

C2C, C2X and C2N – Time for digital solutions linking public traffic management with private routing services

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Starting point – Lack of cooperation & technology

Why do we need a C2N service?

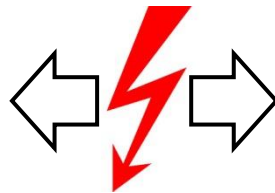
C2N

Typical situations ...

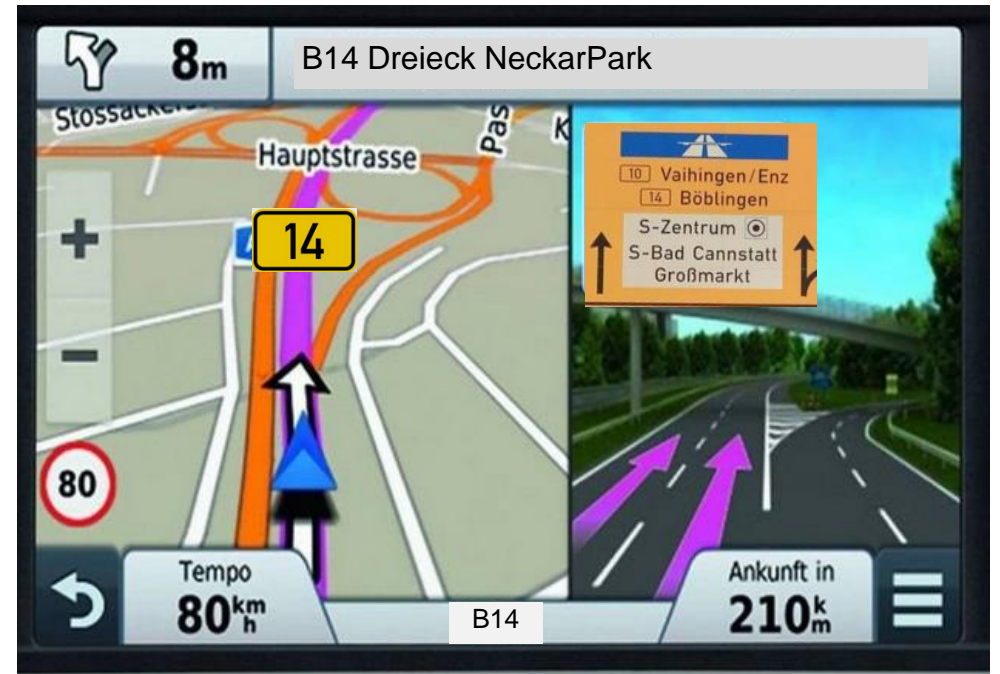
Public traffic management



Diversion to the right

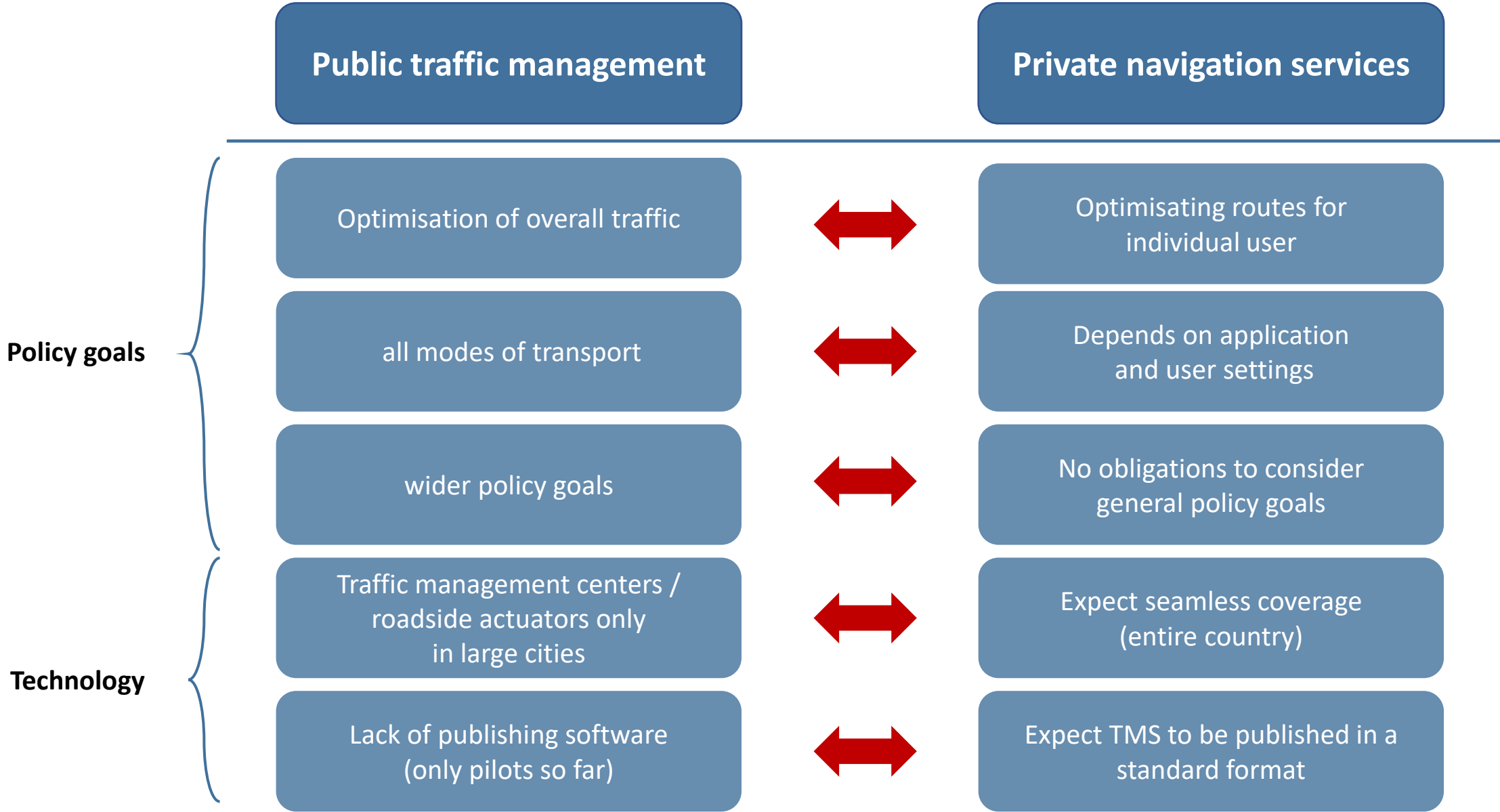


Private navigation services



Continue straight ahead

... and multiple reasons





... with critical impacts

Psychology:

Uncertainty among road users (what information is reliable?)

Road safety:

Creation of dangerous situations if

- drivers spontaneously change their mind and change directions, or if
- traffic is routed along sensitive infrastructures such as schools, kindergartens etc.

Public traffic management strategies (TMS)

- Potentials of traffic management cannot be fully exploited
- TMS may not work, lack of efficiency
- Inefficient use of existing transport infrastructures

Loss of confidence

- in public traffic management, but also
- in private navigation services

Solution:

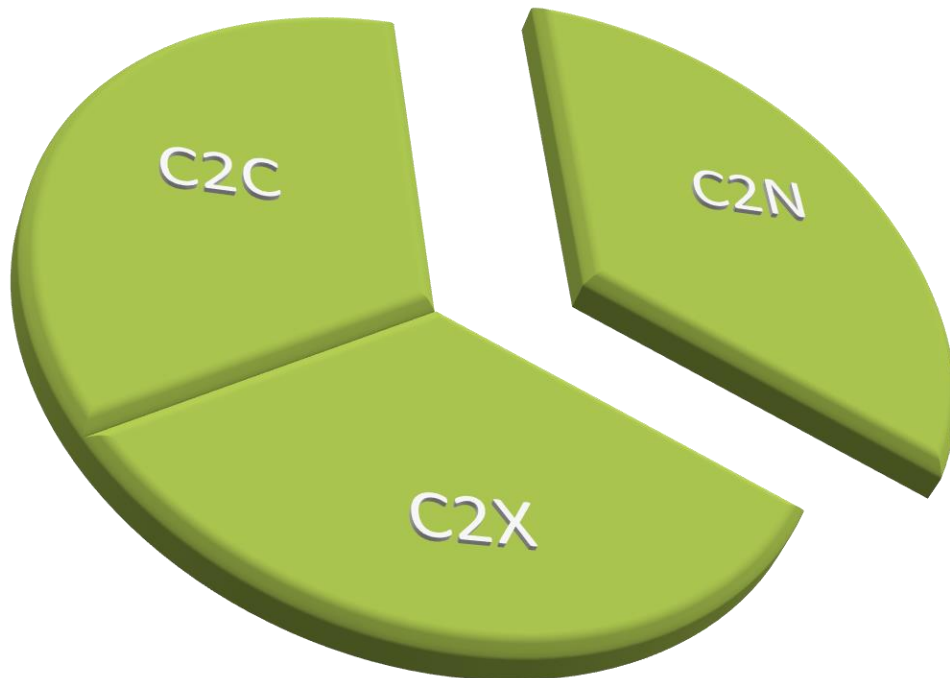
Closer linkages between private navigation services and public traffic management needed:

- Cooperation
- Interaction and information flows in both directions





Future communication: C2C, C2X and C2N



Question:

- Who is going to guide (road) traffic in future?
- How can cities continue to guide traffic in the future?

Idea:

- Digitalisation of traffic management
- Provide cities with digital tools for TM
- Develop concept for cooperative traffic management linking public authorities with private routing services

Solution:

- A new City2Navigation (C2N) service

European legislation:

- European ITS Directive (European Parliament and the Council, 2010)
- Commission Delegated Regulations (EU) 2015/962 and 2017/1926
 - Publication of TMS, national access points, DATEX II format



Use cases for traffic management (TM)

Today's common practice

- Traffic jams
- Road closures
- Construction sites
- Event management
- Parking guidance
- TM in case of accidents or natural hazards
- TM to avoid traffic jams
- Urban & environmentally friendly routing
- Priority routes (e.g. heavy trucks, goods delivery)

New and future use cases

- Intermodal routing
- TM for hubs (e.g. ports, airports, freight villages)
- **Access restrictions for specific vehicles (e.g. diesel)**
- **TM for MaaS (e.g. PUDOS – pick up & drop-off zones)**
- Kerbside management
- **Routing of autonomous vehicles**
- **Geofencing applications**
- Incentivisation
- **Key performance indicators (KPIs)**
- Cooperative traffic management

Planned & ad-hoc use cases

Greater flexibility in TM

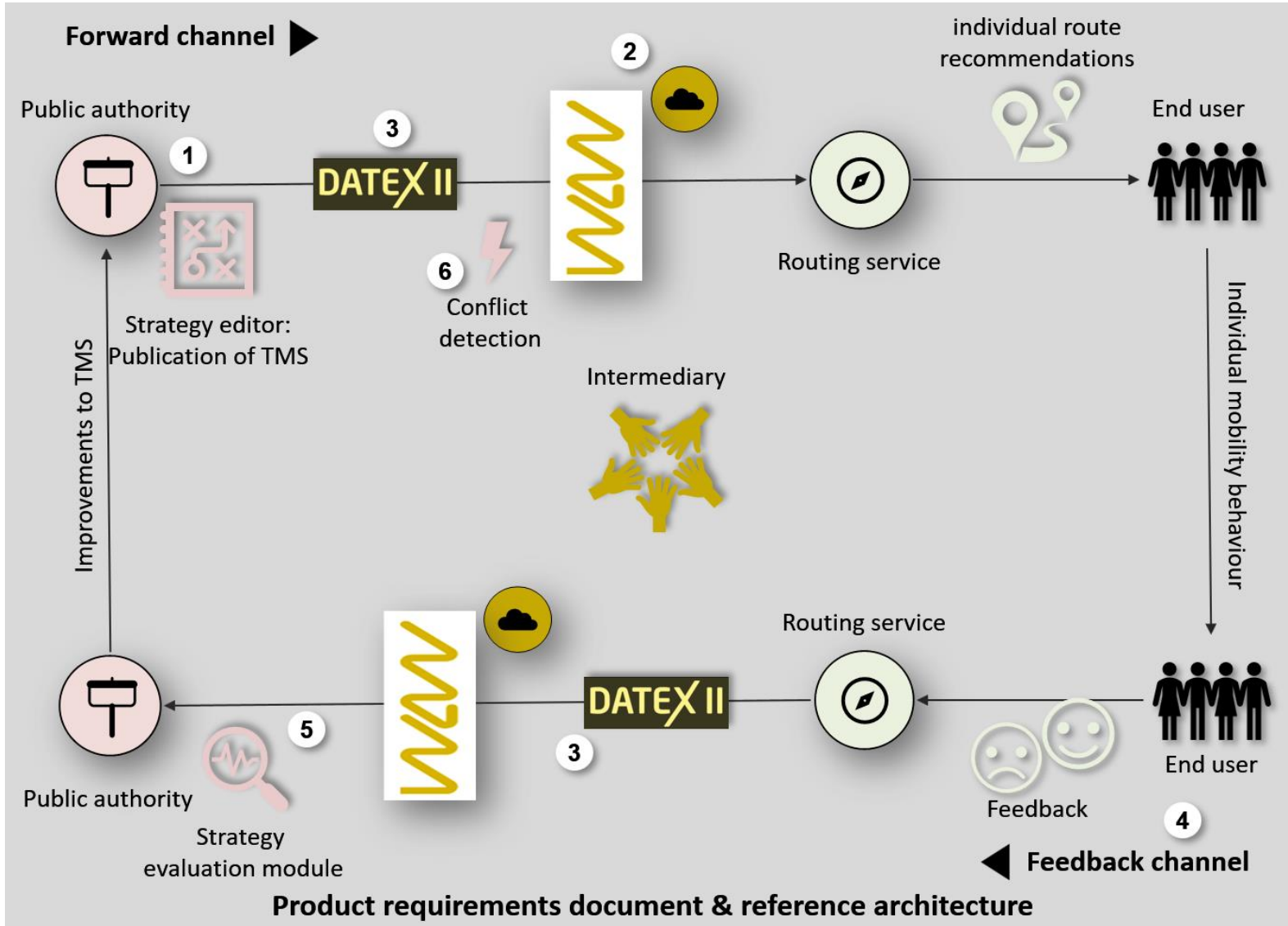
Increasing needs for cooperative TM



C2N service - Components

How does the service work?

Components of the C2N service



- 1 Strategy editor: Editing, managing and activating TMS
- 2 MDM (= German NAP)
- 3 DATEX II publication
- 4 User feedback channel
- 5 Evaluation of TMS (quality control and improvement of strategies)
- 6 Conflict detection of TMS published by neighbouring authorities

Central role of the „strategy editor“

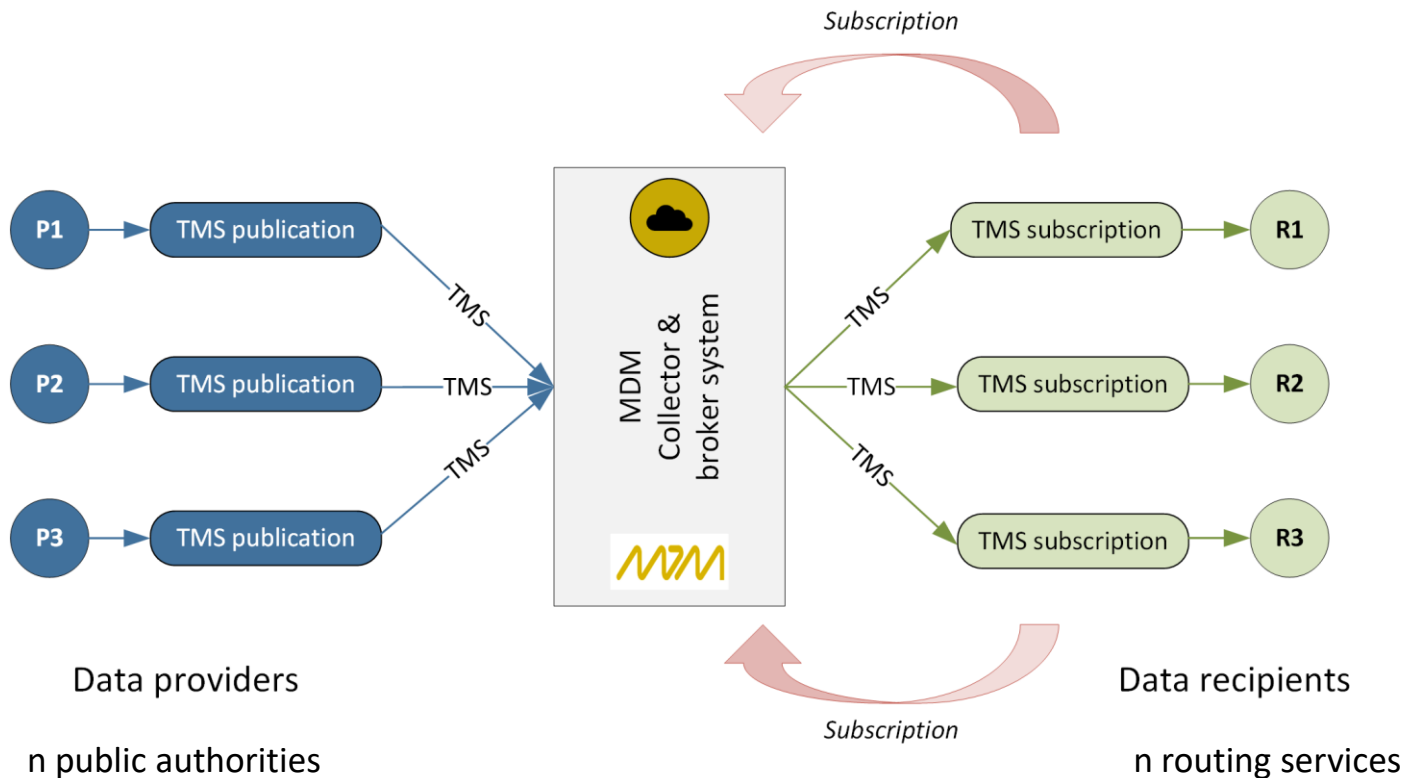


Publication of TMS

- intuitive, simple, convenient, comfortable
- Map-based application
- Gateway to MDM



MDM as data broker



MDM:

- Bundles TMS publications of all cities into one single TMS publication (« collector »)
- Routing services subscribe to this publication
- Receive all active TMS
- No (bilateral) agreements / contracts needed
- C2N relies solely on **General Terms and Conditions** (developed by intermediary)
- **Certification** serves to ensure correct implementation

Service implementation

How can the C2N service be implemented?



City2Navigation: Implementation toolbox

Product requirements document

- Functionalities of the strategy editor

ITS reference architecture and DATEX II profiles

- Comprehensive documentation of all architecture modules, roles and actors
- Further development of relevant DATEX II profiles, new extensions to DATEX II
- Contribution to the European standardisation process

MDM (German NAP)

- Suggestions for simplified handling of registration, subscriptions and publication of TMS

Implementation

- Check lists 
- Certification and evaluation of implementations 
- Success factors 



Transferable to other countries



Advantages and benefits

Public authorities

Strategy editor

- convenient editing, management and activation of TMS
- evaluation and quality management of TMS
- automatic conflict detection

Traffic management strategies:

- greater flexibility in defining specific TMS
- covers entire transport networks
- flexible temporal dimension
- quality control through user feedback

Other advantages:

- no traffic control centres (TCC) required
- no roadside actuators required

Private navigation services

National access points:

- retrieving all TMS from one central data broker
- no bilateral arrangements with hundreds of authorities
- standardized DATEX II profiles

Traffic management strategies:

- very accurate TMS suitable for individual navigation
- more options for predictive routing
- exchange of “tactical” information
- TMS cover entire transport networks
- quality control through feedback channel

Other advantages:

- enables cooperative traffic management solutions
- Options for new business models



Conclusions

- Results of City2Navigation published at <https://fops.de/forschungsergebnisse/>
- City2Navigation (**C2N**): Complement to **C2C** and **C2X**
- Necessary service to ensure that **municipalities** retain possibilities for future **traffic management**:
 - workshop series organized by POLIS Traffic Efficiency Working Group
 - few implementation projects just kicked-off (e.g. SATURN in southern Germany)
 - cities are invited to participate in implementation projects
- C2N = Building block for **future digital traffic management**



Thank you very much!

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