Rijkswaterstaat
Ministerie van Infrastructuur en Waterstaat

Smart mobility

A step towards European traffic management

A paradigm shift in traffic management

SOCRATES2.0

Lees dit artikel

Cooperation framework

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Deploying interactive traffic management

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SOCRATES2.0: A paradigm shift in traffic management

Traffic information Services

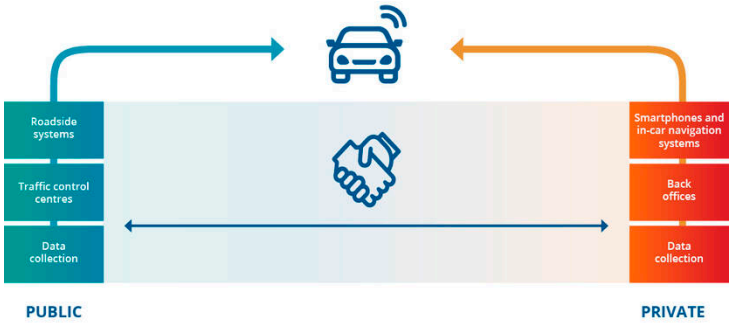
Digitalisation has had a major effect on how we navigate through traffic to reach our destination. Road authorities have a long history of providing drivers with information on incidents and accidents via roadside systems. Over the years, these systems have become more and more advanced, leading to today's elaborate traffic management services based on common goals and principles for the greater good.

In parallel, the use of mobile and in-car information and navigation services is rapidly expanding. These services have obvious benefits for individual road users. Turn-by-turn navigation, information on speed limits, road blocks and traffic jams. And, as the most appealing feature, a calculation of the fastest route to a driver's destination. Features that also anticipate a future of cooperative, connected and automated mobility. A future where a driver is supported more and more by systems.

Sharing data, aligning services

However, drivers also experience inconsistencies between the different information sources. Advice on roadside signs does not always match or may even conflict with the navigation advice. Also, when the original route to a destination suddenly becomes clogged with traffic jams, suggested alternative routes are not always suitable.

New and improved traffic and navigation services



Enabling a future of safer, smoother and greener road transport means embracing the obvious benefits of individual traffic information and navigation services while overcoming their limitations and unwanted effects. As a means of promoting this, the SOCRATES$^{2.0}$ partners share data and introduce traffic management in information and navigation services, and use the navigation system to improve the network performance. This is called interactive traffic management or Traffic Management 2.0.

The "Nash equilibrium"

Traffic engineers have long assumed that the Nash equilibrium describes real-world rush hours pretty well: a situation where drivers choose the fastest route, even though taking a longer route would help spread out traffic and ease congestion. Nobody is motivated to make a different decision than the one they are making because that would leave that individual worse off, even if it would improve overall group welfare.

A win for all

This public–private cooperation is expected to lead to a win-win-win situation for all stakeholders in the traffic management ecosystem. A win for road users and communities who receive better services during a better-facilitated journey, a win for the traffic management centres that gain enhanced overview and insights and new methods to implement traffic management, and a win for service providers who deliver these new messages and can offer better end-user services resulting in new business opportunities.

Shared benefits in traffic management through improved public and private cooperation

ROAD USERS

- Better service
- Fast, safe, green

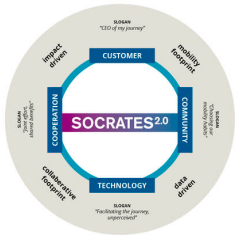
ROAD AUTHORITIES/ TRAFFIC CENTRES

- Fast, safe, green
- Effective traffic management

SERVICE PROVIDERS/ AUTOMOTIVE INDUSTRY

- Business opportunities

CEO of my journey



The SOCRATES$^{2.0}$ partners aim to establish something new, and not just improve an existing concept. The idea of influencing traffic has to be transformed into supporting people on their journey from A to B. As such, the vision not only focuses on technology or the traffic management process, but also on the customer, community and cooperation.

Download deze video

Uitgeschreven tekst

SOCRATES2.0: 'System Of Coordinated Roadside and Automotive services for Traffic Efficiency and Safety'

The SOCRATES2.0 project

In the SOCRATES$^{2.0}$ project, the partners aim to learn how to best cooperate, share relevant data, work towards common interfaces and agree on principles and business models, while taking each other's interests into account and deploying interactive traffic management. Four city regions welcomed the team and enabled real-life testing of the cooperation by deploying newly developed SOCRATES$^{2.0}$ end-user services. Over 20,000 road users participated in the pilots by using and evaluating the services to find out what works and what doesn't.

In this magazine, the SOCRATES$^{2.0}$ partners are happy to present their journey on discovering how to shape public-private cooperation in a future of interactive traffic management.

- **Read:** Cooperation Framework and bottlenecks, report Activity 2 (PDF)
- **Read:** SOCRATES2.0 digital magazine (PDF)

Policy references and TM2.0

- Sustainable and Smart Mobility Strategy
- Cooperative, connected and automated mobility
- Traffic Management 2.0

Newspaper articles

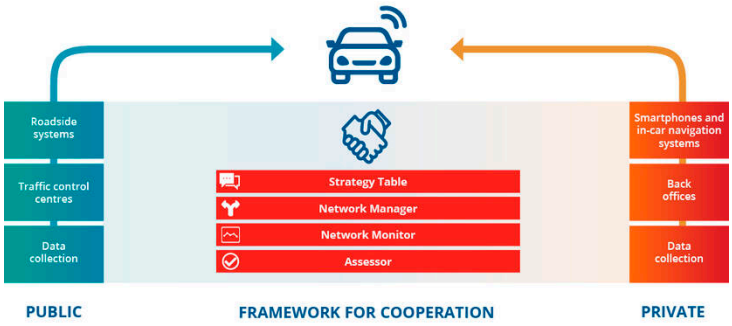
- Waze Hijacked LA Neighborhoods. Can Traffic Apps Be Stopped? (lamag.com)
- File? Dan rijden we met z'n allen om door hetzelfde dorp | NOS (in Dutch only, incl video NOS)

Co-financed by the Connecting Europe Facility of the European Union

Cooperation framework

Cooperation framework

The SOCRATES$^{2.0}$ partners created a cooperation framework to defining three ways of working together. We call this the cooperation models. To make the public–private cooperation work, we introduced four intermediary roles. The main distinction between the cooperation models is the level of communality, which determines how close partners work together. In other words, partners can choose to just 'wave', 'shake hands' or 'hug' each other.



Framework for cooperation

The Exchanged Data cooperation model

This cooperation model is about exchanging data on a voluntary basis, using an agreed standard protocol. There are multiple European standards and variations available for the similar purposes. It is a challenge to agree on one standard and use it in the same aligned way.

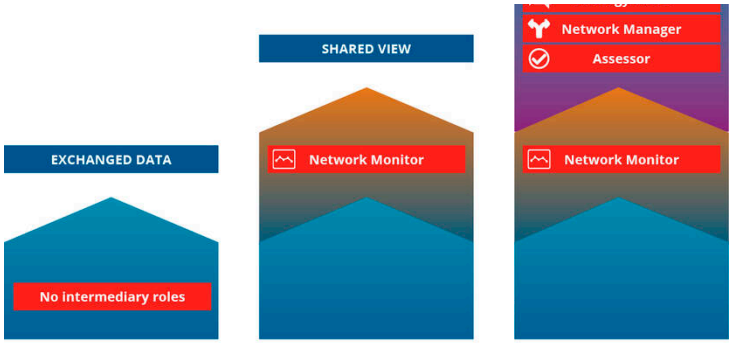
The main focus is exchanging information with the aim of obtaining maximum information coverage for the end users.

The Shared View cooperation model

This cooperation model introduces the concept of 'shared view'. The 'shared view' is a common situational or operational picture with a ground truth. This means that all involved parties, public and private, contribute to and can operate on the same consolidated information.

The Network Monitor is introduced here as a new intermediary role. Each party can choose to use the shared view and use it in its own services to communicate with the end user.

Cooperation models plus intermediaries

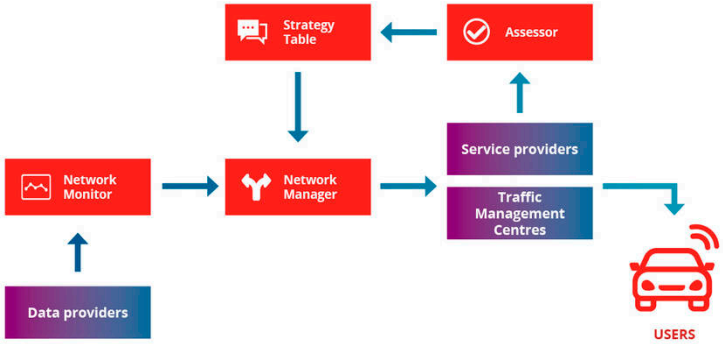


The Coordinated Approach cooperation model

In the Coordinated Approach, the partners identify common problems and develop solutions based on coordinated actions from all parties involved to achieve a set of agreed common goals.

The Strategy Table, the Network Manager and the Assessor are additionally introduced here as new intermediary roles. The challenge is to align public and private goals towards common goals and jointly develop coordinated services to achieve these goals. A reward system can be part of the Coordinated Approach to stimulate contribution from the parties involved including travellers.

Intermediary roles



New intermediary roles

The main new building blocks for the cooperation models are the intermediary roles. A role is defined as a set of tasks that need to be carried out together to create added value for the cooperation. The application of the SOCRATES$^{2.0}$ framework is flexible and adaptable to suit regional situations.

Four new intermediary roles were created to enable a public-private cooperation:

Video: SOCRATES$^{2.0}$ Animation on the Intermediary Roles

Download deze video

Uitgeschreven tekst

Network Monitor

The Network Monitor is especially useful if multiple data providers participate and a shared view is of added value to service providers and TMC's. To this end, the Network Monitor collects data from road authorities and private data providers and determines the shared view for the agreed network. In this process, the Network Monitor can perform data handling tasks such as quality assessment, data completion and fusion of different public-private sources according to use case and business requirements. Furthermore, the Network Monitor distributes the shared view (e.g. actual volume and speed data) to other intermediary roles and agreed parties. Partners can then base their own services on a higher quality shared view.

Strategy Table

The Strategy Table develops agreed common goals based on the individual interests of participating parties. The balance between common and individual goals is essential for sustainable cooperation. Strategic KPIs are derived from the common goals to steer the Network Manager. Based on Assessor reports, the Strategy Table monitors the performance of the cooperation and can make adjustments if needed. Partners agree on what services they can deploy and make them available in the so-called Toolbox for the Network Manager.

Network Manager

The Network Manager uses the common situational picture from the Network Monitor and the KPIs from the Strategy Table to determine inefficiencies or problem states on the network. Based on this insight, the Network Manager uses algorithms to select available services (from the Toolbox) that can solve or alleviate the situation. Then, the Network Manager sends out coordinated service requests to all service providers and TMCs to help alleviate the problem. Service providers and TMCs are responsible to carry out the solution (e.g. through individual routing and roadside equipment settings).

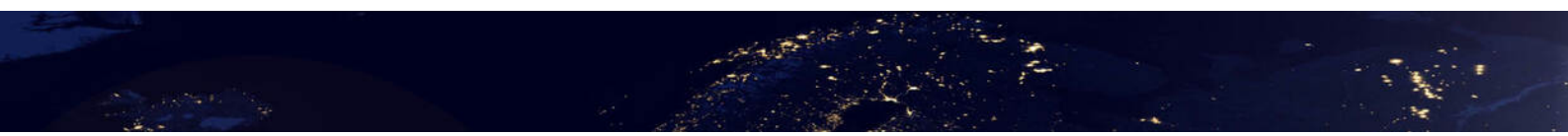
Assessor

The Assessor supports the Coordinated Approach by providing the Strategy Table (and the Network Manager) with insights on the service performance based on data and information individually collected by all partners involved in delivering the service. The Assessor translates them into the predefined goals and KPIs. The partners seated at the Strategy Table use the validated insights from the Assessor for data-driven strategic decisions on how to improve the jointly developed services.

Read all the papers on the SOCRATES2.0 Cooperation Framework

- The role of the Network Monitor in the SOCRATES2.0 project (PDF)
- The role of the Network Manager in the SOCRATES2.0 project (PDF)
- Proactive Network Management in the SOCRATES 2.0 project (PDF)
- The role of the Assessor in the SOCRATES2.0 project (PDF)
- The role of the Strategy Table in in the SOCRATES2.0 project (PDF)

- **Read:** The full article on Assessor *(Thinking Cities magazine)*



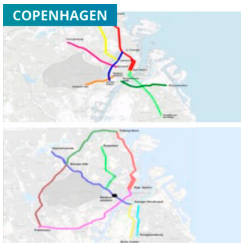
Deploying interactive traffic management

Amsterdam

The road network in the Dutch capital Amsterdam is a combination of national roads (A-roads), provincial roads (N-roads) and municipal roads (S-roads). Three road authorities operate here: the City of Amsterdam, the Province of North-Holland and the Directorate-General for Public Works and Water Management (Dutch: Rijkswaterstaat). All three road authorities have their own traffic management centre responsible for monitoring and controlling their road network. Data presenting traffic on these networks is gathered and distributed by the National Road Traffic Data Portal (NDW).

SOCRATES 2.0
FAST SAFE GREEN

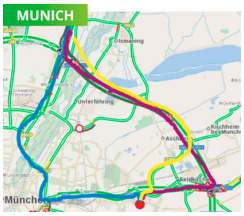
Copenhagen



In line with government policy goals to turn Copenhagen into a carbon neutral city by 2025, the pilot in Copenhagen focuses on a multimodal interactive traffic management approach, which includes the integration of multimodal services. The ultimate challenge for the pilot site is to find an approach where interactive traffic management can succeed in using various data and service providers to significantly improve the level of service. The city of Copenhagen has one traffic management centre. It monitors the main city roads for cars and cyclists and is responsible for gathering and distributing data about traffic on the national road network.

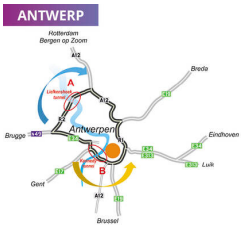
- **Video:** Proactive route advice in the Amsterdam region (YouTube)
- **Video:** Smart traffic and navigation services for safe mobility and a liveable Copenhagen (YouTube)

Munich



Munich is the capital of the German state of Bavaria. The Munich road network predominantly consists of the national and state roads in and around the metropolitan area of Munich (A-roads or *Autobahnen*, B-roads and a few lower-order roads, such as St2082). These are monitored and controlled by the traffic management centre of Bavaria. The national access point MDM is responsible for gathering and distributing data about the traffic on the national road network.

Antwerp



Antwerp, the largest city in Flanders, holds the main port of Belgium. This port is situated along the Scheldt, a large river that divides the city. On the main circular road around Antwerp cars can use two tunnels (A and B) to cross the Scheldt. In normal traffic conditions, there is an unbalanced use of the two tunnels. Where the Kennedytunnel has an average daily traffic volume of 160,000 vehicles, the Liefkenshoektunnel only gets around 40,000 vehicles a day. Since 2002, the Flanders Traffic Management Centre can suspend tolling at the Liefkenshoektunnel when there are incidents that seriously affect the traffic movement. The traffic management centre monitors and controls the national road network around Antwerp. It is also responsible for gathering and distributing data about the traffic on the national road network.

Deployment and operations of interactive traffic management

	Amsterdam pilot site	Copenhagen pilot site	Munich pilot site	Antwerp pilot site
Optimising Network Traffic Flow	Coordinated Approach	Coordinated Approach		Coordinated Approach
Smart Destination	Coordinated Approach	Coordinated Approach	Exchanged Data	
Speed and Lane Information				Exchanged Data
Road Works Information	Shared View		Shared View	Shared View
Environmental Zone Information	Shared View	Coordinated Approach		

Based on the services described later in this section, we conclude the following:

- From an end-user perspective, the services are focused on clear and direct information about the traffic situation and travel options. There are no hints about the underlying, sometimes complex processes of communication and negotiations between service providers, TMCs and intermediaries. This simplifies the user interaction and acceptance of the traffic management advice.
- In most end-user services, there is a freedom to follow and comply with a traffic management scheme. This is done by for instance actively accepting or denying a rerouting advice. Some services also offer a feedback function, verifying the acceptance and behaviour of a user. With the user being in full charge of their decisions, and allowing communication back to the service provider, this corresponds to our vision of the "customer as the CEO of their journey"
- We experienced that multiple service providers can operate in parallel in the same use case, even with different communication channels (smart phone app, in-car app, social media). This is important as we do not expect there to be a "one size fits all" end-user solution, but we need to utilise all existing and upcoming channels and technologies.

A total of 22,511 SOCRATES2.0 users have experienced the developed SOCRATES2.0 services

Optimising Network Traffic Flow (Amsterdam, Antwerp and Copenhagen)

Traffic congestion is common during peak hours in these three European cities. Also, the CO_2 emissions are high. Roadworks, big events, accidents and heavy weather conditions further reduce network capacity. These use cases focus on improving network performance through a better distribution of traffic

New SOCRATES$^{2.0}$ services

The service providers advise specific groups of travellers to switch routes to avoid traffic congestion. The reroute advice for individual road users often means a longer route, so some services use incentives to test how travellers can be persuaded to take another route. One such incentive is rewards in the form of a toll reduction voucher.

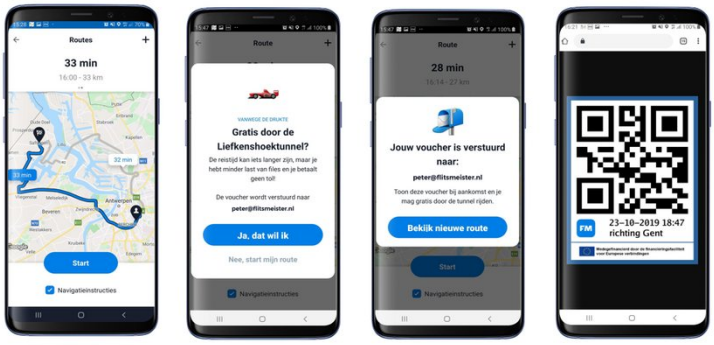
From function to product – Smart Tunnel Service (Antwerp)

Be-Mobile and BMW Smart Tunnel Service

- **Video**: SOCRATES$^{2.0}$ Smart Tunnel Service *(YouTube)*

The Smart Tunnel Service provides routing advice to travellers crossing the river Scheldt in Antwerp. If the toll reduction measure is activated, the routing engine in the navigation service will calculate an alternative route via the Liefkenshoektunnel and, depending on expected travel time on this alternative route, the end user will be presented with this option. When the user accepts the alternative route, the voucher is sent and, upon arrival at the Liefkenshoektunnel, they can have their voucher scanned by a toll booth operator and continue their route without paying a

toll.



Smart Tunnel Service by Be-Mobile

BMW Smart Tunnel Drive service

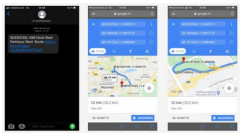
Smart Destination (Amsterdam, Copenhagen and Munich)

When an event is held in one of these three cities, the access roads often become oversaturated. These use cases aim for more satisfied event visitors by improving traffic flow distribution over space and time and offering users optimised dynamic parking guidance. Strategies of preferred routes and available parking facilities are aligned with the event managers and communicated to the users.

New SOCRATES$^{2.0}$ services

The service providers provide road users with smart individual route guidance. Public traffic management strategies are made available so the service providers can incorporate them into their navigation advice. Potential capacity bottlenecks along the network are identified, as are less desirable roads where pollution is overly high.

From function to product – Smart Destination service (Munich)



BrandMKRS Smart Destination service

BrandMKRS focuses on the user, which shows that individuals are presented with a genuine overload of information. An innate capacity to filter and order makes this information usable or not, and determines whether drivers follow up on that information or not. Both the source and form of the information have a huge effect on persuasiveness and impact. Advice from a good friend rates as most persuasive, so the best advice to relevant individuals is via trusted communication channels like WhatsApp and Google Maps.

The BrandMKRS service first targets and approaches users on social media, offers them the chance to opt-in to register, and provides them with relevant information.

The BMW Group service provides information via an in-car vehicle app. A pop-up appears in the main display when users pass specific geofence areas near the event and on the strategic route segments towards the event area. Users are asked whether they want to follow the strategic route advice towards the event area. If they accept, further in-car pop-ups appear and guide them on the strategic streets towards the preferred parking location as shown below.

BMW Smart Destination service

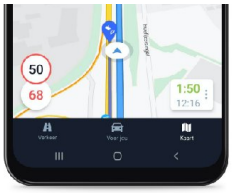
Speed and Lane Information (Antwerp)

Road users in the Belgian city are not currently informed in-car about temporary lane openings and closures. This use case aims to correctly show dynamic in-car lane information.

NewSOCRATES$^{2.0}$ services

The service providers distribute the state of dynamic lanes in-car in real time to enhance traffic safety.

From function to product – Speed & Lane



Be-Mobile's Speed & Lane Information service

Information service

A large part of the Antwerp motorway network has a lane control system that displays which lanes are open or closed to traffic and also shows speed limits. Be-Mobile's Speed & Lane Information service provides this information via corresponding images in their Flitsmeister app.

Road Works Information (Amsterdam, Antwerp and Munich)

Currently, service providers and road authorities do not have accurate enough information on roadworks in these three cities. Information is often erroneous, unreliable and insufficient, which leads to unpleasant surprises, congestion and delays. In these use cases, travellers, service providers and the road authority share data to establish a "ground truth" to see how much this improves the quality of the roadworks information.

Common Road Works picture

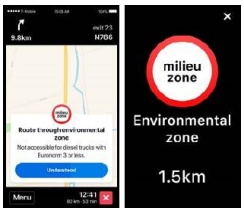
New SOCRATES$^{2.0}$ services

The roadworks intermediary service provider delivers common roadworks information based on public and private data. The location, type and timing of roadworks in a specified region are broadcasted to participating parties by means of a news feed.

From function to product – Common Road Works picture

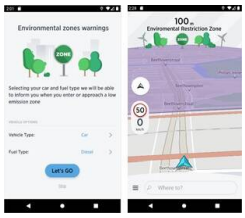
The intermediary service provider combines real-time roadworks information from public sources (planning and real-time data from building and maintenance contractors) and private data service providers (floating car data) into a common roadworks situational picture, including the location, type and timing of the roadworks. This service was tested with multiple public and private data sources in the context of local conditions in Amsterdam, Antwerp and Munich.

Environmental Zone Information (Amsterdam and Copenhagen)



Truckmeister

The use cases in these cities aimed to deliver better information about environmental zones to drivers. This helps them make better decisions, avoid running into surprises along the way and avoid getting fined. Green mobility was stimulated by providing information and advice to drivers so they can avoid certain parts of the city and reduce local emission values.



AmiGO

New SOCRATES$^{2.0}$ services

Several SOCRATES$^{2.0}$ partners developed environmental zone services based on shared information on access restrictions. When approaching an environmental zone, drivers receive warning messages on access conditions and are rerouted when they are not allowed to enter. Notifications and alternative routes are also sent to road users when certain roads are less ideal because of high pollution levels.

From function to product – Environmental Zone Information

Screenshots of Be-Mobile and TomTom demonstrating the newly launched functionality of the Environmental Zone Information use case in the Truckmeister app and AmiGO app.

Read more on the pilot site operations:

- The SOCRATES2.0 pilot in city of Amsterdam (PDF)
- The SOCRATES2.0 pilot in city of Copenhagen PDF)
- The SOCRATES2.0 pilot in city of Munich (PDF)
- The SOCRATES2.0 pilot in city of Antwerp (PDF)

Watch the video's in the SOCRATES$^{2.0}$ Services:

- *Copenhagen*:
  Smart traffic and navigation services for safe mobility and a liveable Copenhagen *(YouTube)*
- *Amsterdam*:
  Proactive route advice in the Amsterdam region *(YouTube)*

- **Read:** The SOCRATES2.0 Consolidation Report (PDF)
- **Read:** The full article on Traffic efficiency in Amsterdam *(Thinking Cities magazine)*

Navigation service with information on environmental zones in the Amsterdam region (*YouTube*)

- *Antwerp*:
  SOCRATES2 0 Smart Tunnel Service (*YouTube*)

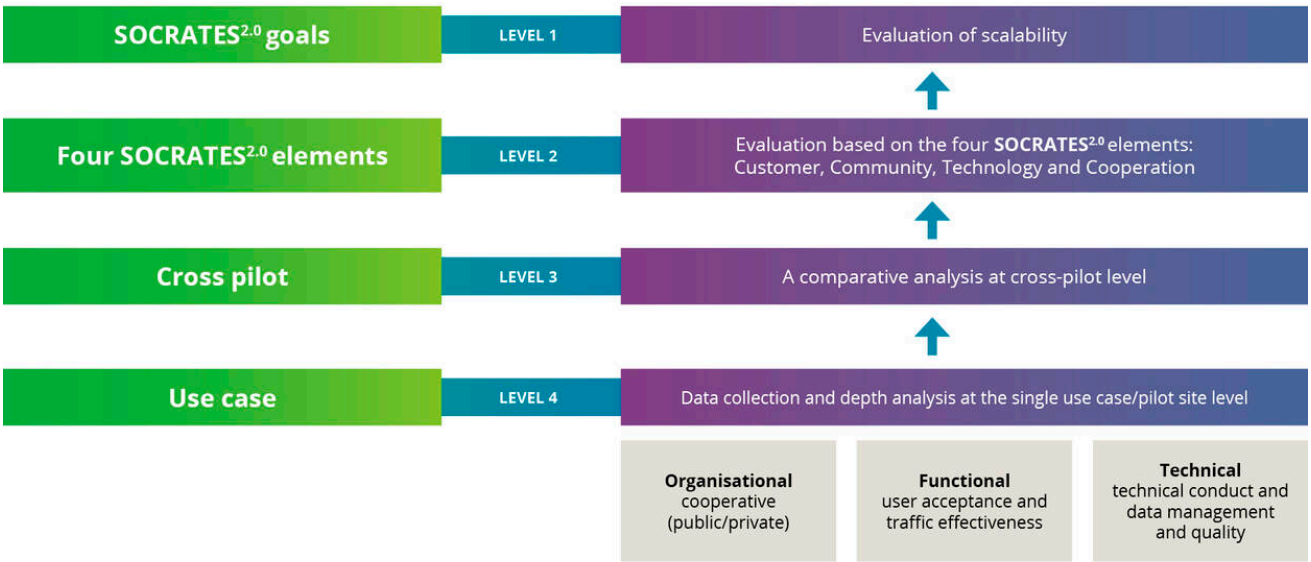
Co-financed by the Connecting Europe Facility of the European Union

What we learned

Evaluation of SOCRATES2.0

To learn and gain insight on deploying interactive traffic management, the SOCRATES$^{2.0}$ partners collected and evaluated relevant deployment data and assessed their experiences in the four pilot cities. The results of this evaluation are presented in the SOCRATES$^{2.0}$ Final Evaluation Report and summarised here.

- **Read:** The SOCRATES2.0 Final Evaluation report (PDF)



Sharing data, improving services

Major traffic management improvements require a step-by-step approach. The SOCRATES$^{2.0}$ partners consider public–private cooperation to be a crucial step in this process. All parties in the project ecosystem were open to cooperation. That is profit in itself.

To start, road authorities should provide public policy objectives (e.g. safe, smart, green), traffic management strategies and response plans. It is important for service providers to be able to explain to their customers why a traffic management measure is needed. However, the availability of such data is no guarantee that private service providers will consider these strategies in their navigation services.

Deploying interactive traffic management in the pilots gave the partners insight into what is essential for successful cooperation. They concluded that the newly developed cooperation models enable cooperation at various levels. This is needed, because a pragmatic or more elaborated model may be more suitable depending on goals, missions and needs of the cooperation. Partners consider the application of one of the cooperation models and their associated intermediary roles to be the main building block for deploying interactive traffic management.

Merging public and private data leads to improved traffic information services, and coordinating these services via the public-private cooperation leverages the potential to increase the number of road users that have access this information. And because road users seem receptive when given the right incentive, this also increases the potential impact on the network performance.

'The availability of such data is no guarantee that private service providers will consider these strategies in their navigation services'

Follow-up actions for making the concept of interactive traffic management sustainable are first and foremost related to finding a win-win-win. The added value for all parties in the ecosystem has not been sufficiently clarified, and there is therefore also a limited view on what the public–private business model could look like. The idea of, for example, an impact-driven business model is promising but needs further exploration.

Impact of new measures and services

'The idea of, for example, an impact-driven business model is promising but needs further exploration'

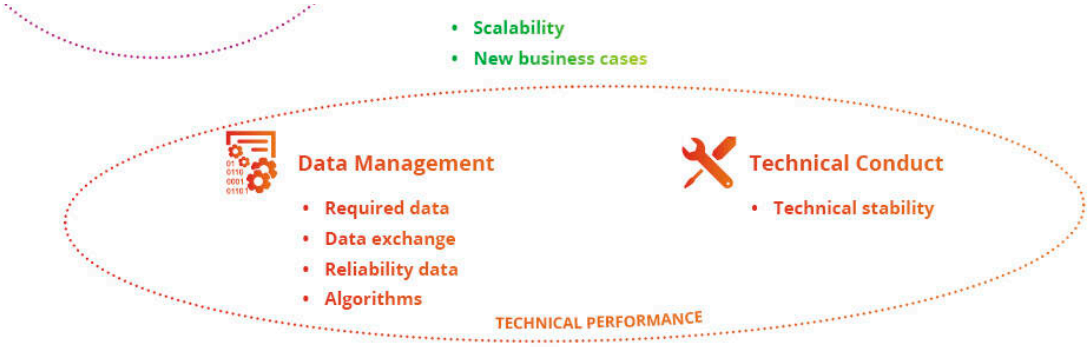
Within SOCRATES$^{2.0}$ a mix of regional, specific and generic solutions was created to implement services. The effort required for this proves that actual scalability remains difficult. No two implementations are the same, so the same effort would be required every time an end user service is deployed in a new region. However, the smart routing service coordination seems promising for all parties, as it creates more strategic routing which in turn leads to a smoother, safer and more sustainable traffic flow. And, interestingly, the concept of interactive traffic management can also be combined with a multimodal approach.

The impact of interactive traffic management is highly dependent on the follow-up rate and the user base. SOCRATES$^{2.0}$ introduced a new feedback loop that allows for the measurement of this type of information from service providers, a necessary component for valuing the impact of new services. When the service providers give traffic management advice, individual road users often trust, accept and respond to this advice. This complements the current methods used to reach road users like road signs provided by road authorities.

Value of the cooperation framework

A well-detailed cooperation framework is essential in interactive traffic management: what could each of the partners contribute to and take from the cooperation? It is also important to agree on the rules of engagement. Trust between parties is essential to make interactive traffic management work. The higher the quality of the data and information shared, the higher the trust in the cooperation and the willingness to accept recommendations. Data exchange is a precondition for upscaling, but standardisation of traffic-related information is needed to make data available (e.g. through a national access point) and organise the exchange. In SOCRATES$^{2.0}$ a lot of standardisation issues were experienced and are promoted to be dealt with on a larger scale than is currently done.

Deploying interactive traffic management is much more than scaling up innovation. It also requires a mind-shift about the traditional roles and responsibilities of traffic management actors. The role of both road authorities and service providers is changing. Governments continue to play an important role in formulating societal goals, but the service providers are willing and able to make an important contribution to societal goals. Both stakeholders need each other to improve their services for road users, and therefore need to work together as equal partners.



Generating impact: the Be-Mobile Antwerp example

The Optimising Network Traffic Flow (ONTF) service developed in Antwerp offers a new communication channel for sending traffic management strategies to travellers. The ultimate objective is to generate impact on the road authorities' goal to improve the distribution of traffic over the two tunnels crossing the river Scheldt in Antwerp, by shifting specific travellers from the Kennedytunnel to Liefkenshoektunnel.

Compared to traditional solutions, a huge advantage of the developed service is that it allows for the targeting of individual travellers. Alternative routes can be offered via the Liefkenshoektunnel and corresponding vouchers can be provided for toll-free entry for specific travellers, for example, travellers who had an original route via the Kennedytunnel. This targeted toll reduction is far more cost-effective compared to a general toll reduction. It is also possible to limit the number of shifted travellers to predefined constraints.

The developed end-user services can create a significant impact on the set objective.

The impact is the result of a number of factors and can be summarised as follows:

*IMPACT RATE=OFFER RATE*ACCEPTANCE RATE*FOLLOW UP RATE*

The offer rate represents the probability that a user is offered a voucher when they take a route through the Kennedytunnel when the Smart Tunnel Service (or ONTF toll reduction service) is active; the acceptance rate represents the probability that a user accepts the voucher when offered one; the follow-up rate represents the probability that the user will follow-up on the acceptance of the voucher and avoid the Kennedytunnel.

The key takeaways can be summarised as follows:

- The service reached almost 8000 unique users. Uptake of the service was severely impacted by COVID-19 and COVID-19-related measures.
- Almost 70% of trips resulted in a voucher being offered to and accepted by the user. The offer rate is 78%, and the acceptance rate 88%.
- More than two thirds of users ended up avoiding the Kennedytunnel (most taking a route via the Liefkenshoektunnel instead). The follow-up is estimated to be 69%. Follow-up rates are lower when the route via the Liefkenshoektunnel is slower than the original route via the Kennedytunnel, but are still considerable even in this case.
- The data suggests that the service diverts 47% of targeted users away from the Kennedytunnel.

In conclusion, the analysis suggests that the Smart Tunnel Service can have a considerable impact on a traveller's incentive to take the Kennedytunnel at peak hours. Users will typically be inclined to accept and use a voucher, even if travel times via the alternative route are somewhat higher. The eventual impact on rebalancing the traffic load between the Kennedytunnel and the Liefkenshoektunnel depends on the size of the targeted population. If say 5% of the traffic that intends to go through the Kennedytunnel can be reached, then the analysis suggests that around 2.5% of all traffic can be diverted away from the Kennedytunnel.

The business side

A win for all

SOCRATES 2.0 partners believe that deployment of the SOCRATES 2.0 vision will lead to a win-win-win situation for all actors in the traffic management ecosystem:

Win for the road user:

- receiving the best route options based on interactive traffic management principles
- receiving aligned traffic information provided on-trip to road users, eliminating confusion on today's conflicting roadside and in-car information
- having the chance to provide feedback to the traffic management operators on the current traffic situation
- feeling like real customers of traffic infrastructure providers

Win for public traffic management centres:

- substantially optimise traffic management operations
- being part of a holistic traffic management ecosystem, considering the expertise and assets of different parties and market players

Win for private service providers:

- expanding their services to seamless door-to-door traveller assistance
- serving innovative use cases
- taking on active responsibility to improve traffic efficiency and safety
- keeping the competitive freedom how to set up services towards the travellers

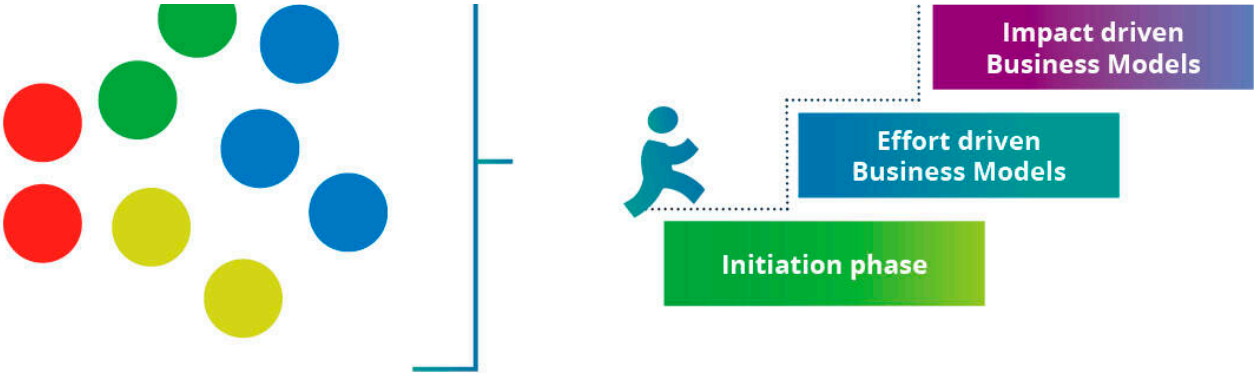
Staged business building

Based on lessons learned and experiences from four pilot sites, multiple business ideas emerged for the SOCRATES$^{2.0}$ Coordinated Approach cooperation model. First and foremost, trust needs to be built between partners before such cooperation can be effective.

The business-building process was structured by defining three stages: initiation phase, effort-driven business model and impact-driven business model.

PILOTSITE BUSINESS MODELS

SOCRATES$^{2.0}$ BUSINESS MODELS



Initiation phase

This stage enables cooperation between partners who are not yet familiar with each other. At the start of a new cooperation, all the public and private organisations involved share their initial insights and knowledge of the problem or needs. They also introduce their proposals and available resources (e.g. services, systems) that can contribute to solving the problem. The decision to proceed with a cooperation should be based on a positive joint assessment that the sum (or combination) of the presented proposals and resources is valuable and contributes to the solution of the problem. When partners agree on the role distribution, the Strategy Table should be the first active role to start working on a shared vision, common goals and strategic KPIs.

The shared vision builds on the principle of creating benefits and new value for all stakeholders. The quantification and valuation of these benefits are the elements that define the 'win' for each of the stakeholders. To cover the initiation costs, a governmental subsidy or investment is advised.

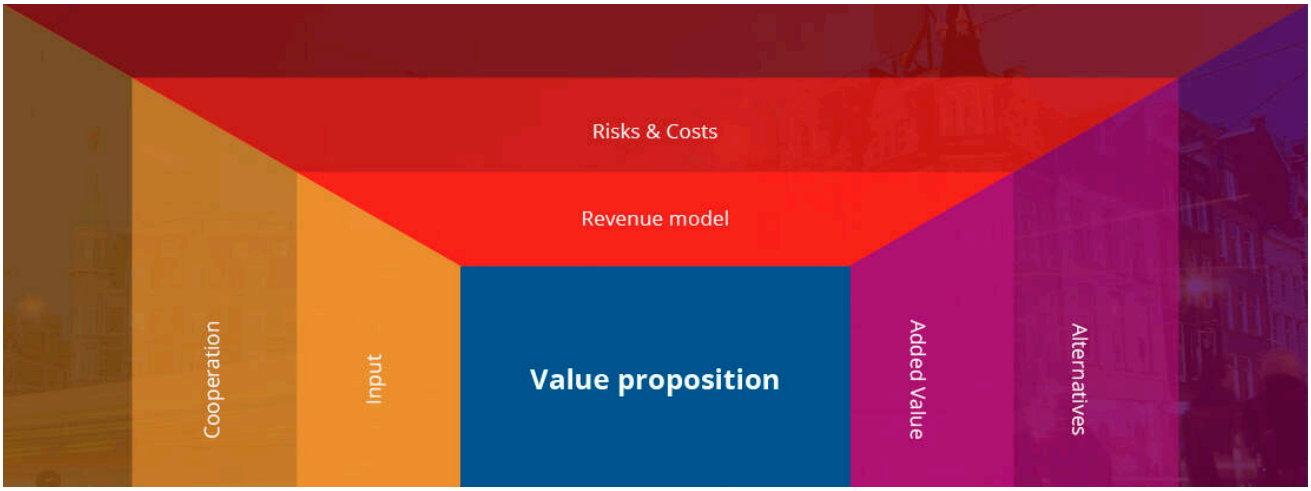
Effort-driven business model

The effort-driven business model empowers an already initiated or established cooperation. The goal would be a more effective cooperation by aligning goals and services. It is assumed that the public road authority is the most suitable partner to lead the orchestration of the cooperation and ensures commitment for a longer period. The cooperation should also be transparent and open for newcomers. In order to reach sustainable cooperation, a legal framework is needed for governmental spending and procurement and keeping a level playing field for private companies.

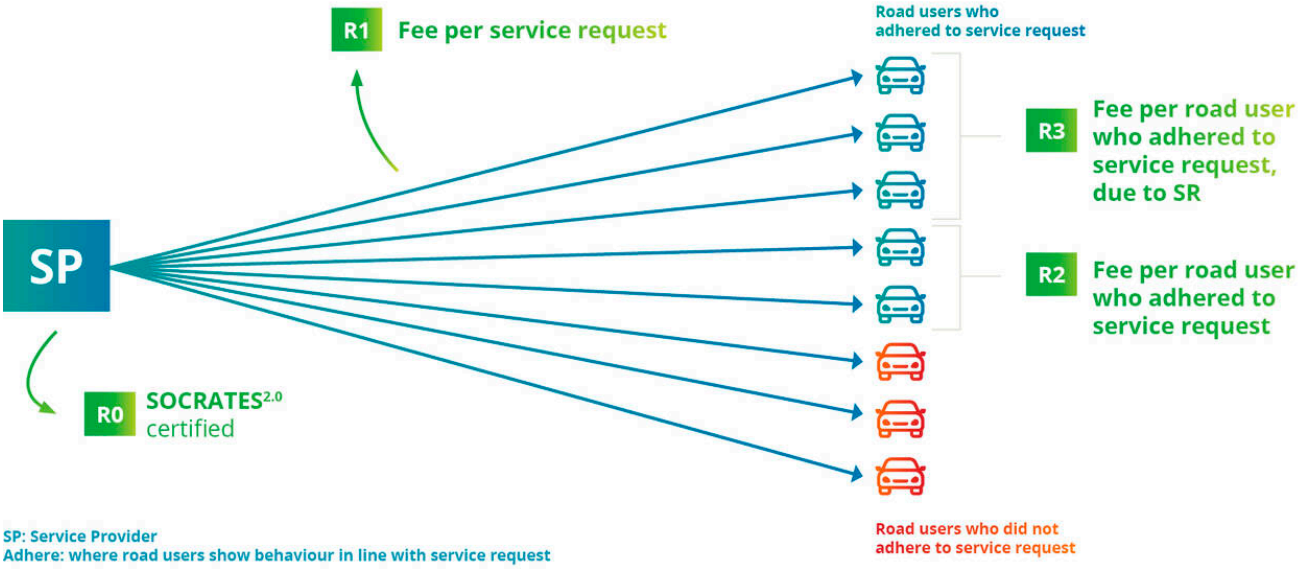
The main business case for private service providers is an effort-based reward for service requests. They receive compensation for sending coordinated advices to their users, regardless of the generated impact.

Impact-driven business model

This model supports sustainable cooperation for an effective and efficient execution of traffic management. The main goal of the cooperation is a common value proposition. All partners work closely together and maximise the added value for the whole chain.



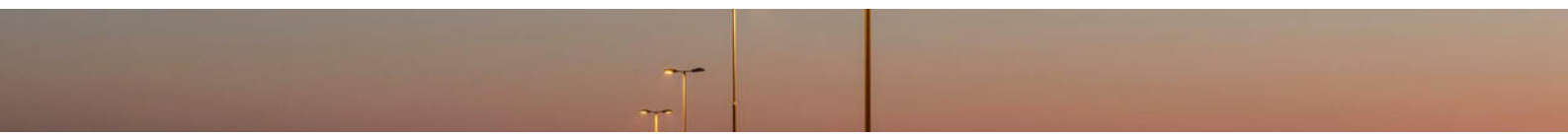
Starting with public goals, government investments are needed for the initiation. The main business case for private service providers is an impact-based reward for service requests. Compensation depends on measurable impact on traffic. This creates an incentive for service providers to maximise impact using re-routes, for example. It aligns the objectives of service providers with those of road authorities. Service providers can nudge or incentivise their users to increase follow-up behaviour and impact. Service providers are often better placed to create impact more effectively and cheaper, since they can target specific users and apply creative concepts like gamification.



Together with traffic management centres, a strong alignment of private and public services can be created. So, a large impact can be expected on public and private goals, making traffic management more cost-efficient and effective.

Learn more on Incentives and Rewards:

- Rewards and Incentives in the SOCRATES2.0 project (*Powerpoint*)
- The Antwerp Voucher System in the SOCRATES2.0 project (*Powerpoint*)



Reflection on the concept of interactive traffic management

Opportunities and challenges

SOCRATES$^{2.0}$ is paving the way for the next generation of traffic management. On the path ahead lay several opportunities that facilitate or accelerate the concept of interactive traffic management. There are also challenges and bottlenecks, which can delay or even hinder some envisioned goals. When starting SOCRATES$^{2.0}$, the partners identified these opportunities and challenges with the knowledge that addressing them all in this project would go far beyond the scope. However, several crucial reflections on these opportunities and challenges were identified when implementing interactive traffic management in real-world environments. These are detailed in the SOCRATES$^{2.0}$ Consolidation Report and are summarised here.

- **Read:** The SOCRATES2.0 Final Evaluation report (PDF)
- **Read:** The SOCRATES2.0 Consolidation Report (PDF)

Data standards

Even with accessible data of good quality, using a standard for data exchange in a harmonised way is vital for interoperability and scalability across users and deployments. This saves deployment efforts and increases acceptance by (potential) data re-users. However, working with a standard that is not commonly used is challenging. Fostering and improving harmonisation across Europe is key to tackling the issue and enabling a further roll-out of interactive traffic management.

Availability of data

In interactive traffic management, data availability, data quality and exchange are the cornerstones for successful implementation. Data and information need to be available about any transport infrastructure element and from any corresponding stakeholder. However, looking at medium and small-size municipalities in Europe, traffic management-related information is not always digitalised sufficiently or even at all. In this context, stronger support and investment are an on-going requirement for the technological advancement of the transport network and related authorities, such as via sensors and TMCs.

Data availability is also essential for impact-driven approaches, where the involved stakeholders are incentivised to contribute and their successful operation is measured. This relates to data and information about the efficiency and reaction of road users in terms of traffic management measures. The SOCRATES$^{2.0}$ partners see this as a relevant topic for future activities, such as examining whether frameworks and mechanisms to make end-user-based and service-provider-based data available in a wider scale is feasible.

Product life cycle

Reflecting on the implementation of the SOCRATES$^{2.0}$ pilots shows that not all technical aspects are ready for interactive traffic management.

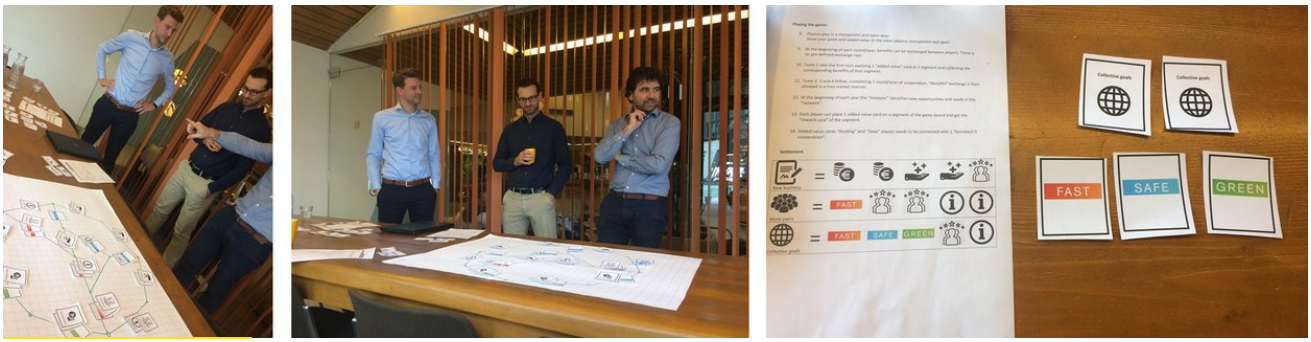
Existing TMCs, especially the older ones, sometimes struggle to deal with new interfaces or use and process new data, mainly because of the old software architectures. In the worst-case scenario, this could impact the Europe-wide roll-out of interactive traffic management solutions. A major observation was that using existing standards helps overcome connectivity issues and helps interact with third parties in a standardised way.

Another technical bottleneck is the still very limited penetration rate of connected cars with services of suitable capabilities to interact with traffic management and TMC's. This makes it almost impossible to measure the impact of interactive traffic management solutions and so creates a barrier to promoting solutions. Also,

product life cycle management from connected vehicle services need to be considered. A significant run-in period is needed before new services can be integrated into a commercial offering.

Return on investment

Public and private parties both need economic justification for investments in technical infrastructure and additional data sources or services extensions. SOCRATES$^{2.0}$ therefore places a strong emphasis on identifying the win-win-win for all involved parties (public, private, and not to forget the end user) as early as in the pilot preparation phase. All parties agreed that a convincing win-win-win situation was needed to appeal to parties to invest or adopt interactive traffic management solutions.



Partners playing the win-win-win game

Business models

The lack of appropriate business models is the main obstacle for the successful introduction of interactive traffic management solutions.

Several approaches were discussed:

- Most promising is the impact-driven business model for the Coordinated Approach cooperation models. In this model, all involved parties are remunerated based on their contribution to achieving commonly agreed targets. At the Antwerp pilot site, SOCRATES$^{2.0}$ successfully developed and applied this approach but the very specific local conditions made the model possible here.

- SOCRATES$^{2.0}$ also implemented data exchange as a basic approach for a business model. It should be noted that this was possible due to the specific pre-commercial environment in which partners operated, and additional contractual agreements may be needed outside pilot situations.

- Sharing a common view allows for a specific approach, where all parties have access to the same information and can distribute this information to their customers. The result is a uniform state of knowledge at the end-user level. The Environmental Zone Information use case, as implemented at the Amsterdam pilot site, demonstrated the added value of the information provided by the road authorities, incorporated into the applications of the private service providers and thus maximising the reach to the road users.

Further work is needed and details of the follow-up activities are described in the SOCRATES$^{2.0}$ Consolidation Report.

Privacy concerns

When it comes to data privacy, SOCRATES$^{2.0}$ partners learned quickly that General Data Protection Regulation (GDPR) measures can restrict service providers from measuring service usage and impact. Tracking people and their behaviour is a very sensitive topic and requires the consent of the end user. Services providers have different approaches for the topic and finding a suitable one for interactive traffic management will be a prerequisite for the further elaboration of impact-driven business models. The road authorities expect transparent information on impact for their money. Getting prior consent is therefore recommended before starting projects that require information on individual user behaviour. This will not only

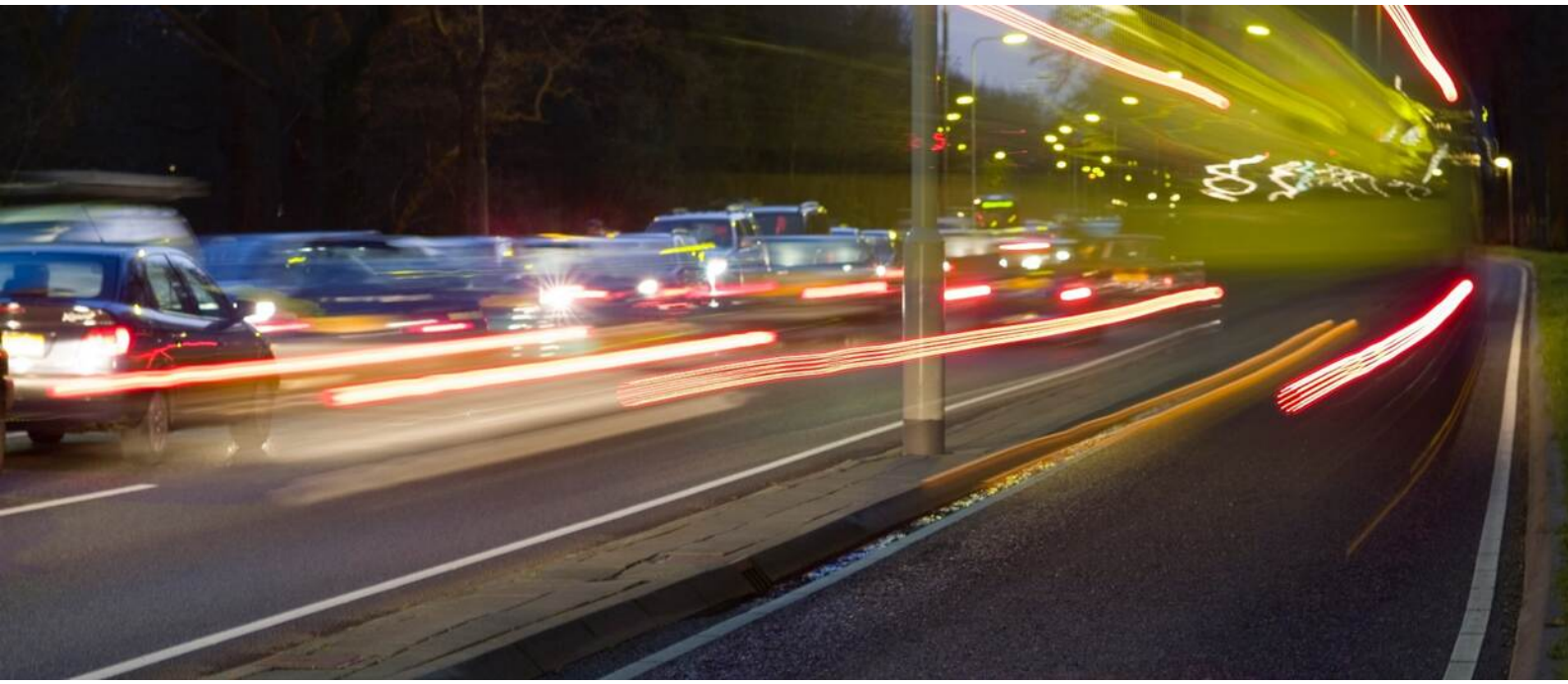
increase user acceptance but also limit the risks of project execution.

Liability concerns

Faulty or inaccurate data or information and malfunctioning systems can have a severe impact on service execution in interactive traffic management. It can lead to legal and liability implications for the actors involved, and in the worst-case scenario, result in complicated legal trials and high costs. This is especially important for use cases providing legally binding information. The liability aspect needs further elaboration and is expected to be a complex topic. It involves multiple public and private stakeholders and may include several communication channels with different responsibilities.

Data ownership

Data ownership could also present a challenge in the ecosystem of interactive traffic management. Answering questions like who owns, can access, uses and is liable for the data may become more complex if parties have a third party aggregating their data to create a common view. A legal framework may be required to avoid misunderstandings and cover the liability and rights of sharing content. It is strongly recommended this aspect be further explored and suitable solutions be found for interactive traffic management. Not doing this could jeopardise successful implementation.



Experiencing public-private cooperation in SOCRATES2.0

The cooperation framework

Partners believe the cooperation framework developed in SOCRATES$^{2.0}$ has laid the foundation for future deployment of interactive traffic management. It is an understanding built on trust and a common language and we consider it the first step towards a reference architecture for interactive traffic management. The partners designed and deployed relevant building blocks including the intermediary roles that led to new and enhanced services for road users.

The interactive traffic management concept offers an effective tool to increase the number of road users who have access to relevant and aligned information. When provided with the right incentive, road users seem receptive to following advice from the SOCRATES$^{2.0}$ services. This contributes to the potential impact on the traffic state, thus creating effective and efficient traffic management opportunities. Several functions and services developed in SOCRATES$^{2.0}$ are so successful they will be used in future projects and applications beyond SOCRATES$^{2.0}$.

'What is new in SOCRATES2.0 is public–private partnerships where private end-user services can be used to pursue aligned public–private goals. The potential is clear to the SOCRATES2.0 partners, but the challenge remains to identify the win-win-win for all stakeholders. And to find suitable business models.'

New in SOCRATES2.0

In SOCRATES$^{2.0}$ the partners operate in a special, pre-commercial environment. This removed obstacles and enabled partners to go beyond the state of art. These specific circumstances eliminated the need to elaborate appropriate business models and set up specific terms and conditions for the public–private cooperation in advance. As such, the partners could find solutions that benefited all and were based on partner equality.

The development and testing of the cooperation framework and its intermediary roles was new to all partners. Partners also invested in the exchange of new types of data, using and advancing standards, developing and deploying new end-user services that include traffic management objectives, testing traffic predictions, measuring user acceptance and service performance and carefully experimenting with incentive schemes.

Win-win-win

The SOCRATES$^{2.0}$ consortium placed a strong emphasis on identifying the win-win-win for all involved parties (public, private and, not to forget, the

end user). They agreed that a convincing win-win-win situation was needed to interest investors. Partners conclude that the main challenge now for the successful introduction of interactive traffic management solutions is finding the right business models to support the win-win-win. Further work on value insights is needed to support this.

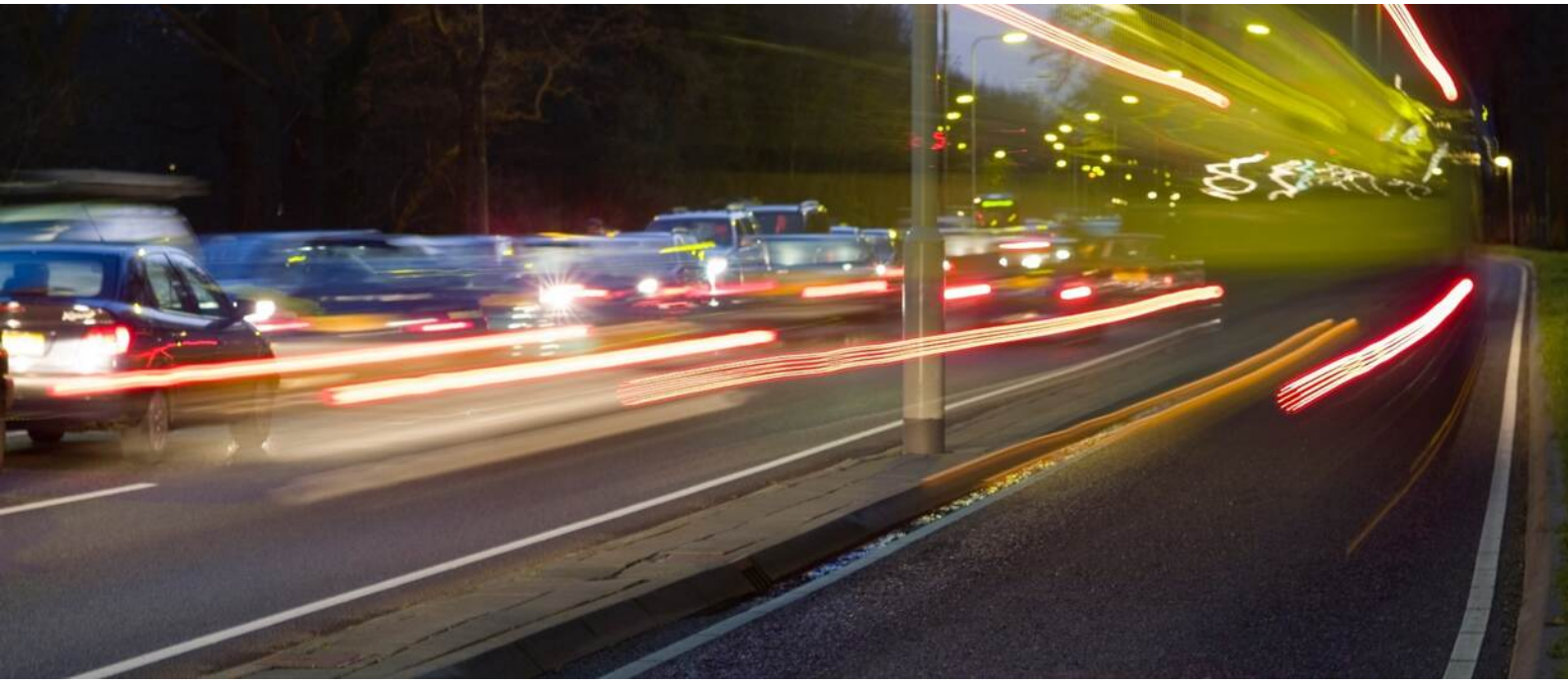
An impact-driven approach seems the most promising business model for the Coordinated Approach cooperation model. This model remunerates all involved parties based on their contribution to achieving commonly agreed targets. The novelty of this approach as well as the required, but lacking, data on value has meant that SOCRATES$^{2.0}$ has not yet been able to develop an impact-driven business model.

Future deployment

Creating the cooperation framework within SOCRATES$^{2.0}$ has been a joint journey. Each of the partners has mastered the cooperation models and intermediary roles and has been inspired by the opportunities the collaboration provides. The partners look forward to liaising with interested stakeholders to demonstrate the value of the cooperation framework and improve it with further use cases and experiences.

- **Read:** SOCRATES$^{2.0}$ digital magazine (PDF)

The cooperation framework inspired the SOCRATES2.0 partners in their collaboration. The partners look forward to applying it in follow-up initiatives together with new stakeholders so they can demonstrate its value and improve it with further use cases and experiences.



After SOCRATES2.0

The partners look forward to undertaking already existing and new follow-up initiatives after the project together with (new) stakeholders, to demonstrate the value of the cooperation and improve it with further use cases and experiences and, eventually, make the concept sustainable and fully accepted.

Several crucial follow-up activities were identified. These are detailed in the SOCRATES$^{2.0}$ Consolidation Report and are summarised here.

Data standards

A common digital language, to communicate traffic management-related information between the various partners, is a crucial building block to enable the concept of interactive traffic management. Within the SOCRATES$^{2.0}$ project part of the work was to harmonise the data messages being communicated in our pilots, in terms of data structure and data content. However, such harmonisation work is only a small part of the puzzle within the wider scope of stakeholders and use cases. So, further validation and enhancement for future deployment on an EU-wide scale is necessary and addressed in the new EU-funded UVAR and NAPCORE projects.

Further exploration of the SOCRATES2.0 Cooperation Framework

Based on lessons learned and the experiences from four pilot sites, multiple business ideas emerged for the SOCRATES$^{2.0}$ cooperation models. The most innovative and promising examples were an effort-driven business model and an impact-driven business model, where the main goal is to create a common value proposition.

Within the project we learned that the win-win-win is not easy to find. Incentives and rewards are assumed to be part of the solution as well as the currently lacking methods of measuring service usage and follow-up behaviour. Also, a win-win-win is not per se a monetary value, but can also be an increased user base or improved service offering smarter routes or destination recommendations.

Partners experienced the great potential of the concept and look forward to applying it in follow-up initiatives together with new stakeholders. We feel this requires detailing proper foundations for business models, with a focus on a multi-party cooperation with public and private partners in the traffic management domain. Among other aspects, this would cover new procurement, contractual and rewarding schemes. The value of that kind of integration needs to be further demonstrated with new use cases and experiences that provide more insight into the win-win-win and further elaborate on the business perspective.

Regulation and legislation

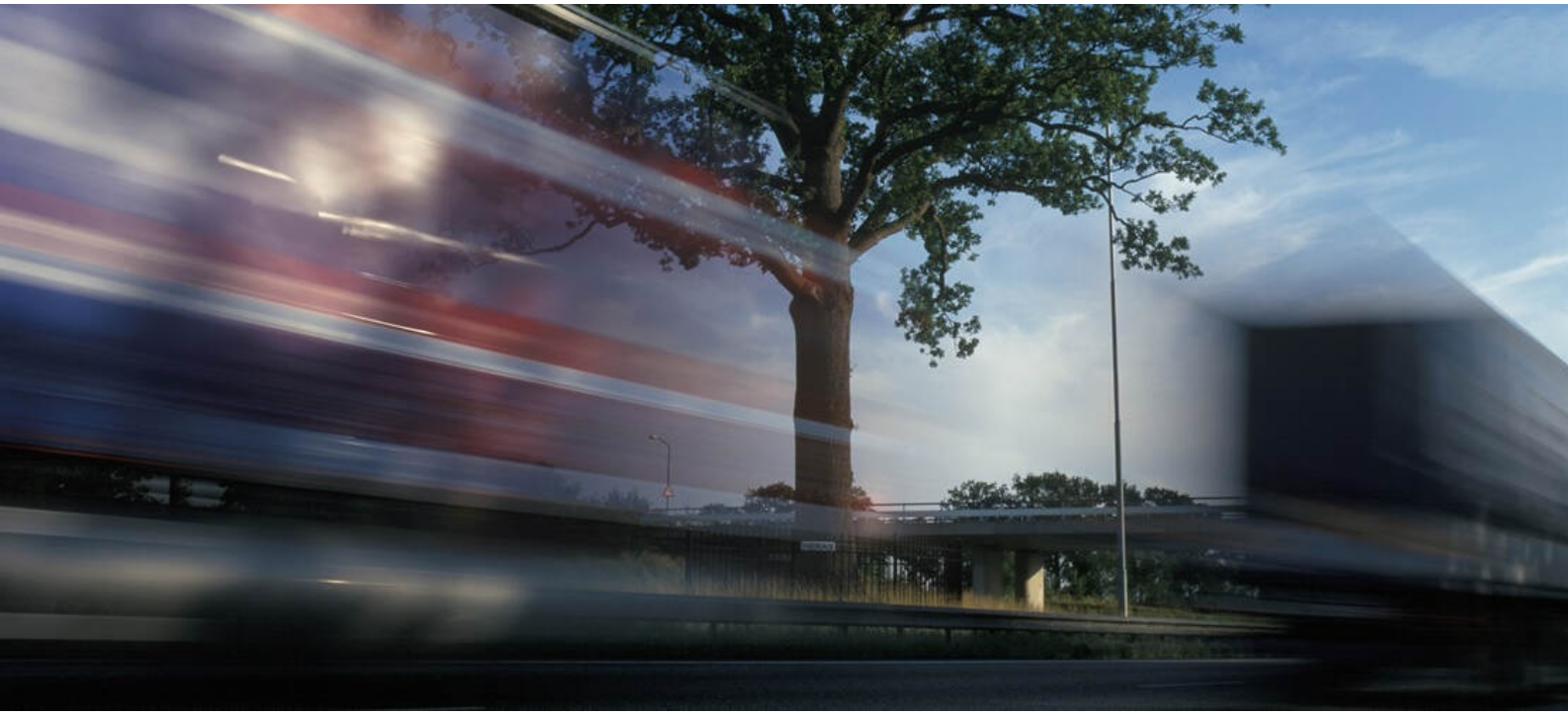
An important framework for regulation and legislation in the context of interactive traffic management is the EU ITS Directive and its Delegated Regulations. It has

the potential to facilitate the pre-requisites for the Exchanged Data cooperation model, especially when considering the extension of the geographical scope and data types to the urban environment. We expect that the mandate on making this data available in a standardised format via National Access Points will accelerate the interactive traffic management concept. That is provided appropriate and sufficient data offers are made available by the various data providers addressed by the regulations. Motivated by the EC funding, the SOCRATES$^{2.0}$ consortium is spreading knowledge on related learnings in a wider scale to advance both the concept and the practical realisation of the EU regulations. The latter was showcased by data offers on National Access Points established in our pilot deployments.

Sustainability goals

Other relevant EU frameworks at a strategic level are EC's Sustainable and Smart Mobility Strategy 2020 and Data Strategy and the EC's White Paper on Artificial Intelligence. SOCRATES$^{2.0}$ covers many topics, such as digitalisation and access and use of data, that aim to generate business opportunities, innovation, new services and business models, and create safer and cleaner transport systems via data-driven applications. SOCRATES$^{2.0}$ also addresses the sustainability goals of these frameworks in a practical way, for example in the Copenhagen pilot, where one of the Network Manager's roles was to foster sustainable travel modes. SOCRATES$^{2.0}$ developed several building blocks that promote the EC's strategic goals and will also be in operation beyond SOCRATES$^{2.0}$.

- **Read:** The SOCRATES2.0 Consolidation Report (PDF)
- **Read:** SOCRATES2.0 digital magazine (PDF)



Fast, safe and green

Throughout the project, the SOCRATES$^{2.0}$ partners ensured strong interaction between SOCRATES$^{2.0}$ activities and relevant experts to bring strategic thinking expertise on new concepts for mobility and traffic management, but also provide complementary knowledge and experiences to the project.

Finalising the project, the Director Investment, Innovative & Sustainable Transport at the European Commission, a member of the SOCRATES$^{2.0}$ Advisory Board, the chair of the TM2.0 platform and the head of the CEF Unit "South West Europe, BeNeLux + Innovation, ITS and RIS" at CINEA reviewed the results, placed them in the broader context of European policy goals, the mobility ecosystem and future scenarios of connected and automated driving and provided their findings.

Hereunder the SOCRATES$^{2.0}$ partners proudly present these four essays as valuable additional context for the journey on discovering how to shape public - private cooperation in a future of interactive traffic management.

Author

Mr. Herald Ruijters

Director for Investment, Innovative & Sustainable Transport

European Commission, DG Move

European Commission and SOCRATES2.0: Stepping stone to the future of mobility

The themes at the core of the work in SOCRATES$^{2.0}$, "fast, safe, green", are also at the heart of the European Commission's policy work set by the Sustainable and Smart Mobility Strategy. The goals of alleviating congestion, reducing casualties on European roads and migrating towards sustainable ways of travel and transport are underpinned in the actions to be undertaken in the coming years as the strategy unfolds into the concrete initiatives.

The strategy's objectives, sustainable, smart and resilient, with their respective international components, rely on digitalisation and cooperation between stakeholders to become a reality. SOCRATES$^{2.0}$ has been exemplary in showing us the benefits of both: digitalisation as the driver for innovative solutions and public–private cooperation as the prerequisite for a successful outcome of the project.

This is also visible in the latest developments in the field of Intelligent Transport Systems (ITS), which is coming of age, reflected in the revisions of the related legislations. Advancing digitalisation by updating requirements on data types, quality, availability and geographical scope will serve mobility users through improved traffic and travel information services. In turn, these will give us less congestion, safer roads and more choice in terms of modes and routes.

'By acknowledging that public or private organisations cannot solve today's problems in the mobility sector by themselves, space for exploring synergies and new roles has been created'

That is precisely why the experience in SOCRATES$^{2.0}$ has been very valuable: the goal to leverage public–private opportunities in order to reach these objectives by providing interactive traffic management, allowing each actor to deliver according to their strengths, is something worth striving for in the broader field of ITS as well. By acknowledging that public or private organisations cannot solve today's problems in the mobility sector by themselves, space for exploring synergies and new roles has been created through the cooperation framework delivered by the project. The experimentation with these new roles has been beneficial in understanding potential new business cases and coordinating responsibilities for private actors, while giving public authorities the chance to recalibrate their own roles in a more effective and efficient way. This will also help the European Commission in shaping appropriate and specific support through funding and legislation in the future.

The next decade is going to bring further (r)evolutions in the field of traffic management, with the worlds of different modes, stakeholders and communities integrating more and more into a single mobility system. The end user services and data feeds created in SOCRATES$^{2.0}$ prove that this is indeed possible, bringing benefits to everyone involved, but most importantly setting the scene for digitalisation and cooperation as stepping stones to achieve this. I wish to thank all the partners involved in the project for their efforts, trust in each other and belief in the value of the lessons the project would bring to the sector.

Author

Michael L. Sena

Member of the SOCRATES$^{2.0}$ Advisory Board

SOCRATES2.0

SOCRATES$^{2.0}$ FAST SAFE GREEN
ADVISORY BOARD

There is no question that SOCRATES$^{2.0}$ has made an extremely significant contribution to the practice of cooperative and integrated traffic management. What is unique about SOCRATES$^{2.0}$ compared to many multi-country intelligent transport system projects is that it was initiated and has been guided by two insights. The first is the understanding that traffic management as it has been designed and operated by public authorities is not working. Command and control of thousands of independent drivers who are attempting to optimise their individual journeys is a thankless and impossible task. Public authorities have not had the means to reach all drivers with command information, and when information is received by drivers, they must feel that what they are receiving will help them achieve their own goal - reaching their destination quickly and efficiently - and that their well-being will not be sacrificed for a greater good. The second insight is the acceptance that making traffic management work is not a matter of developing yet another technical solution, but of finding a way to create a workable method of cooperation between public road authorities who have useful static, temporal and real-time data and private companies manufacturing motorised road transport vehicles and delivering road-related services to those vehicles.

What I feel is the most important contribution that SOCRATES$^{2.0}$ has made to the field of enabling the flow of motorised transport vehicles on roadways is that it has redefined the relationship between the road builders and the vehicle builders. They are not adversaries with conflicting objectives. Both are providing the means for people who drive, and who pay for the roads they are using, to achieve their objective of reaching their destinations safely and efficiently. It is only through cooperation between the road and vehicle builders that both the needs of the individual driver can be reconciled with the needs of all drivers, pedestrians, property owners and the environment. Road authorities, vehicle manufacturers and their service providers are all partners. They have different sources of funding and different business models, but their mission is the same: to enable safe, efficient and clean mobility.

'It is only through cooperation between the road and vehicle builders that both the needs of the individual driver can be reconciled with the needs of all drivers, pedestrians, property owners and the environment'

The SOCRATES$^{2.0}$ project team determined that there was not a single approach to how public and private companies can interact. In some cases, it may be sufficient to deliver timely data to service providers about short-term roadworks or the temporary closing of a road. In other cases, service providers and public authorities may want to deliver the same messages on navigation systems and variable message signs. Also, there can be opportunities in which coordinated efforts of data exchange and information processing can lead to more optimum guidance and routing of traffic. Each of these cooperation approaches has different preconditions. Each of these approaches were put to the test in four cities and as much information as possible was collected given the extremely difficult restrictions caused by COVID-

19 pandemic.

SOCRATES$^{2.0}$ is an excellent new beginning. There must be a continuation with more vehicle manufacturers and service providers participating. The evaluation prepared by the project team is a perfect starting point for deciding how to proceed.

Author

Dr Johanna Tzanidaki

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Director Innovation and Deployment

ERTICO –ITS Europe

SOCRATES2.0 as the proof of concept of TM2.0

Most of the partners in the SOCRATES$^{2.0}$ CEF-funded project, are also active in the TM2.0 ERTICO Innovation platform since its early days in 2014. The TM2.0 Platform aims to facilitate the evolution of traffic management towards an interactive process that involves the traffic management authorities, the service providers, the infrastructure and the vehicle itself. Having acknowledged that what hampered the consistency of traffic information on the road network was the inability of traffic stakeholders to work with each other on an equal footing, the TM2.0 concept aimed from the start at ensuring that all stakeholders involved in traffic could see the win(public sector)-win(private sector)-win(driver) in such a cooperation.

SOCRATES$^{2.0}$ is seen as the TM2.0 proof of concept. It has also expanded and further developed the concept by adding a role for an intermediary, an entity that facilitates the exchange and availability of data, as well as trust among the stakeholders. The project has proven the viability of interactive traffic management and shown it is possible for public authorities to orchestrate the management of traffic by planning and justifying their decision-making within a continuous dialogue and exchange of information on set priorities with the private and public stakeholders in traffic. The TM2.0 principle of co-opetition, where service providers continue to compete in the market based on the quality of their traffic information services but agree to cooperate for the common benefit, as this is set by the public authorities, was put into practice in the SOCRATES$^{2.0}$ pilot cities, where it has proven feasible. The TM2.0 principle of trust among competing but co-operating service providers who are also members of the TM2.0 Innovation Platform (i.e. HERE, TomTom, Be-Mobile, Technolution and BMW) has been used as a guiding value throughout the SOCRATES$^{2.0}$ project. It has also been the main factor of its success.

The SOCRATES$^{2.0}$ pilot schemes in Antwerp, Amsterdam, Munich and Copenhagen elevated the cooperation of public and traffic stakeholders from exchanging data towards creating a common situational picture and eventually resulting in coordinating actions that can potentially optimise the traffic network. They have focussed on the very essence of interactive traffic management. The SOCRATES$^{2.0}$ project's answer to this challenge and the cooperation of stakeholders who were made in the project responsible to co-create and co-opete in optimising the traffic flow, paves the way for a traffic management system that can also accommodate automated vehicles.

'The deployment of the SOCRATES2.0 Cooperation Framework and its three cooperation models can potentially lead to valuable insights on how to manage the CCAM domain and also environmental targets'

With increased automation forecasted to have a gradual but considerable impact on traffic over the next decades, the TM 2.0 concept that SOCRATES$^{2.0}$ has proven and further evolved the close cooperation between public authorities and private traffic service providers (providers of traffic information and hosting services infrastructure). The deployment of the SOCRATES$^{2.0}$ Cooperation Framework and its three cooperation models can potentially lead to valuable insights on how to manage the CCAM domain and also environmental targets.

A cooperation scheme aimed at aligning Operational Design Domains (ODDs) and Infrastructure Support Levels for Automated Driving (ISADs) as part of handling CCAM in mixed traffic seems to be a possible prospect based on the outcomes of SOCRATES$^{2.0}$. More to that, the attainment of the climate targets by European member states, to which both public and private stakeholders are asked to adhere, can be a driving force for the scalability of the operational deployment of the concept of TM2.0 and SOCRATES$^{2.0}$. The Green Deal goals can only be achieved if all stakeholders cooperate. The insights gained by this project are proof that this is possible.

More work should follow the success of this project, so that the concept of the Intermediary that ensures the accessibility and availability of data exchanged among partners in real business can be established. At the same time viable business

models for all actors involved need to be better defined, outside the piloting environment of projects. We expect the legacy of SOCRATES$^{2.0}$ to be the adoption of its cooperation framework in a scalable scheme in Europe and around the world, where more and more traffic management stakeholders will assume the responsibility of acting towards the benefit of all in the traffic management value chain.

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CINEA

SOCRATES 2.0 – Epilogue

Co-financed by the Connecting Europe Facility of the European Union

The development and deployment of Intelligent Transport Systems (ITS) is one of the key priorities of the European Commission to help promoting transport efficiency, boost road safety and enhance greener and smarter mobility. In particular these last two points – making road transport smarter and greener – will be of key importance in achieving the ambitious objectives laid out by the European Commission in its European Green Deal.

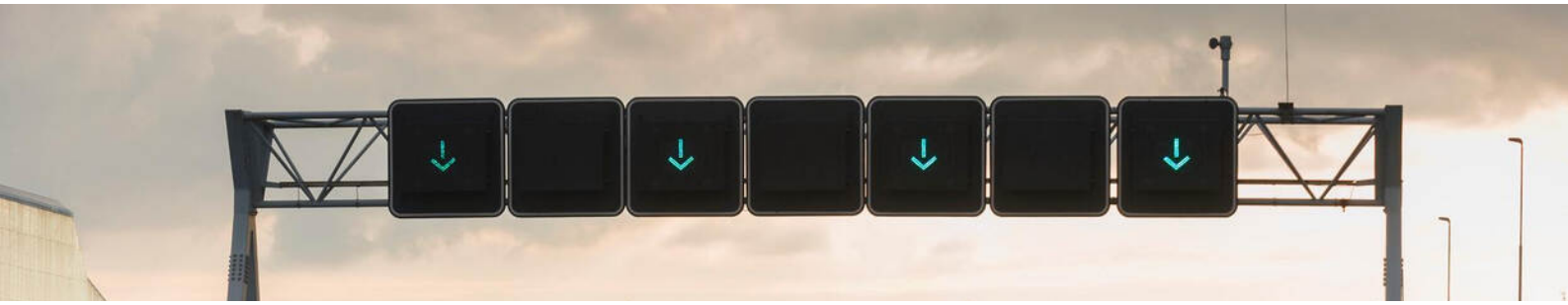
CINEA (European Climate, Infrastructure and Environment Executive Agency) has a key role in supporting the European Green Deal, the roadmap for making the EU's economy sustainable and achieve climate neutrality by 2050. The Agency will channel European Union funding to ITS projects through the Connecting Europe Facility (CEF) Programme. Since 2014, the CEF programme has already provided over €500 million of EU funding to ITS projects, matching investments of more than €1.3 billion.

The SOCRATES 2.0 initiative was one of the beneficiaries of CEF funding. The project improved traffic by promoting a continuous deployment of European-wide traffic management measures and mobile/in-car services for road users, while supporting cleaner, efficient and safer flows. This was possible thanks to a solid cooperation of road authorities, service providers and car manufacturers in Europe.

' The Agency will collaborate with all stakeholders in the road transport sector (and beyond) to ensure that ITS solutions are rolled out quickly. These solutions and upgrades will hail a new era for the road transport sector, which will immediately benefit citizens and businesses'

CINEA, via the CEF programme, will co-finance, between now and 2027, the construction and upgrade of vital infrastructure, and encourage the rollout of smarter and safer solutions for transport. The Agency will collaborate with all stakeholders in the road transport sector (and beyond) to ensure that ITS solutions are rolled out quickly. These solutions and upgrades will hail a new era for the road transport sector, which will immediately benefit citizens and businesses.

On behalf of all CINEA colleagues working on ITS, at CINEA, I would like to thank all stakeholders involved in SOCRATES 2.0 for their commitment, and for their contribution to make European Road Networks connected, greener and smarter.



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In memoriam: Fred Zijderhand

On 28 June 2018 Fred Zijderhand passed away. As the originator and initiator of the SOCRATES$^{2.0}$ project, we remember his passion for innovation combined with outstanding technical knowledge.

Back in the early nineties, Fred was already closely involved in the preceding projects PROMETHEUS, DRIVE and SOCRATES, containing early perspectives on traffic information and navigation systems, enabled by the introduction of 2G and 3G telecommunication. In those days, he used to say, it felt like a real playground for grown-ups. Driving around in Volvo 240 series, fully packed with heavy hardware sets, testing roadside to vehicle communication, demonstrating the feasibility of dynamic route navigation. Today it is hard to imagine that not long ago route guidance was something you got from a physical map.

Fred was a wiz at inventing and building a bridge while crossing it. We knew Fred for his enthusiasm, ambition and original thinking, but he was also a friendly mentor, a helping hand to whoever needed it and an all-around great guy.

We are sad he cannot witness the finalisation of this project that brought his career full circle, but the least we can do is thank Fred for laying the profound foundation of SOCRATES$^{2.0}$.

You are missed Fred.

Co-financed by the Connecting Europe Facility of the European Union