

PSIroads
Multi-criteria Decision Support (MDS)
Management Summary
Version 1.0

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Change History

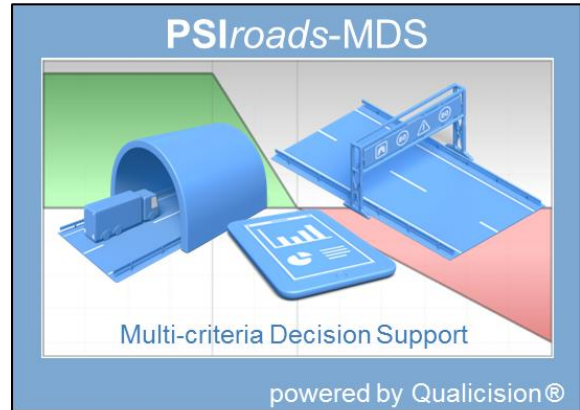
Changes	Version	Date	Editor
Creation	0.1	25.02.2016	Elmar Jaeker
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A new category of decision support in multi-layered traffic management

PSI have introduced a new category of decision support which enables new steps in multi-layered traffic management by the development of the Multi-criteria decision support system for traffic network management: **PSIroads-MDS**

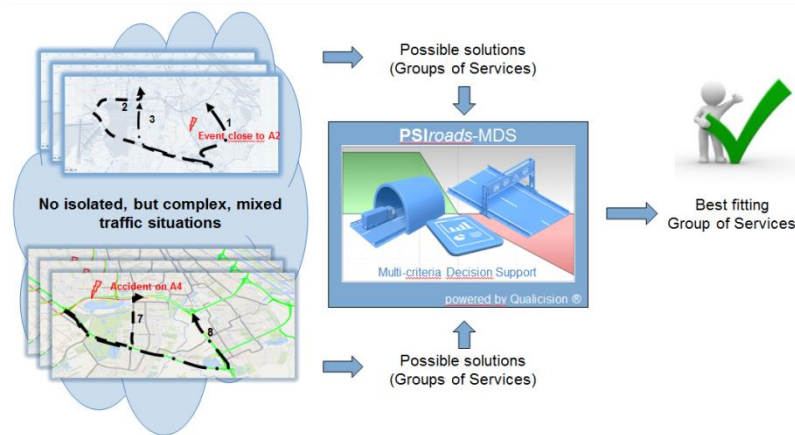
PSIroads-MDS supports the management of large traffic networks and the co-operation of urban, regional and national road authorities by balancing different goals using a unique and efficient fuzzy logic based decision engine.

PSIroads-MDS includes supervised self-learning adapting to changed conditions or new knowledge and is flexible to allow new trends in advanced network management.



How does the MDS support daily network management?

Traffic operators in TMCs have to ensure the best network performance for road users. During congestion, incidents, special events and bad weather the traffic operator has to select the services which are most effective to solve the situation.



Often these are not isolated conditions, but mixed with other incidents.

The selection of the best services is not an easy task and needs a lot of local traffic management experience.

PSIroads-MDS supports the operator by offering groups of services like rerouting, increasing outflow and decreasing inflow on road sections which may optimise network performance. The proposed Services are determined as most suitable to balance various conflicting goals.

Normally each authority tries to deliver best network performance with Services on its own roads, but special situations may require support by other authorities.

Services:

- Rerouting via ...
- Increasing outflow to ...
- Decreasing inflow from ...

Goals (partly conflicting):

- Minimize travel time
- Minimize pollution emission
- Prefer using self-owned infrastructure

PSIroads-MDS powered by Qualicision®

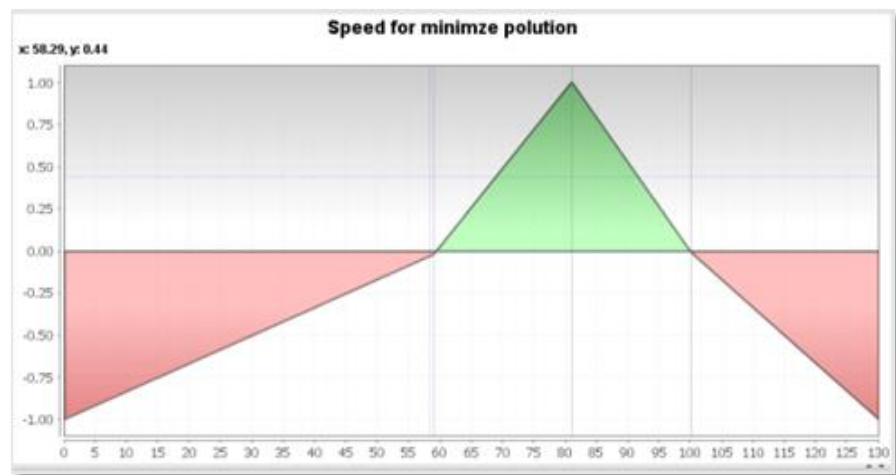
PSIroads-MDS uses the multi-criteria decision technology Qualicision® to balance the available Services in the given traffic scenario under the applied goals and their priorities.

With Qualicision® the relationship between the available Services and the Goals are not expressed in a classical arithmetic equitation model which might be known from other optimization tasks. Such approaches need exact input data, time intensive software coding and are highly sensitive to model changes.

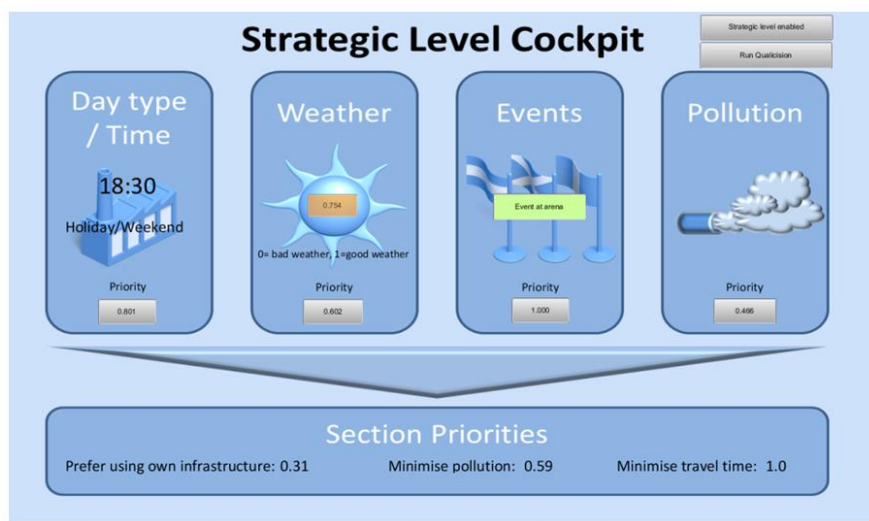
Qualicision® utilizing an extended fuzzy-set theory follows a very different way:

The relations between Goals and Services are expressed in graphical Goal Functions which indicate how a Service under certain situations supports a Goal or hinders the goal achievement.

The definition of those Goal Functions is performed by traffic engineers with general and local traffic management know-how.



Strategic Level Cockpit for influence factors



Traffic conditions are not only influenced by traffic data.

To consider additional factors like certain day types, the current time or weather conditions a Cockpit view is introduced to PSIroads-MDS on a strategic level.

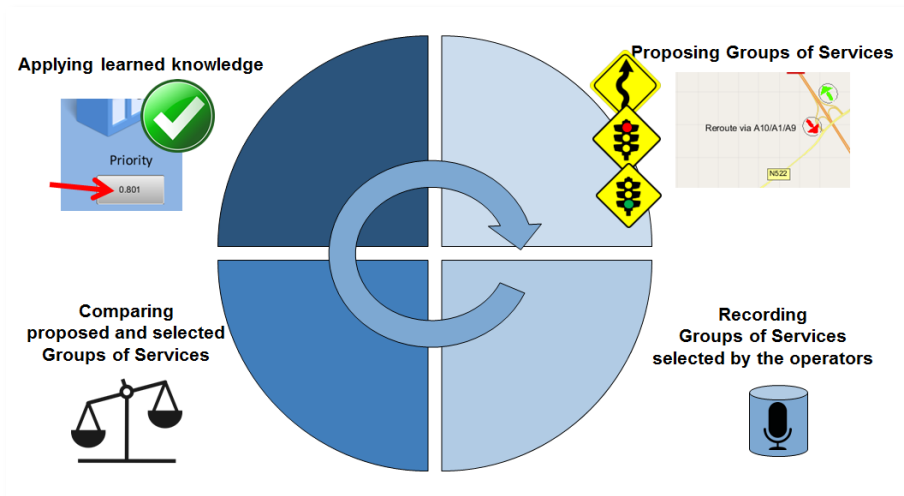
A general priority on pollution can be set in accordance with policy.

All these influence factors are considered to optimise the regional or national network.

Supervised Self-learning capabilities

The decisions for recommended service groups of **PSIroads-MDS** will be improved by a supervised self-learning module.

The differences between operators' decisions and **PSIroads-MDS** recommended service groups are recorded on a daily basis.



The self-learning module adjusts the priorities of the input factors to reproduce the operator's decision.

Traffic engineers review the proposed priorities before they release them for the use in the decision support system. The self-learning module is not only useful for optimizing the system. Systematic errors in traffic management, training deficits of the operators or gaps in the designed model can be detected which enables active quality management.

Ready for integration

PSIroads-MDS offers a multi-layered network management approach based on the highly configurable decision support technology Qualicision®.

- It is easy to use in daily network management and enables the co-operation between different authorities to optimise overall network performance.
- A supervised self-learning module is integrated for constant decision improvement and quality management.
- **PSIroads-MDS** can be integrated in different traffic management environments and can easily be adapted to a various number of tasks.



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