Technolution

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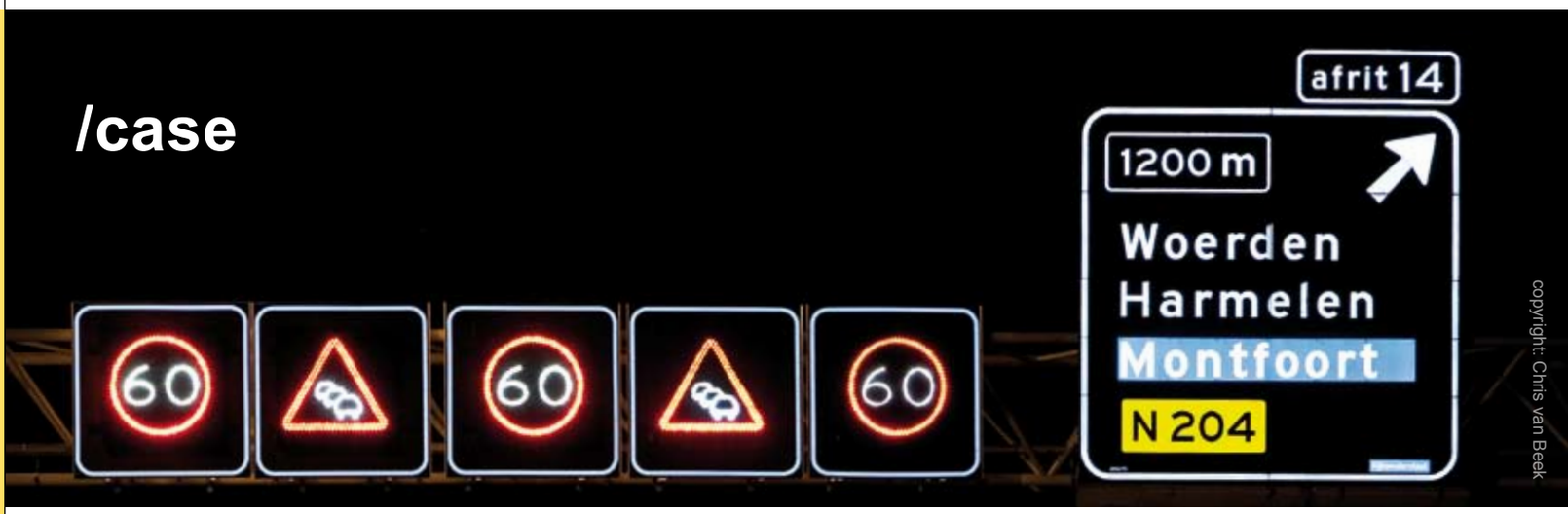

Drive faster when you can, slower when you have to

A speed limit that suits the conditions on the road, isn't that what every driver wants? Faster in the night-time when it is quiet and not quite so fast when it is busy or the weather is bad. The Dutch Directorate-General for Public Works and Water Management has started tests with dynamic speed limits on three different stretches of motorway in order to better understand "tailored" speed modifications. These tests are not only about winning support among drivers. The Dynamax project involves maximum speeds being tailored to actual traffic, road and local conditions at different locations. The tests are designed to reveal what the effects of this new way of handling maximum speeds will be on traffic flow, the environment and safety

Shorter journey time

On the A1 at Bussum, the Directorate-General is investigating what happens if the speed limit is raised to 120 kilometres per hour during quiet periods. The Dynamax system measures traffic intensity using vehicle loop detectors set into the road surface. If the volume of traffic allows, the roadside signs show the symbol for "end of all restrictions" and motorists are allowed to drive at 120 kph. When it gets busier, the signs switch back to 100 in a red circle.

Limiting environmental impact

The environment plays the decisive role in determining speed modifications on the A58 at Tilburg. Whenever the concentration of fine particulates is set to exceed pre-determined levels, drivers have to slow down. The input data is supplied by the Royal Netherlands Meteorological Institute, which calculates a five-day forecast based on a model. If the maximum value is expected to be breached, the Dynamax system reduces the maximum speed to 80 kilometres per hour and this is shown on the roadside signs. The National Police Agency is also informed, so that it can enforce this speed limit.

Improved road safety and better traffic flow

On the final test section on the A12 between Bodegraven and Woerden, two tests are running which are both aimed at improving road safety and enhancing traffic flow. Speed restrictions are introduced in case of rainfall – in fact before any rain falls. The Royal Netherlands Meteorological Institute's rainfall radar supplies the input data for the system. The speed restrictions remain in force for a time after a shower, because a wet road surface reduces visibility and increases braking distances, leading to a higher risk of accidents.

On the same section, a study is underway into the possibility of preventing so-called 'shock waves', a well-known phenomenon to traffic scientists. Car drivers are also familiar with the phenomenon of apparently spontaneous short traffic jams. Their cause is often a

small disruption in traffic flow when the volume of traffic is increasing. For example, a driver braking hard can cause a ‘queue wave’. This ‘wave’ moves against the direction of travel and it can be a long time before it resolves itself naturally.

The algorithms in the Dynamax system process the speed of passing vehicles and detect such shock waves based on this data. As soon as a shock wave is observed, successive maximum speed adjustments are made over several kilometres in an attempt to dissipate it.

Challenging task

It takes a lot of work to make tests like these succeed. Technolution has been asked by the Directorate-General for Public Works and Water Management to develop the technology to manage the roadside infrastructure from traffic centres.

The Dynamax system lies at the heart of each of the tests because it converts input data into a plan of measures – a plan which determines what sign should display what speed limit at what time. In order to display speed limits, the Dynamax system makes use of the Motorway Traffic Management system (MTM) at the traffic centre and the roadside equipment linked to it.

Together, these systems are responsible for ensuring that road users are not shown confusing or erroneous combinations of images which might endanger road safety. For example, the Dynamax software makes allowances for the fact that the various algorithms may want to display signals to road users at the same time. It also allows the regular queue detection – which warns traffic of queues ahead – to continue to do its work independently of Dynamax

Technical implementation

The tests will provide plenty of challenges in both technical and organisational terms, not least because Minister Eurlings himself is the initiator of the Dynamax project. The way in which the technology is implemented and how the wishes of a large group of players involved are accommodated are at least as important as the technology. Those involved include the traffic experts at the Directorate-General for Public Works and Water Management, who define the basic conditions: which speeds need to be displayed under which conditions. Another interested party is the Directorate-General’s test centre in Delft, which tests whether the system meets all requirements, with a particular focus on road safety. In addition, there are naturally many points of contact with the customers whose job it is to implement the project on the roads and with the managers and suppliers of the systems at the traffic centre.

But because the tests are taking place in the real world, the regional traffic centres and the road traffic controllers who work there also have their own requirements. The automatic systems must seamlessly fit with the way these traffic controllers work – after all, they have their own responsibility in managing the traffic in their region on a day-to-day basis. In this context, the A12 trial is a particularly interesting case because the test section extends across the control area of two traffic centres: Zuid-Holland and Utrecht.

All in all, the Dynamax project proved to be a challenging commission and one which had to be carried out under significant time pressure because the start of the tests was already fixed at an early stage. An important factor in the success of the project was our extensive experience with dynamic traffic systems, both at the roadside and in traffic centres. As a result, we were able to quickly translate the commission into clear system specifications. This and a results-focused, no-nonsense approach were key to a timely and satisfactory completion of the various tests. Within six months of the start of the project, the Minister opened the test on the A1 and now, a little more than a year on, all the tests from the original projects are operational.

Inspection is in full swing

It is early days yet for results. All tests are accompanied with investigations. Rijkswaterstaat measure the speed and flow of traffic, and specialized agencies research the impact on behavior, safety and environment. It is certain the tests will be continued on the A12 near Voorburg and the A20 near Rotterdam, concerning improvements of traffic flow as well as improving air quality.