of well-designed, legacy NMT facilities;
- review designs and achieve optimal results, i.e. exemplary rather than substandard facilities;
- standardise NMT accreditation and ratings;
- automate assessment reporting, thus reducing human error, and
- reduce time and cost, and improve design standards.

In developing SMART, literature reviews were initially used to identify the appropriate categories before the applicable indicators were developed and subsequently simulated in an easy-to-interpret diagram, created by MS Excel.

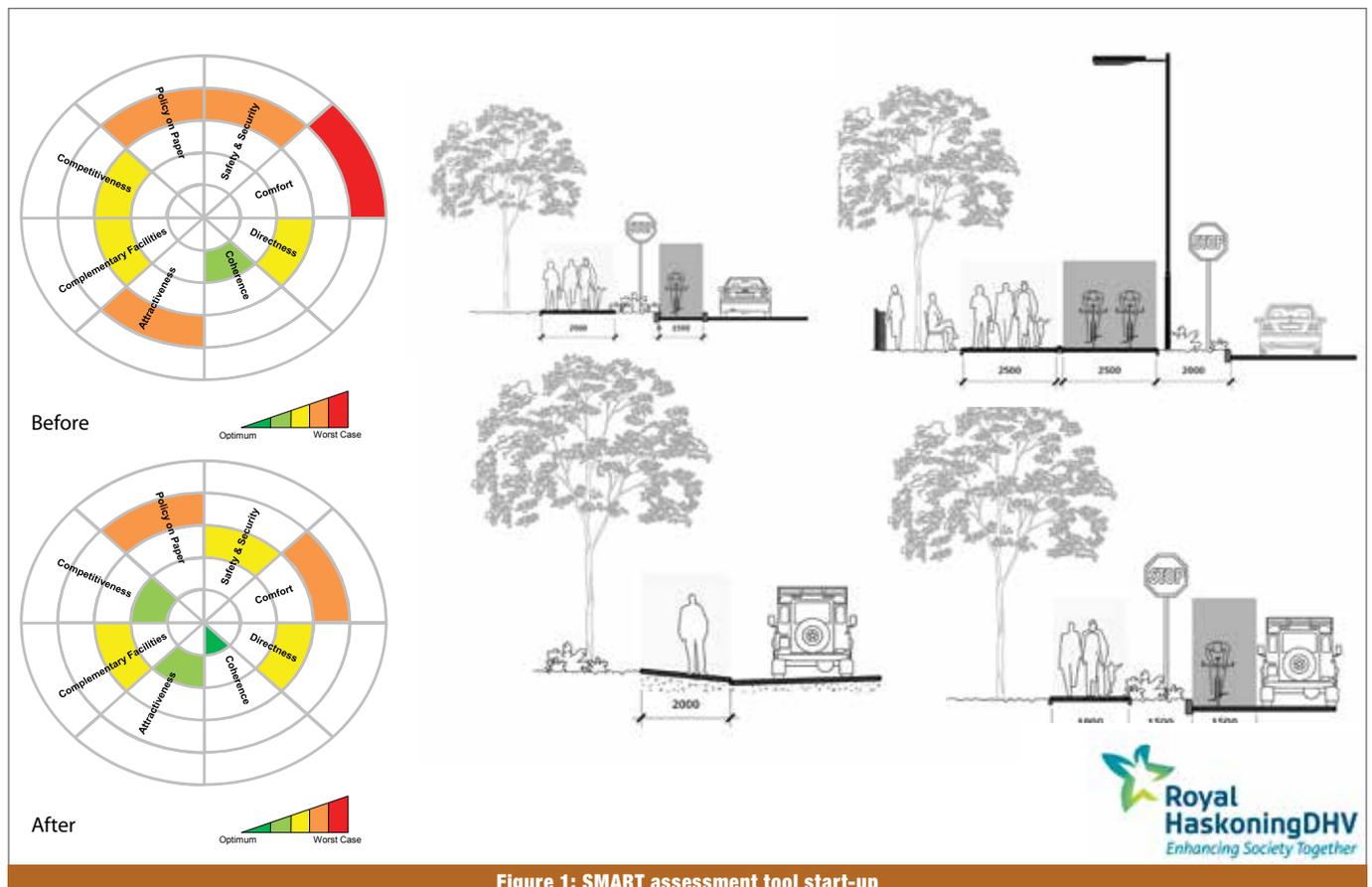


Figure 1: SMART assessment tool start-up

## STRATEGIC OBJECTIVES

SMART is an assessment tool which makes use of custom-approved local and international best practice to evaluate NMT paths and facilities. In essence, SMART is the result of innovation from an intensive review of literature and global best practice. The aim is to promote the use of NMT facilities by quantifying the improvement of existing NMT facilities and optimally designing new facilities.

Not only does the SMART tool cut the workload and the evaluation process, but it is so effective that it is bound to become the standard for assessing existing NMT facilities, or the design of new NMT facilities in the best way possible for future development. A remarkable feature of SMART is that it is easy to use and the results can be interpreted by all interested and affected parties.

## GUIDING PRINCIPLES

The SMART framework recognises the integrated and inter-dependent nature of different NMT sustainability considerations, based on promoting the use of NMT by improving the design of new NMT facilities, and upgrading existing NMT facilities. By investigating and applying best practice research, the following eight key categories have been developed:

- Safety and Security
- Comfort
- Directness
- Coherence
- Attractiveness
- Complementary Facilities
- Competitiveness
- Policy on Paper

An unpopulated diagram indicating the eight key categories is shown in Figure 2.

Each of the listed key categories has its own unique indicators.

The Safety and Security category, as an example, has the following indicators:

- Visibility at night
- Security measures
- Design of facility for safety of users
- Intersection control treatments
- Rural road shoulders or paths

The unique indicators have an Optimum Measure description and a Worst Case description, assisting the assessor in the evaluation process. As an example, Table 1 shows an extract of the unique indicators and descriptions for the Safety and Security category.

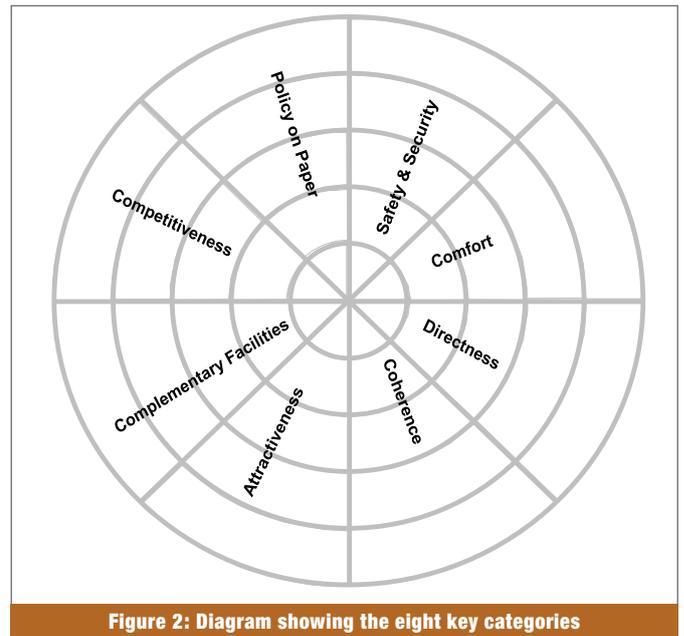


Figure 2: Diagram showing the eight key categories

Table 1: Extract showing unique indicators and descriptions for the Safety and Security category

Safety and Security	Optimum Measures (2)	Worst Case (-2)
Visibility at night	Street lights allowing for good visibility and no dark areas along route. Street lights can consist of 'intelligent street lights' providing nominal illumination (never dark) when not used, but brightening when NMT is detected.	NMT persons using the facility at night with no lighting or evidence that authorities or security firms are at least watching over them. Overall facility creates an insecure presence.
Security measures	CCTV cameras linked to control centre. Visible policing of area or presence of security guards.	NMT persons using the facility at night with no visible policing. Overall facility creates an insecure presence.
Design of facility for safety of users	Dedicated and segregated NMT facility within road reserve to avoid conflict between pedestrians/cyclists and motorised traffic. Intersections designed to accommodate mixed traffic, including NMT and universal access users, such as ramps for wheelchairs.	NMT users must share road and lane space with high-speed motorised traffic.
Intersection control treatments	Pedestrians cross a maximum of two lanes of traffic before reaching a pedestrian refuge (sidewalk or median) for un-signalised crossing. If pedestrians need to cross more than two lanes, a signalised intersection is provided.	Very wide un-signalised intersections which do not enable pedestrians to cross safely.
Rural road shoulders or edge paths	NMT facilities as a separate path, or segregated from motorised road traffic, particularly on roads with a high heavy-vehicle volume.	NMT must share road lane space with high-speed motorised traffic.

## SMART ASSESSMENT PROCESS

During the assessment process each of the indicators are evaluated and rated according to the new designs that are proposed or, in the case of an existing facility, rated to what was provided on site.

SMART has five different rating levels which range between +2 and -2. A rating of +2 is coloured dark green and represents optimum design (exemplary), while a rating of -2 is coloured red and represents a substandard design. The rating system is shown in Figure 3.

The extract from the Safety and Security category in Table 2 indicates how the rating system will be applied per indicator.

As part of the assessment process the assessor is also required to comment on or justify why a specific rating was given to a specific indicator, as well as list proposed mitigation measures to improve the ratings given.

After the assessment process has been completed, the SMART tool will generate a diagram which provides a holistic summary of the assessment, and which is easy to evaluate at a glance. This 'before evaluation' diagram can then be reviewed against improved designs or upgraded existing facilities to produce an 'after evaluation' diagram.

Figure 4 shows a typical comparison between a 'before' and 'after' assessment diagram.

## SMART PROJECT LIFE CYCLE

As with any other tool, suitable training is required before an individual can be considered an assessor. This is to ensure that the assessor fully understands the impact of each category and its various indicators, and that objective ratings and proposed mitigation measures can be specified.

The SMART project life cycle consists of a four-step process covering the following:

### 1. Project initiation

The project will be initiated between the project team and stakeholders, and the project boundaries and objectives will be identified.

### 2. Project action

The project team will review the SMART indicators, gather on-site information or review detail designs, rate the indicators and justify the rating.

### 3. Project review

The assessor will undertake a SMART peer review and incorporate feedback where applicable.

### 4. Project report

A draft and final report will be prepared and submitted, with practical mitigation measures proposed to enhance the NMT facilities and ensure a memorable experience for the users of the NMT facilities.

The assessment process is schematically illustrated in Figure 5.

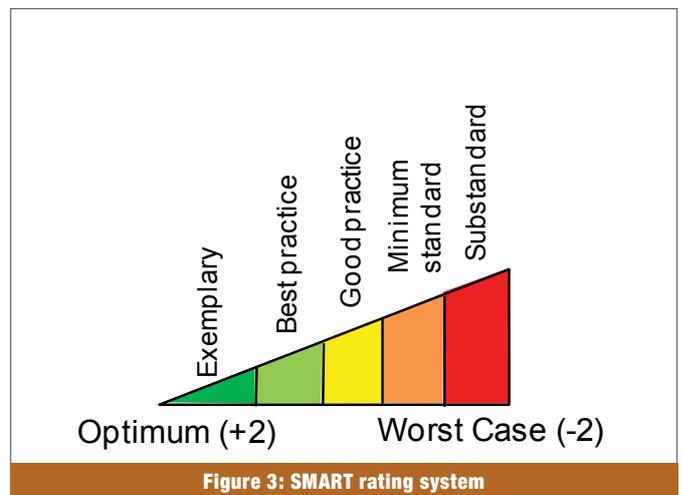


Table 2: SMART rating system

Safety and Security	Optimum Measures (2)	Worst Case (-2)	+2	+1	0	-1	-2
Visibility at night	Street lights allowing for good visibility and no dark areas along route. Street lights can consist of 'intelligent street lights' providing nominal illumination (never dark) when not used, but brightening when NMT is detected.	NMT persons using the facility at night with no lighting or evidence that authorities or security firms are at least watching over them. Overall facility creates an insecure presence.					
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## CONCLUDING COMMENTS

SMART is a user-friendly NMT assessment tool, developed to assess the sustainability of new NMT designs and existing NMT infrastructure.

The SMART tool provides the opportunity to measure and show improved safe NMT facilities. However, the tool also has some additional benefits, including the following:

- Through the SMART tool South Africa contributes to the Decade of Action Plan to ensure that we have safer roads.
- SMART ensures that our unique environment is considered in all our approaches and designs for custom solutions.
- Together with SMART we can enhance society by providing safer roads and a safer environment.

## BIBLIOGRAPHY

ARUP. The Sustainable Project Appraisal Routine (SPeAR®). Available online at: <http://www.arup.com/>

Building and Construction Authority 2013. Code on Accessibility in the Built Environment 2013: Building and Construction Authority.

City of Johannesburg 2009. Framework for Non-motorised Transport, South Africa.

City of Johannesburg 2012. Complete Street Design Guidelines, South Africa.

Committee of Transport Officials 2012. The South African Road Classification and Access Management Manual, South Africa.

CROW 1998. Recommendations for Traffic Provision in Built-Up

Areas. ASVV. CROW Information and Technology Centre for Transport and Infrastructure, Ede, The Netherlands.

CROW 2006. Design Guidelines for Cycling. CROW Information and Technology Centre for Transport and Infrastructure, Ede, The Netherlands.

Department of Transport 1996. The White Paper on National Transport Policy. Department of Transport, Pretoria.

Department of Transport 2003. Pedestrian and Bicycle Facility Guidelines, South Africa.

Department of Transport 2012. South African Road Traffic Signs Manual, Volume 3: Traffic Signals, South Africa.

Department of Transport 2014. NMT Facility Guidelines, South Africa.

Georgia Department of Transport 2003. Pedestrian and Streetscape Guide, USA.

National Department of Transport 1996. White Paper on National Transport Policy, Pretoria.

Nickpour, F 2012. Chapter 2: Inclusive Bus Travel – A Psychosocial Approach. In: Designing Inclusive Systems, pp 13–22. Springer: London.

Oxley, P R 2002. Inclusive Mobility: A guide to best practice on access to pedestrian and transport infrastructure: Transport for London.

Royal HaskoningDHV 2015. NMT Standards, Polokwane, South Africa.

SANS 10400-S: 2011. The application of the National Building Regulations Part S: Facilities for persons with disabilities, Pretoria: SABS Standards Division.

SANS 784: 2008, 2008. Design for access and mobility – Tactile indicators. Pretoria: SABS Standards Division.

Transport for Cape Town 2013. Universal Access Policy for Cape Town.

TRL Limited 2004. Enhancing the mobility of disabled people: Guidelines for Practitioners, London: Department for International Development.

US Department of Transportation Federal Highway Administration 2014. Designing Sidewalks and Trails for Access. Available online at: [www.fhwa.dot.gov/](http://www.fhwa.dot.gov/) (Accessed on 23 March 2015).

United States Architectural and Transportation Barriers Compliance Board 1991. Uniform Federal Accessibility Standards Retrofit Manual, Washington DC. □

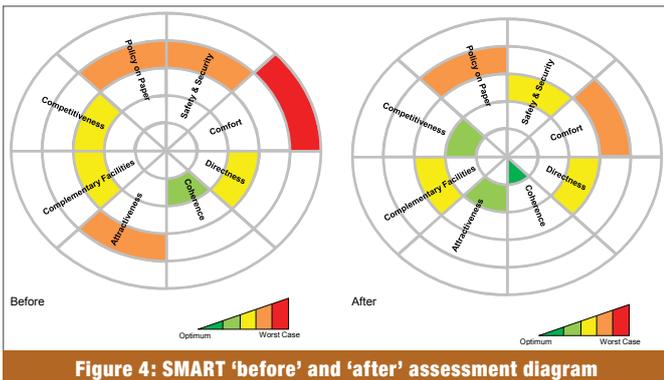


Figure 4: SMART 'before' and 'after' assessment diagram



Figure 5: SMART assessment process