

YUNEX TRAFFIC

Uniting what's next in traffic

Int. Mobility Days Vienna 2023

Intelligent connections for a more efficient infrastructure, more environmentally friendly mobility and more livable cities



Our Planet Faces Major Challenges



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**9.6
Billion**

World population
by 2050

70%

of the world population
to live in (mega-) cities
by 2050

+4°C

global temperature
rise by 2050

4x

Annual global trade
volume growth
2000-2023

**46
Zettabytes**

data until 2022 –
10x more than in
2013

Transformation in Mobility

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Today



Owned



Stand-alone



Combustion



Manual driving

Tomorrow



Shared



Connected



Emission-neutral



Automated

Area-wide Smart Traffic Solutions

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TRAFFIC MANAGEMENT PLATFORM

URBAN

INTERURBAN & TOLLING

Cities

Highways

Bridges

Tunnels



24/7/365 CUSTOMER SERVICES



Area-wide Smart Traffic Solutions

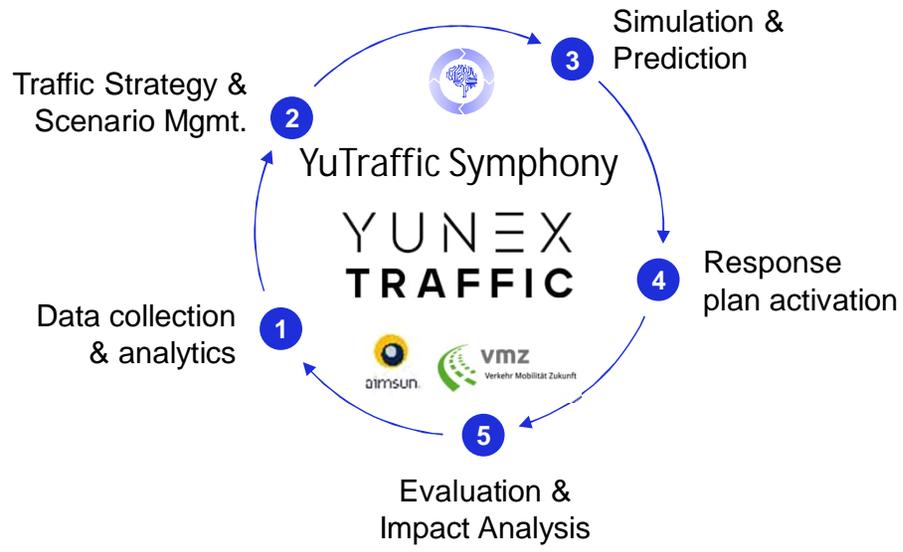
Closed Loop & End2End From Data Collection to Traveler Guidance



Data

- Traffic detection
- Historical traffic & environmental data
- Live Environment/ Weather data
- Parking data
- Traffic incidents
- V2X
- Public Transport
- Floating Car Data (FCD)

Active traffic management – closed loop



Traffic control / policies

- Traffic signal / Smart signal control
- Variable message signs
- Mobile / Traveler Apps
- V2X
- Clean Air Zone
- Tolling / Road User Charging (SENSUS ®)
- Highway & Tunnel (VARIA ®)

One overarching management platform for seamless intervention via all systems

Motivation on traffic management efficiency

The EU zero pollution targets for 2030

The zero pollution targets for 2030²⁰

Under EU law, Green Deal ambitions and in synergy with other initiatives, by 2030 the EU should reduce:

1. by more than 55% the health impacts (premature deaths) of air pollution;
2. by 30% the share of people chronically disturbed by transport noise;
3. by 25% the EU ecosystems where air pollution threatens biodiversity;
4. by 50% nutrient losses, the use and risk of chemical pesticides, the use of the more hazardous ones, and the sale of antimicrobials for farmed animals and in aquaculture;
5. by 50% plastic litter at sea and by 30% microplastics released into the environment;
6. significantly total waste generation and by 50% residual municipal waste.

This action plan also sets out **key actions for 2021-2024** to complement the many relevant actions in other European Green Deal initiatives, including the chemicals strategy for sustainability.

Source: https://ec.europa.eu/environment/pdf/zero-pollution-action-plan/communication_en.pdf



Source C2C-CC/Yunex Traffic

Connected Mobility (V2X)

The digitalization of road networks is important for economic growth and quality of life. Connecting vehicles to the infrastructure will allow cities to manage their traffic network more precisely and efficiently than ever before with significant reduction of traffic jams, accidents and emissions.

Source: Yunex Traffic

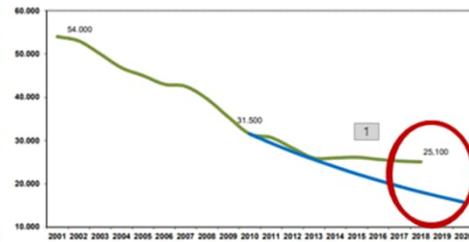
Motivation on traffic management safety

The EU Road Safety Policy Framework 2021-2030

Road fatalities in 2013, with comparison to 1980, by country

Country ^[20]	1980 killed	2013 killed	2013/1980 percent	2013 killed per million population	2013 killed per 100 billion vehicle-kilometers
Australia	3,272	1,185	36.2	51	496
Austria	2,003	455	22.7	54	583
Belgium	2,396	723	30.2	65	707
Canada	5,462	2,255	41.3	65	
Czech Republic	1,261	655	52.9	62	1,573
Denmark	690	191	27.7	34	386
Finland	551	258	46.8	48	476
France	13,636	3,268	24.0	51	
Germany	15,050	3,339	22.2	41	460
Greece	1,446	874	60.4	79	
Hungary	1,630	591	36.3	60	
Ireland	564	190	33.7	41	396
Italy	9,220	3,385	36.7	57	
Japan	11,388	5,152	45.2		
Luxembourg	98	45	45.9		
Netherlands	1,996	476	23.8		
Norway	362	187	51.7		
Poland	6,002	3,357	56.0		
Portugal	2,850	637	22.3		
Slovenia	558	125	22.4		
South Korea	6,449	5,092	79.0		
Spain	6,522	1,680	25.8		
Sweden	848	260	30.7		
Switzerland	1,209	269	22.3		
United Kingdom	6,182	1,770	28.6		
United States	51,091	32,719	64.0		
EU	152,736	69,138	45.3		

Figure 1: Evolution of EU road fatalities and targets for 2001-2020

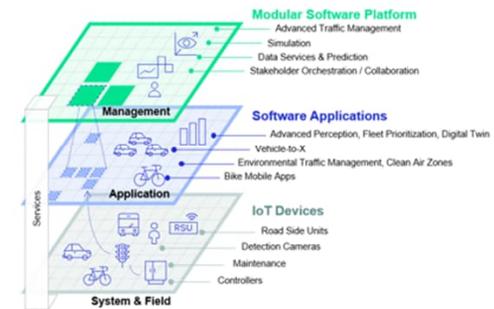


Source: CARE (EU road accidents database)

Source C2C-CC/Yunex Traffic

EuroRAP
 Across Europe **EuroRAP**, the **European Road Assessment Program** is bringing together a partnership of motoring organizations, vehicle manufacturers and road authorities to develop protocols for identifying and communicating road accident risk and to develop tools and best practice guidelines for engineering safer roads. EuroRAP aims to support governments in meeting their Vision Zero targets.

The "Roadmap to a Single European Transport Area" issued in 2011 by the European Commission states in point 2.5 (g): "By 2050, move close to zero fatalities in road transport. In line with this goal, the EU aims at halving road casualties by 2020."

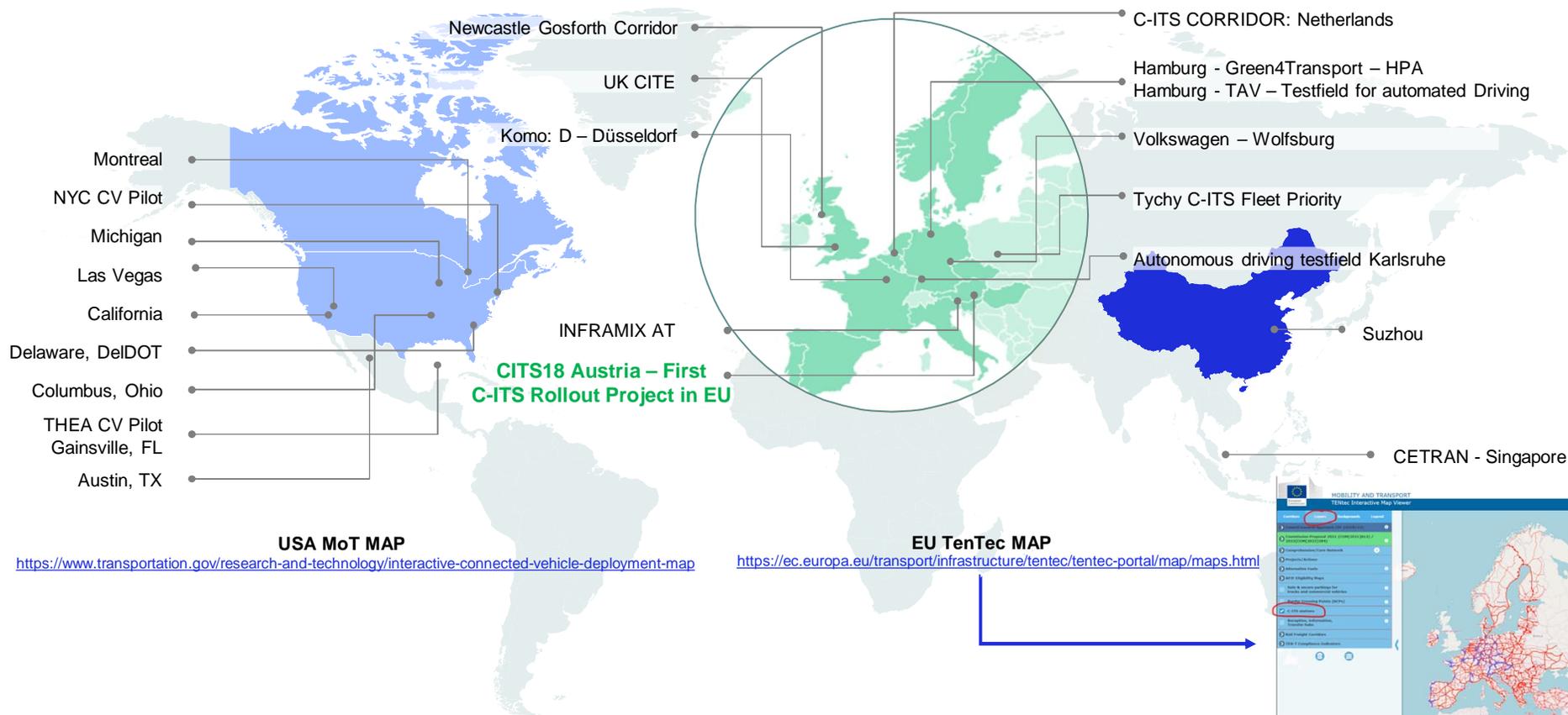


Connected Mobility (V2X)

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Source: Yunex Traffic

We have implemented area-wide smart traffic solutions in more than 20+ projects

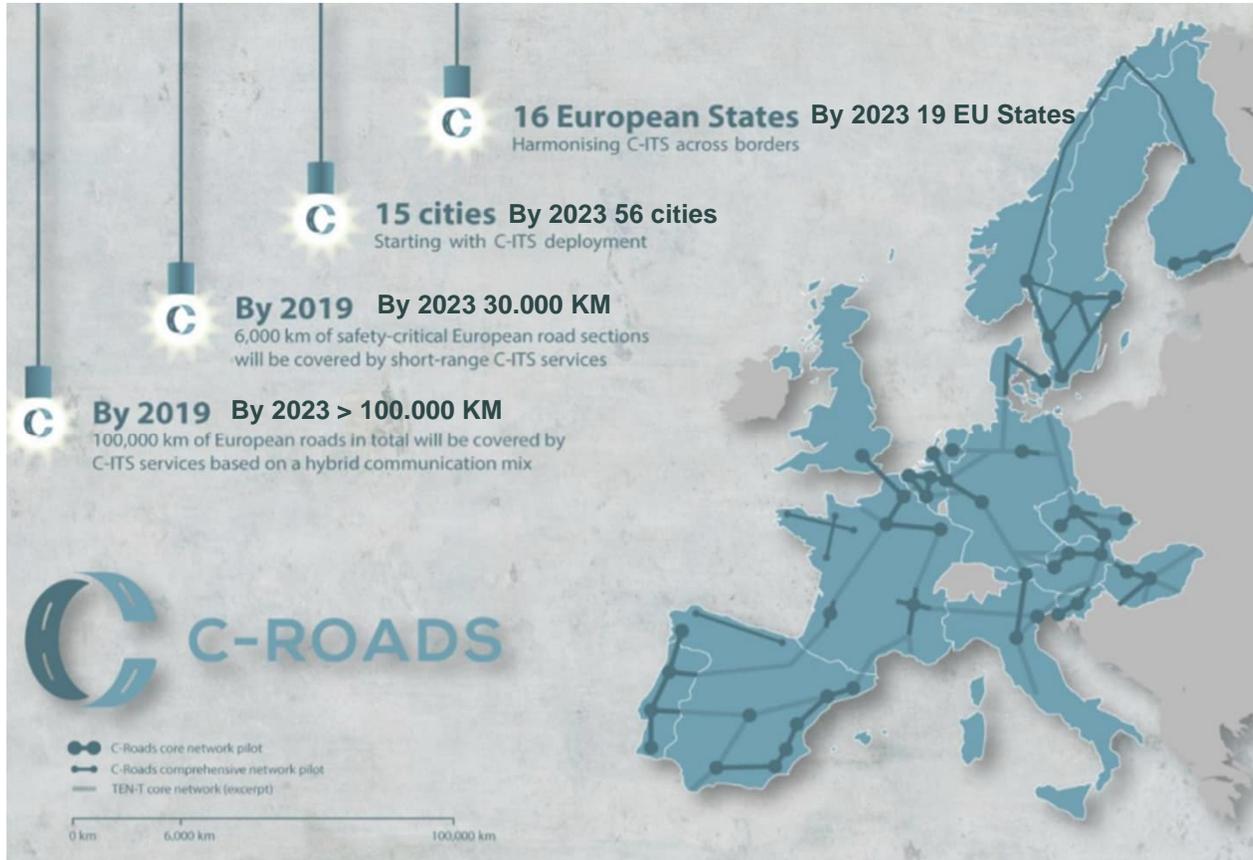


Cooperation in Standardization as a key factor

C-Roads - THE PLATFORM OF HARMONISED C-ITS DEPLOYMENT IN EUROPE

<https://www.c-roads.eu/>

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Source C-Roads

THE FOLLOWING DAY 1-SERVICES ARE IN THE FOCUS OF THE C-ROADS PLATFORM

ALERT WRONG WAY DRIVING	DYNAMIC ACCESS CONTROL OF DESIGNATED INFRASTRUCTURE	DYNAMIC ENVIRONMENTAL ZONES
EMERGENCY BRAKE LIGHT	EMERGENCY VEHICLE APPROACHING (EVA)	GREEN LIGHT OPTIMAL SPEED ADVISORY (GLOSA)
IN-VEHICLE SIGNAGE	IN-VEHICLE SPEED LIMITS	OBSTACLE ON THE ROAD
OTHER HAZARDOUS NOTIFICATION	PROBE VEHICLE DATA	PUBLIC TRANSPORT PRIORITY
RAILWAY CROSSING	REDUCED VISIBILITY	ROAD WORKS WARNING (RWW)
SHOCKWAVE DAMPING	SIGNAL VIOLATION / INTERSECTION SAFETY	SLOW OR STATIONARY VEHICLE(S)
TEMPORARILY SLIPPERY ROAD	TIME TO GREEN (TTG)	TRAFFIC INFO AND SMART ROUTING
TRAFFIC JAM AHEAD WARNING	TRAFFIC SIGNAL PRIORITY REQUEST BY DESIGNATED VEHICLES	(UNPROTECTED) ACCIDENT AREA
WEATHER CONDITIONS		

<https://www.c-roads.eu/pilots/implemented-services.html>

C-ITS Vehicle-Impact on traffic management safety and efficiency

C-ITS Vehicle Rollout VW

C-ITS Supporter ADAC/Euro NCAP

Cooperative Safety via Car2X Communication

contact: car2x@volkswagen.de CMC Demonstration | September 14th 2023

Overview

Volkswagen is the first automotive OEM to successfully deploy Car2X Direct Communication in Europe. After launching with the Golf 8 in 2019, there are now over 1 million vehicles on the road equipped with Car2X, including ID models, the TT and the Cupra Born. The number of equipped vehicles is growing continuously and more models with additional use cases will soon be available. Car2X technology enables the communication between vehicles and the traffic environment in the European C-ITS ecosystem. The first function based on Car2X 'Local Hazard Warning' made Cooperative Safety suitable for large scale production. Already today, Road side units can warn drivers about hazards on the road, traffic jams, road works and drivers can be informed about approaching emergency vehicles. This is one step on the way to Vision Zero.

Over 1 million vehicles equipped with Car2X on the road, in 31 countries and growing!

Car2X Technology

WLANp, in Europe officially designated as ITS-G5, was specifically developed for spontaneous, local communication between vehicles and it operates without the need for mobile phone networks. Consequently, it works across EU countries and provides blanket coverage within the limits of the system. Vehicles equipped with the dedicated hardware modules directly exchange positioning data and other information using WLANp. This is potentially possible within a radius of roughly 800 meters and within a matter of milliseconds. The data is not saved anywhere and thus data privacy is maintained.

Local Hazard Warning

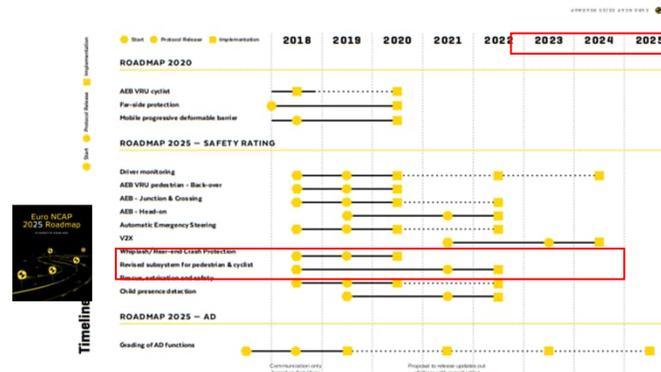
The Local Hazard Warning function uses the information received over Car2X direct communication to warn the driver of the possibly unexpected and therefore critical situations can be avoided before they arise. In addition, messages are sent in case of a detected critical situation by the ego-vehicle, such as emergency braking or an accident. That way other participants in the C-ITS ecosystem can be warned.

Volkswagen is the first automotive OEM to successfully deploy Cooperative Safety based on Car2X Direct Communication. Volkswagen engages the ecosystem growth by Innovation, Cooperation, Interoperability and Scalability.

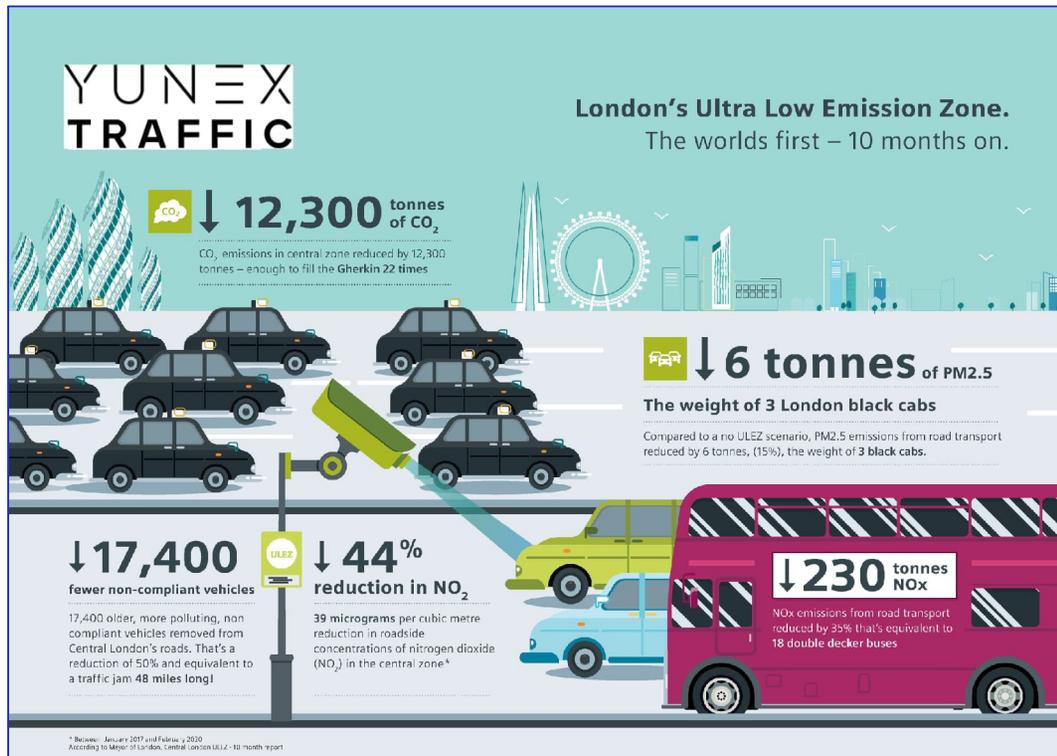
Source Volkswagen



Source ADAC



Example of Day1 Deployment (“Clean Air & Low Emission Zones” in London) (2022)



✓ **Londoners living** in areas exceeding the legal limit for NO₂ **reduced by 94%**

✓ **State schools** in areas exceeding the legal limit for NO₂ **reduced by 97%**

✓ **Monitoring sites** above the short-term legal limit for NO₂. **reduced by 97%**

Example of Day1 Deployment (“ITS-Tychy” project Tychy-Poland) (2022)

The most comprehensive and advanced ITS project in Poland

Implementation of ITS Tychy in 2019-2022

Elements of the ITS system:

- The most advanced Traffic Control Center in Poland
- Construction and modernization of nearly 40 intersections and a system supporting autonomous driving
- Nearly 600 surveillance and number plate recognition cameras
- 12 weather stations and 7 air and noise pollution measurement stations
- More than 80 boards on traffic volume, traffic conditions and free parking spaces
- 6 speed measurement sections and 5 intelligent vehicle weighing stations
- Priority for more than 170 buses and trolleybuses and 15 emergency vehicles
- Improved comfort and safety for cyclists
- Information portal for inhabitants on traffic conditions and a journey planner



ITS TYCHY

Intelligent Traffic Management and Control System

ITS system in Tychy has been implemented between 2019 and 2022
www.its.tychy.pl



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TYCHY DOBRE MIEJSCE



ITS Tychy



MAZOWIEC

Main components of the system:



1
Construction and modernization of nearly 40 intersections with installation of traffic control and monitoring system



2
Implementation of the first system in Poland supporting autonomous driving through special V2X technology transmitters installed at intersections



3
Priority at junctions for more than 170 buses and trolleybuses and 15 emergency vehicles



4
Nearly 600 surveillance cameras and about 90 number plate recognition cameras



5
12 weather stations and 7 air and noise pollution measurement stations



6
Vacancy detection system in 14 municipal car parks with 6 electric car charging stations



7
72 variable message signs informing, among others, about traffic volume and conditions



8
Improving safety through 6 speed measurement sections and 5 intelligent vehicle weighing stations



9
Information portal for residents on traffic conditions with a travel planner









Project co-financed by the European Union through the Regional Development Fund under the Operational Program 'Smart Growth' (2014-2020)

Source Yunex Traffic

Example of Day1 Deployment (Environmentally sensitive traffic management Osnabrück) (2023)

Osnabrück – Informiert ✓

16.06.2023

Umweltsensitives Verkehrsmanagement ab Juli im Einsatz

Im Straßennetz von Osnabrück soll die Luftschadstoff-Belastung an Straßenabschnitten mit potenziellen Luftschadstoff-Grenzwertüberschreitungen durch eine umweltorientierte und netzadaptive Steuerung des Straßenverkehrs nachhaltig reduziert werden. Dazu fällt am 1. Juli nach intensiven Vorbereitungen der Startschuss für den Betrieb des umweltorientierten Verkehrs- und Mobilitätsmanagements (UVM). Das System sorgt für einen flüssigeren und in Verbindung mit begleitenden Informations- und Mobilitätsdiensten zugleich auch für einen umweltverträglicheren Verkehr.

Ziel ist es, die Verkehrsqualität insbesondere in den Spitzenzeiten deutlich zu verbessern und die NO₂-Belastung an den Hotspots und im Stadtgebiet im Allgemeinen mit möglichst minimalen Eingriffen zu reduzieren. Das System, das im Rahmen des Förderprojektes „Saubere Luft“ des Bundes umgesetzt wird, wird zunächst im Bereich der Osnabrücker Innenstadt und der zuführenden Radialen realisiert. Hier wurden in der Vergangenheit die Grenzwerte der NO₂-Jahresmittelwerte an mehreren Abschnitten überschritten.

Digitale Lösung zur Verkehrsverbesserung

Stadtweit werden die Verkehrssituation und die Luftschadstoffbelastung überwacht und berechnet, dazu wurden spezielle Verkehrsmessstellen an 35 Standorten im Stadtgebiet in Betrieb genommen. Das System errechnet aus den Informationen über den Verkehr und die Wetterlage die stadtweite Luftbelastung.

Steigt die stündliche NO₂-Konzentration in den betroffenen Straßenabschnitten über einen festgelegten Schwellenwert an, oder ist dieser Anstieg erwartet, reagiert das System situativ. Mithilfe der netzadaptiven Steuerung der Ampelanlagen wird eine Drosselung der Verkehrsmenge zur Reduzierung der Luftschadstoffbelastung eingeleitet. Das heißt, dass sie den Verkehrsfluss in hochbelasteten Bereichen verflüssigt. Gleichzeitig werden die Belastungsspitzen mit dem Ziel reduziert, den Jahresmittelwert für NO₂ dauerhaft einzuhalten.

Vorteil des UVM ist es, dass Verkehrsteilnehmer nur bei Überschreitungen des definierten Schwellenwertes potenziell in ihrer Mobilität eingeschränkt und über die eingeleiteten Maßnahmen über verschiedene Informationsmedien rechtzeitig informiert werden. So sollen, neben der bestehenden Umweltzone, weitere Verkehrsbeschränkungen für bestimmte Fahrzeugklassen vermieden werden.

Hierfür hat die Stadt 32 Lichtsignalanlagen im Stadtgebiet technisch auf den neuesten Stand gebracht. Damit in Echtzeit Informationen über die Verkehrssituation gesammelt und ausgewertet werden können, hat die Stadt in den vergangenen Monaten mehr als 120 Verkehrserfassungs-detektoren neu installiert und 70 Verkehrsmessstellen eingerichtet. Die Server des für die Gesamtsteuerung eingesetzten Verkehrsrechners wurden für die erhöhten Anforderungen erweitert. Im Zuge der Arbeiten hat die Stadt zudem 360 energieeffiziente Signalgeber an Ampeln montiert.



Kontakt | Impressum

Umweltsensitives Verkehrsmanagement

Start Förderung Datenerfassung Monitoring Karte Informationstafeln

Das Monitoring - also der Bereich Beobachtung und Überwachung- setzt sich innerhalb des UVM aus dem Verkehrs- und Umweltmonitoring zusammen. Beide Systeme bilden die Grundlage für die Verkehrssteuerung, sodass eine Verbesserung des Verkehrsablaufs und schließlich der Luftqualität erreicht wird.

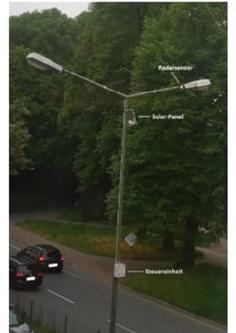
Verkehrsmonitoring

Unter dem Verkehrsmonitoring werden alle Prozesse der Datenerfassung, -überwachung und -bereitstellung aus verkehrlicher Sicht zusammengefasst. Zusätzlich berücksichtigt das Monitoring auch die Maßnahmenziele.

Zur Erfassung des Verkehrszustands wurden im Rahmen des Projektes UVM Messstandorte (sogenannte TEUs) im gesamten Stadtgebiet auf allen Hauptverkehrsachsen angebracht. Mithilfe dieser Messstellen wird die Verkehrsstärke und die aktuelle Geschwindigkeit der Verkehrsteilnehmer:innen erfasst. Diese beiden Faktoren bilden die Grundlage für die Beurteilung der Verkehrssituation. Das System ist in der Lage, zwischen Pkw und Lkw zu unterscheiden, eine Kennzeichenerfassung findet nicht statt.

Die erhobenen Daten aus den Radarmessstellen werden mit Floating Car Data fusioniert und anschließend in das Verkehrsmodell eingesetzt. Dadurch ist es möglich, die stadtweite Verkehrssituation anhand Modellberechnungen abzubilden. Mithilfe dieser Berechnungen kann das Verkehrsgeschehen auch auf untergeordneten Straßenabschnitten, die nicht über gesonderte Messstellen verfügen, prognostiziert werden.

Das umweltsensitive Verkehrsmanagement ermöglicht durch die komplexen Berechnungen des Verkehrsmodells eine Verkehrsprognose für den Folgetag. Diese neue Technik ist in der Lage, die Verkehrsteilnehmer:innen bereits am Vortag auf eventuelle Einschränkungen am nächsten Tag aufmerksam zu machen (die sogenannte Prognose Tag +1). Den Verkehrsteilnehmern bleibt ausreichend Zeit, um sich auf die Veränderung im Verkehrssystem einzustellen, andere Routen zu wählen oder auf ein anderes Verkehrsmittel umzusteigen.

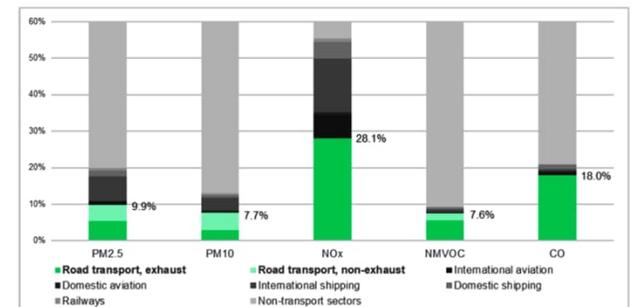


Umweltmonitoring

Das Umweltmonitoring dient zur stadtweiten Überwachung der Luftschadstoffbelastungen. Dabei setzt sich das Monitoring aus verschiedenen optimal aufeinander abgestimmten Softwarekomponenten (z. B. IMMISSM) zusammen.



Für die Erstellung einer Prognose werden regelmäßige Messungen der Luftschadstoffbelastungen durchgeführt. Die erhobenen Informationen fließen in das Umweltmonitoring ein. Mit diesen Eingangsdaten und der aktuellen stadtweiten Verkehrslage, kann eine Prognose Tag +1 abgeleitet werden. In diese Berechnung fließen auch urbane Faktoren (z. B. aus der Industrie etc.) ein.



[Umweltsensitives Verkehrsmanagement \(osnabrueck.de\)](https://osnabrueck.de)

[Umweltsensitives Verkehrsmanagement ab Juli im Einsatz – Stadt Osnabrück \(osnabrueck.de\)](https://osnabrueck.de)

Example of Day1 Deployment (“Urban-Rail2X (CBTC) VGF/MIND+” in Frankfurt) (2023)



610
OBU2X rack module
Application + Integration



163
Roadside Units
Application + Integration

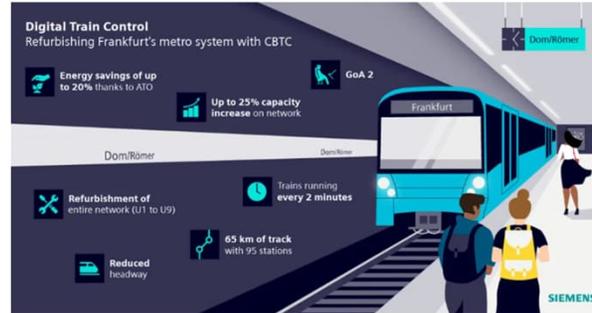
Central Systems

SENSUS + C-ITS CMS



Link list:

- <https://blog.vgf-fm.de/dtc/>
- <https://press.siemens.com/global/en/pressrelease/digital-train-control-system-frankfurt-metro>
- <https://www.yunextraffic.com/around-the-world-with-yunex-traffic-germany/>
- <https://www.youtube.com/watch?v=DIIRLOGN-mo>
- <https://www.youtube.com/watch?v=SsPtyMoZ6is>



V2X
Adaption Rail

10 years
Project duration



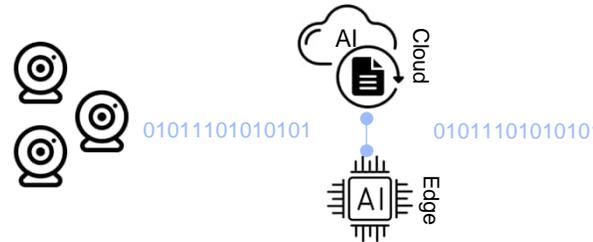
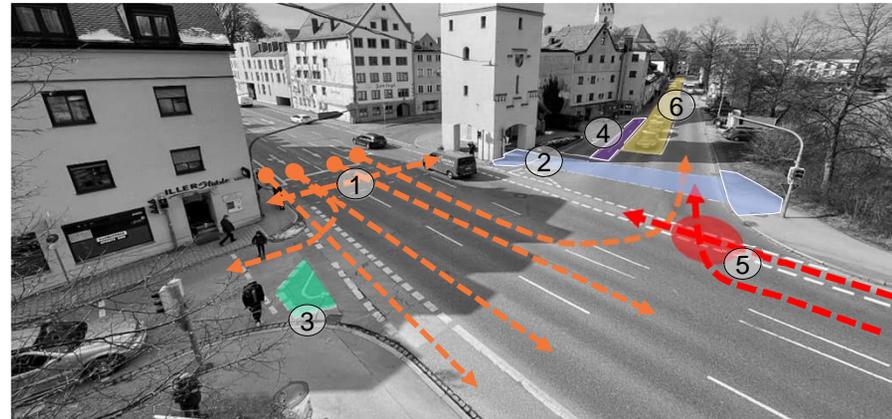
30 years
Maintenance



43 km
Route Network

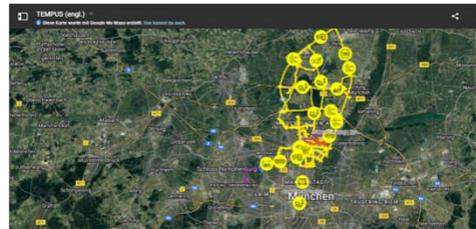
Research Pilot Project “TEMPUS” test field for automated driving in Munich (2023/2024)

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YUNEX Products

Symphony	FUSION
RSUX	sX
OBUX	CONCERT



TEMPUS, test field for automated driving in Munich (<https://tempus-muenchen.de/en>)
CONNECTED.DIGITAL.FORWARD

Live examples of Day1 applications “TEMPUS project Munich” (Near Munich – B13 Unterschleißheim 7 Intersections are equipped)



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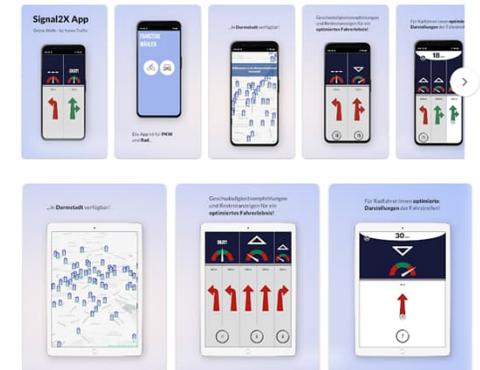
You can download the
APP for free at:

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[Signal2X App Apple Store](#)



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Thank you for your attention!

Franz Schober
[LinkedIn](#)

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 and Standardization for Connected Mobility

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My International functions where I may be able to help standardize C-ITS topics and coordinate traffic management issues

Region	Committees	Name of the addressed committee	Function
worldwide	ISO TC204	WG 18 Co-operative ITS	Head of Delegation GER; Convenor
Europe-wide	CEN TC278	WG16 Co-operative ITS	Head of Delegation GER; Convenor
Europe-wide	C2C-CC	Technical & Steering Committee, WI's	Chairman, Expert Member
Europe-wide	C2C-CC	City Initiative	Chairman, Expert Member
worldwide	ERTICO BoD	Board of Directors	Head of Delegation GER
worldwide	ERTICO Congresses	Congresses ORG	Head of Delegation GER
Europe-wide	ERTICO	Steering Committee	Delegate
Europe-wide	ERTICO	TM2.0 Platform/AI	Expert Member
Europe-wide	EC/EU	DG MOVE ITS Advisory Group	Delegate, Expert Member
Europe-wide	CCAM	Technical Committee, WI Obeserver	Expert Member
Europe-wide	ETSI	WI Obeserver & Exchange (VRU, AI, FuSa)	Expert Member
national	DIN/DKE	NA52-71 ITS-Spiegel Committee for CEN/ISO	Obmann NA52-71GAK16/20
national	VDA	Arbeitskreis V2X Kommunikation	Delegate, Expert Member
national	BMVI	IVS Beirat	Delegate, Expert Member
national	ITS-Mobility	Working Committee	Expert Member
national	Deutsches Verkehrsforum	Lenkungskreis Straßenverkehr/dig. Vernetzung	Expert Member

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