TM 2.0
ENABLING VEHICLE INTERACTION WITH TRAFFIC MANAGEMENT

Task Force 1:
Viability analysis and recommendations

Preliminary report

23 February 2015

Task Force members

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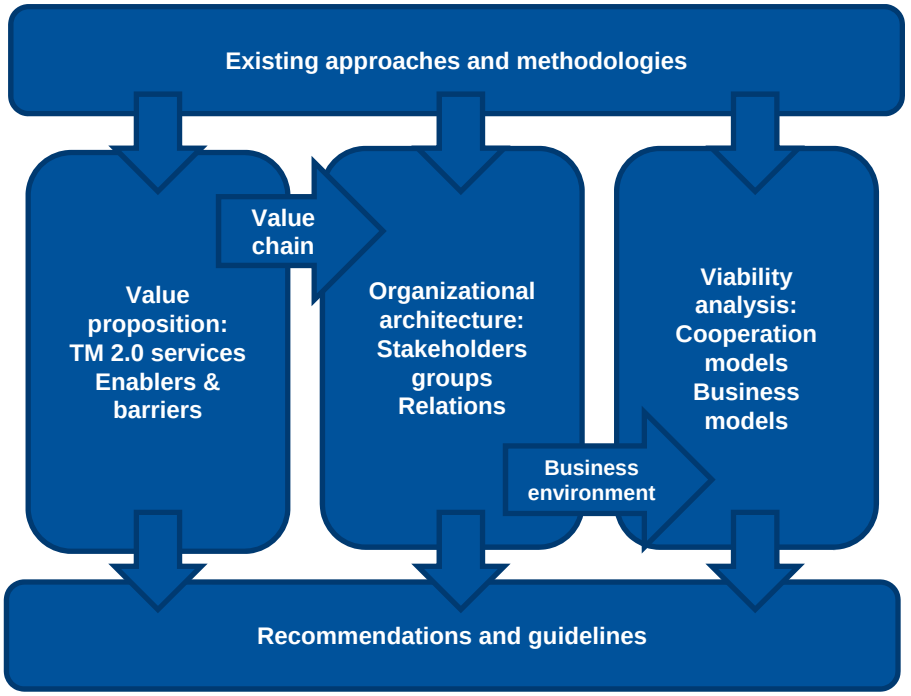
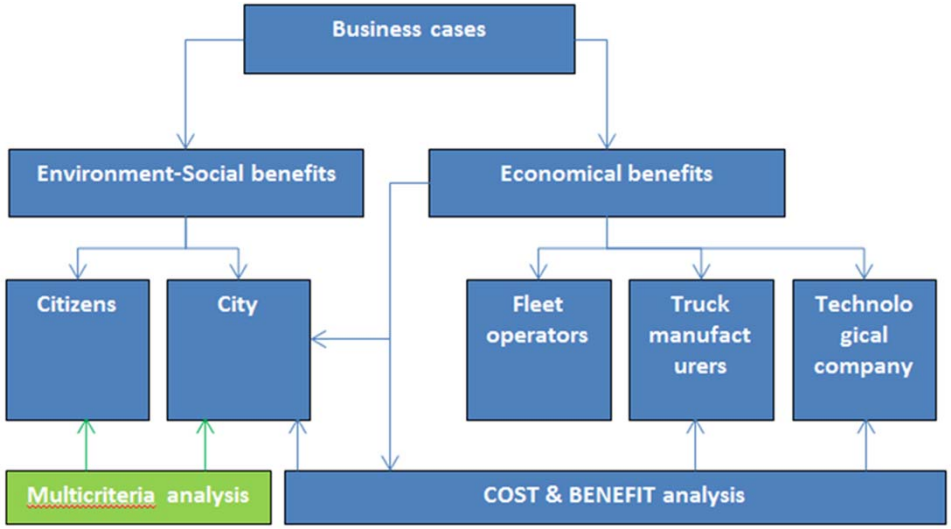
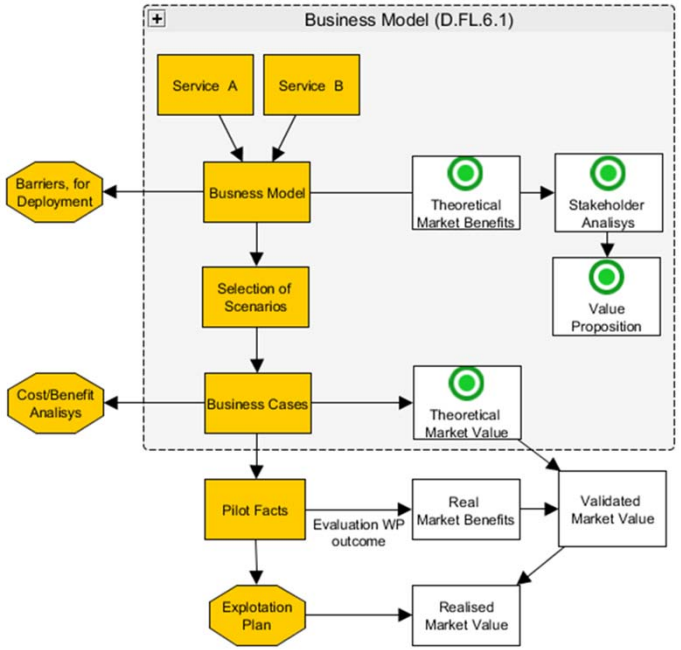
Methodology

1. State of the art
   - Collect and review information on current TM2.0 related activities in Europe
2. Value proposition
   - TM 2.0 services
   - Enablers & Barriers
3. Organizational architecture
   - Stakeholders groups and relationships
4. Viability analysis
   - Cooperation models
   - Business modelling and scenarios
5. Recommendations and guidelines for TM2.0



Freilot


Business cases
Environment-Social benefits
Economical benefits
Citizens
City
Fleet operators
Truck manufacturers
Technological company
Multicriteria analysis
COST & BENEFIT analysis


Business Model (D.FL.6.1)
Service A
Service B
Barriers, for Deployment
Busness Model
Theoretical Market Benefits
Stakeholder Analisys
Selection of Scenarios
Value Proposition
Cost/Benefit Analisys
Business Cases
Theoretical Market Value
Pilot Facts
Evaluation WP outcome
Real Market Benefits
Validated Market Value
Explotation Plan
Realised Market Value

Multi criteria and Multi agent exercise

Stated benefits	Drivers	SP	TMC
Develop new products, technologies, services, organisational structures and business cases fulfilling users' needs	17%	15%	10%
Efficient use of assets, technology and infrastructure / shared information / improve quality and use of data	6%	8%	15%
Improve drivers comfort	3%	6%	5%
Improve image of the company / city and enhance position in the market	17%	15%	5%
Improve safety conditions and incident management capabilities	5%	7%	16%
Improve traffic flow / energy efficiency / reduce emissions	15%	14%	17%
Provide to the drivers real choices between route alternatives	21%	19%	12%
Quality assurance of multi-level and multi layer "strategic multimodal traffic management" based on cooperative systems	12%	10%	13%
Reduced costs for users	6%	6%	8%

Multi criteria and Multi agent exercise

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The two most important benefits as well as the two less important benefits per role are highlighted in green and red respectively.	All	Automotive industry	Automotive OEM (SP)	Consumers (Drivers)	Content provider (SP)	Fleet operators	Infrastructure manager (TMC)	Police/Enforcement	Professional drivers	Public Authorities (TMC)	Public Transport Operator	Road Operator (TMC)	Service provider (SP)	Technology provider (TMC)	Telecommunication provider
Develop new products, technologies, services, organisational structures and business cases fulfilling users' needs	13%		15%	17%	17%		7%			10%		8%	13%	13%	
Efficient use of assets, technology and infrastructure / shared information / improve quality and use of data	13%		15%	6%	6%		14%			15%		14%	8%	15%	
Improve drivers comfort	6%		15%	3%	3%		4%			4%		6%	5%	6%	
Improve image of the company / city and enhance position in the market	9%		15%	17%	17%		3%			3%		3%	13%	9%	
Improve safety conditions and incident management capabilities	12%		4%	5%	5%		17%			17%		21%	9%	13%	
Improve traffic flow / energy efficiency / reduce emissions	16%		14%	15%	15%		19%			18%		19%	14%	13%	
Provide to the drivers real choices between route alternatives	13%		15%	21%	21%		14%			13%		11%	19%	8%	
Quality assurance of multi-level and multi-layer "strategic multimodal traffic management" based on cooperative systems	13%		4%	12%	12%		13%			13%		8%	12%	16%	
Reduced costs for users	6%		1%	6%	6%		8%			7%		10%	8%	7%	

CHARM Cooperative ITS challenge

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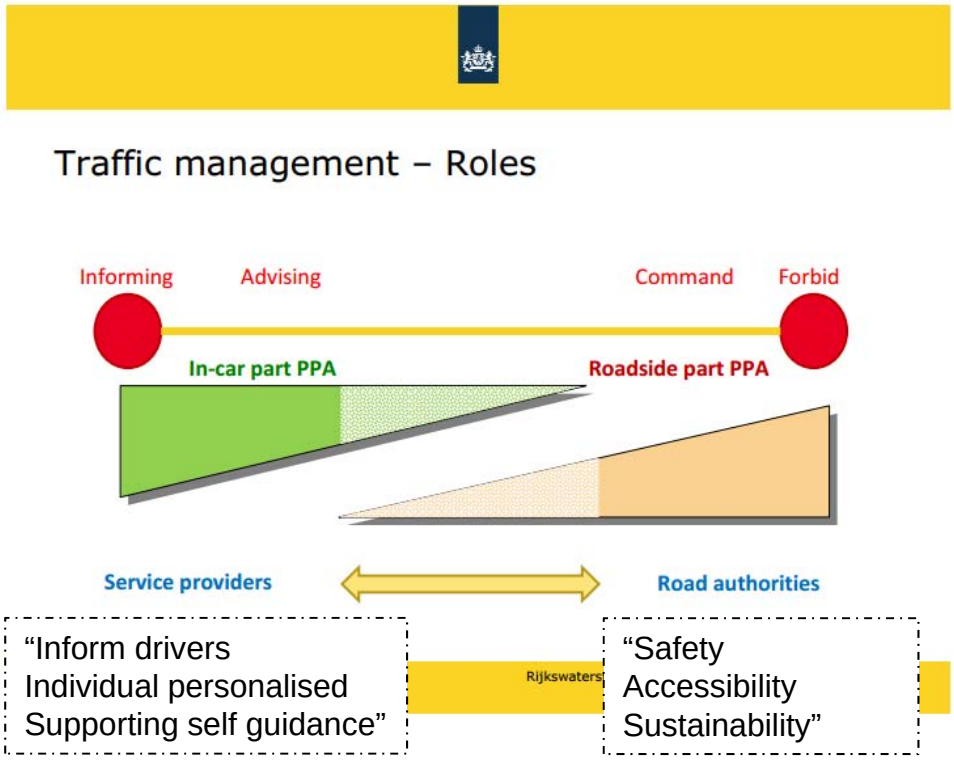
- Cooperation between **UK Highways Agency** and **Dutch Rijkswaterstaat**
- Challenge 3 Support of Cooperative ITS Functions. To realise a module that supports the implementation of cooperative system services requiring a participation of intelligent infrastructure, in order to optimise the performance of the road network.
- Context statements:
  - Cooperative ITS systems offer a novel way of gathering traffic data and influencing the behaviour of drivers. Communication between vehicles (C2C) and between vehicles and (roadside) infrastructure (C2I) offers many new opportunities.
  - In the traditional approach, information is aimed at groups of drivers passing e.g. a traffic sign. Specific drivers and/or types of vehicle can hardly be addressed, and there are limitations to the information that can be provided.
  - Through cooperative systems personalized, frequent, vehicle and destination specific communication is possible.
  - It can be used to improve current measures (such as prevention of head-end collisions) but also to implement new services from a Traffic Management Centre point of view.

Traffic management trial Amsterdam (NL)

- Show that shorter and more reliable travel times in the Amsterdam region are possible in a cost-effective way, by implementing roadside and in-car systems
- Roadside system track: reducing congestion by integrated network-wide implementation of roadside systems. (traffic manager responsibility)
- In-car system track: optimizing travel times by giving personalized information to road users through in-car systems. (service providers responsibility)



Development strategy for Traffic management (NL)

- ‘Ontwikkelstrategie Verkeersmanagement 2013-2023’ Rijkswatwrestaat

- From the TMCs, information can be given to service provider about the status of TM systems so e.g. navigation systems can give the best advice (route choice). For local management (optimising the route chosen), information can be given through a short range communication beacon (ITS G5). This may be done by the road authority or a service provider.

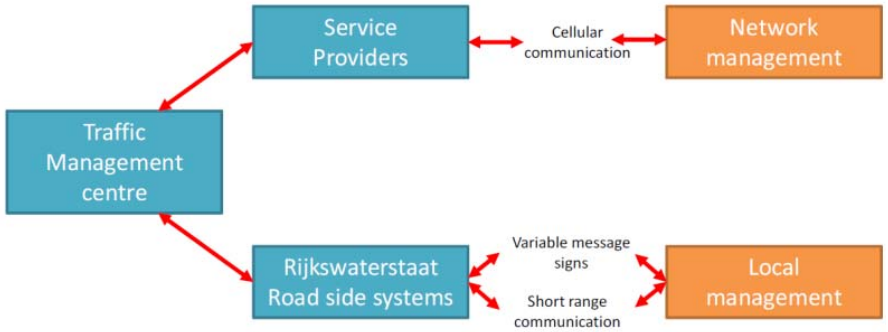


Figure 5: Communication for traffic management of the future[40]

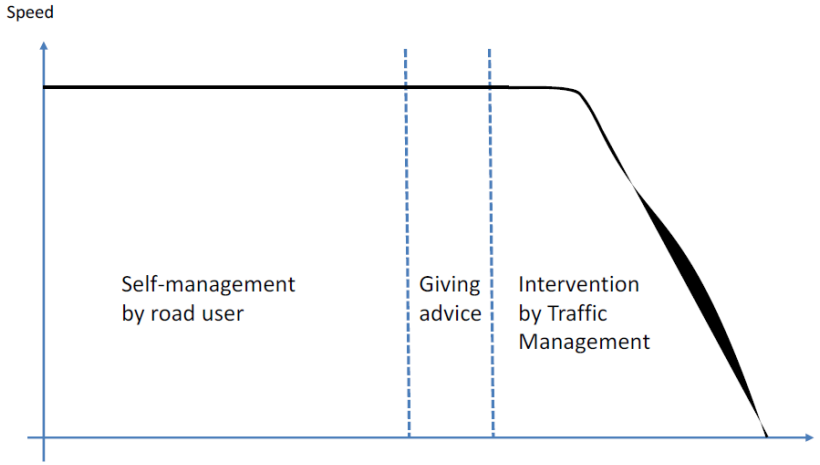
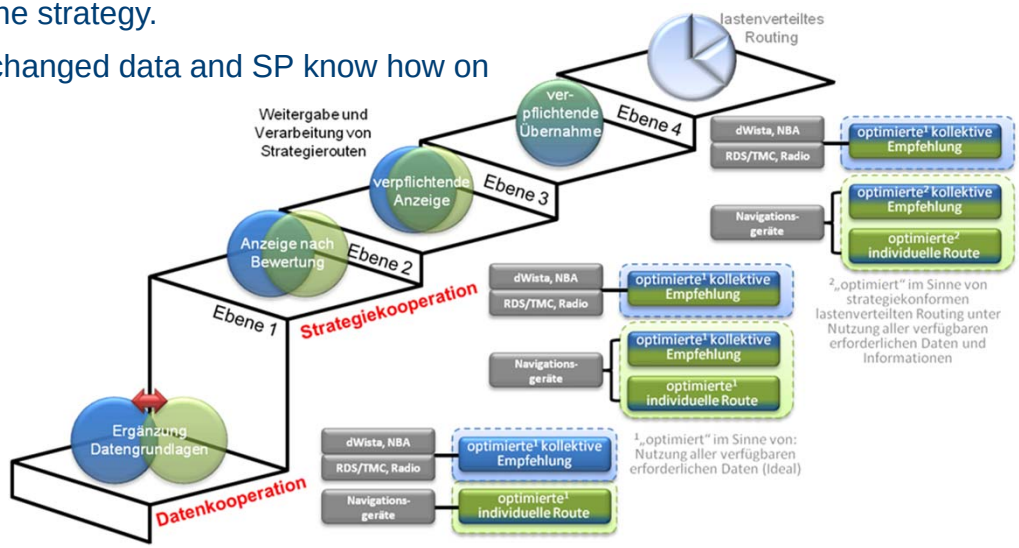


Figure 6: Communication for traffic management of the future

LENA4ITS

- German project to investigate measures to ensure the interoperability of public traffic management and individual navigation services;

- 5 levels of cooperation between traffic managers and service providers:
  - Level 0: data cooperation.
  - Level 1: Traffic managers make their strategies available to optional use
  - Level 2: Strategies must be displayed in the vehicle.
  - Level 3: SPs must use routes prescribed by the strategy.
  - Level 4: Load-balanced routing, based on exchanged data and SP know how on traffic state estimation



MOBiNET

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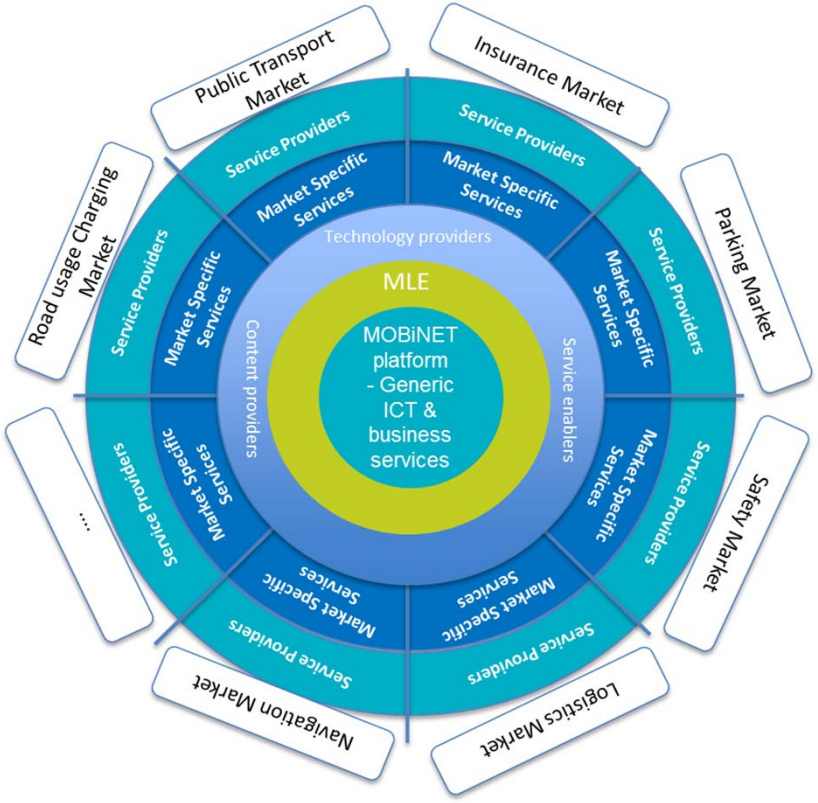

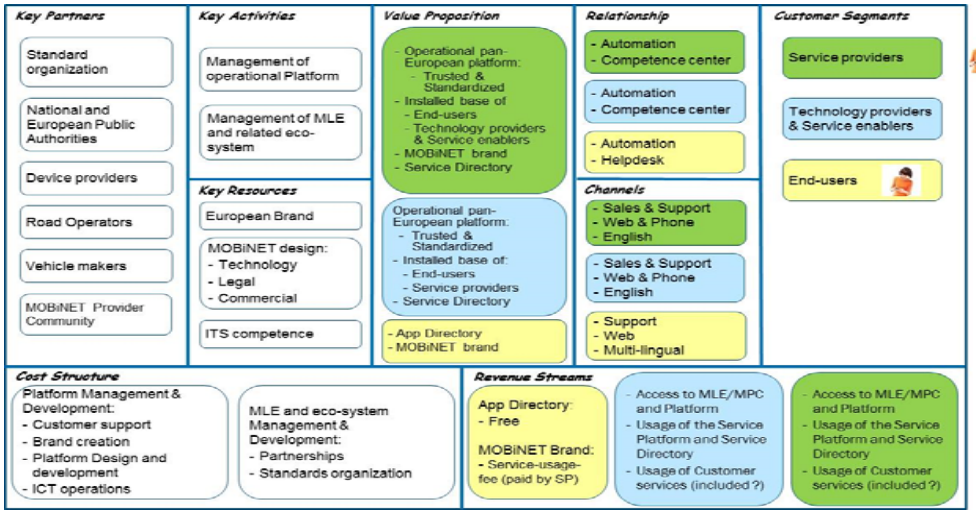

TM 2.0 services relevant services

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1. **Advanced Navigation Services**: individual turn by turn navigation taking into account road and traffic conditions predictions also based on traffic management plans;

2. **Adaptive and Dynamic Traffic Control**: traffic management and control services with adaptive and dynamic decision making processes based on real time and historical probe vehicle data.

3. **Traffic Status and Event Detection**: traffic state information service including real time event (incidents and congestion) detection based on probe vehicle data.

To be reviewed and when necessary further developed in collaboration in with Task Force 3

Advanced Navigation Services

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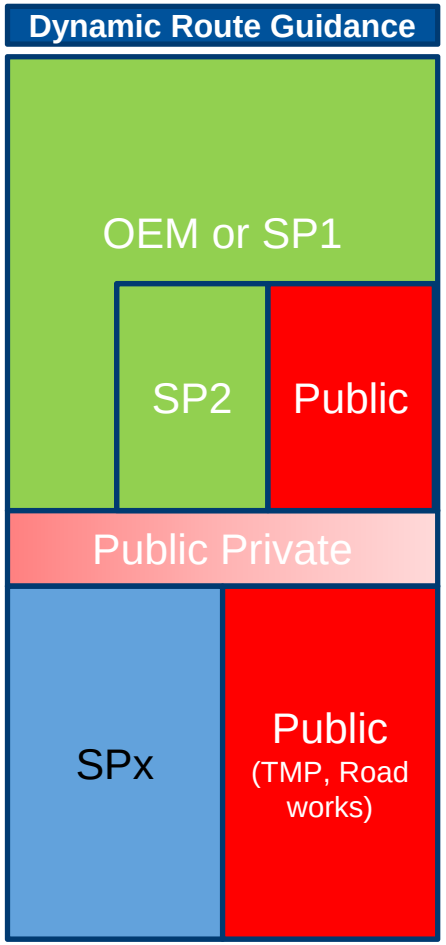
Function	Requirement
Provision of ITS Service	Human-Machine and Machine-Machine Interface
	Transmission of the ITS service
	Individualisation
	Non-discrimination
Creating ITS Service	Simulation & Forecast
	Routing Capability
	Pooling of Dynamic and Static Information
	Analysis of Information
Information Maintenance	Barrier-Free Exchange of Information
	Cross-Linking of Information
	Storage / Update of Dynamic Information
	Storage / Update of Static Information
Data Processing/ Generation of Information	Update of Information
	Validation of Data
Data Collection	Update of Data

Quality



Adaptive and Dynamic Traffic Control

ENABLING VEHICLE INTERACTION WITH TRAFFIC MANAGEMENT

Function	Requirement
Provision of ITS Service	Human-Machine and Machine-Machine Interface
	Transmission of the ITS service
	Individualisation
	Non-discrimination
Creating ITS Service	Simulation & Forecast
	Routing Capability
	Pooling of Dynamic and Static Information
	Analysis of Information
Information Maintenance	Barrier-Free Exchange of Information
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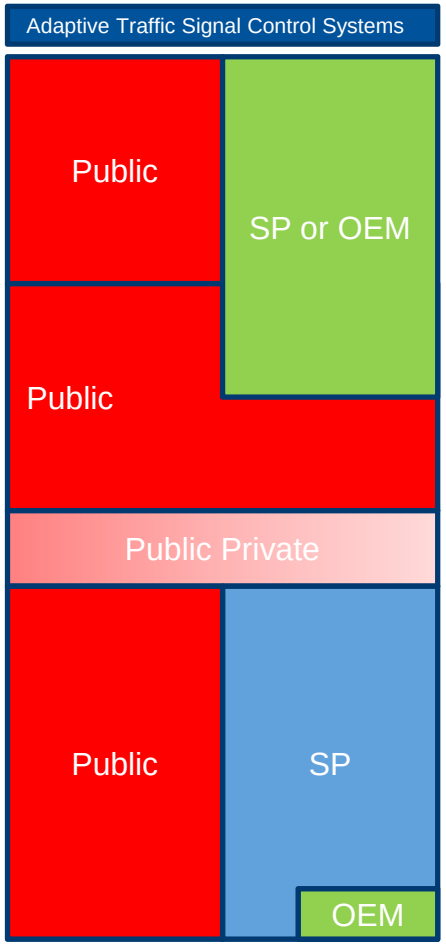
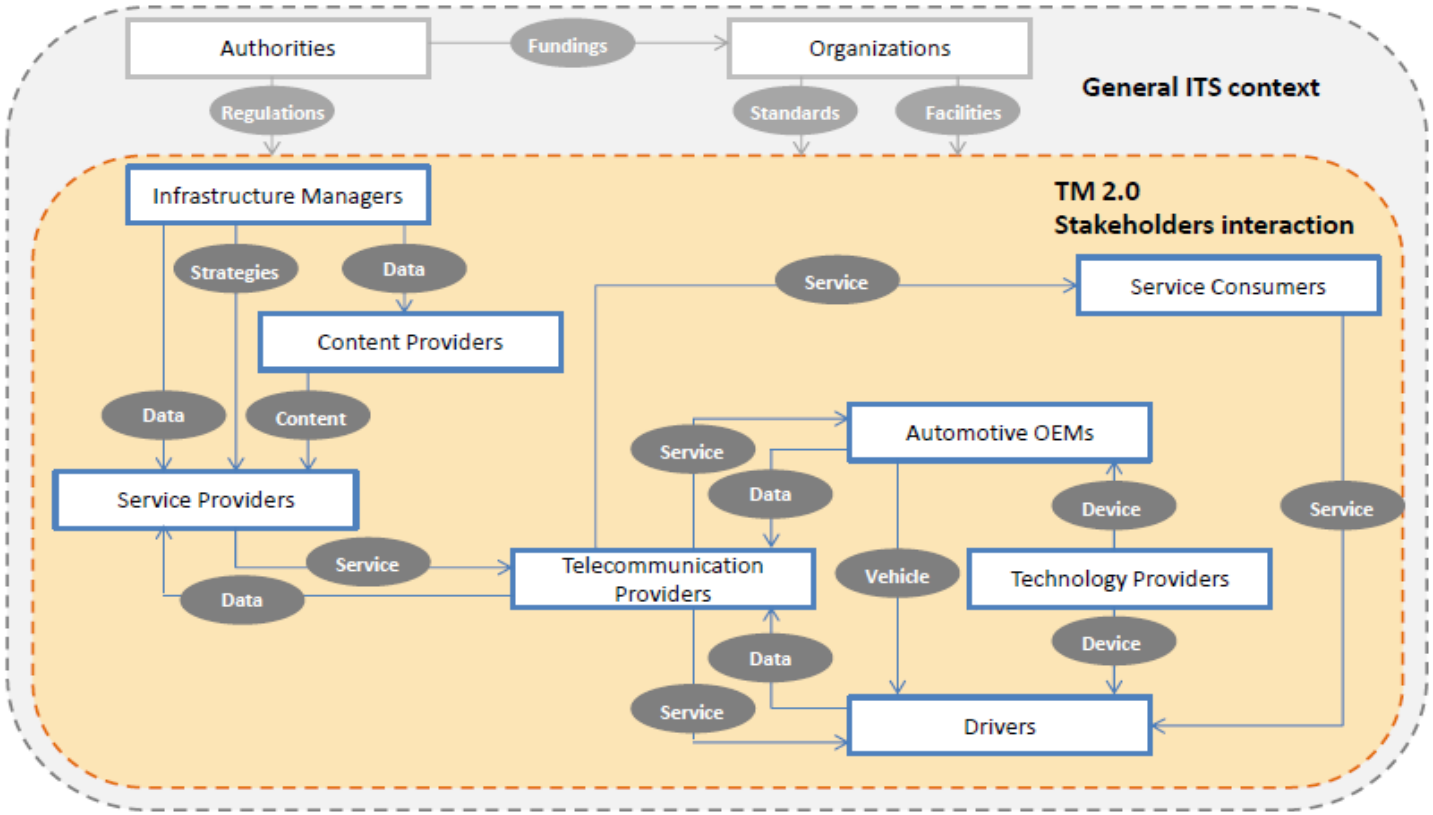
Data Collection	Update of Data

Quality



TM 2.0 relations between actors



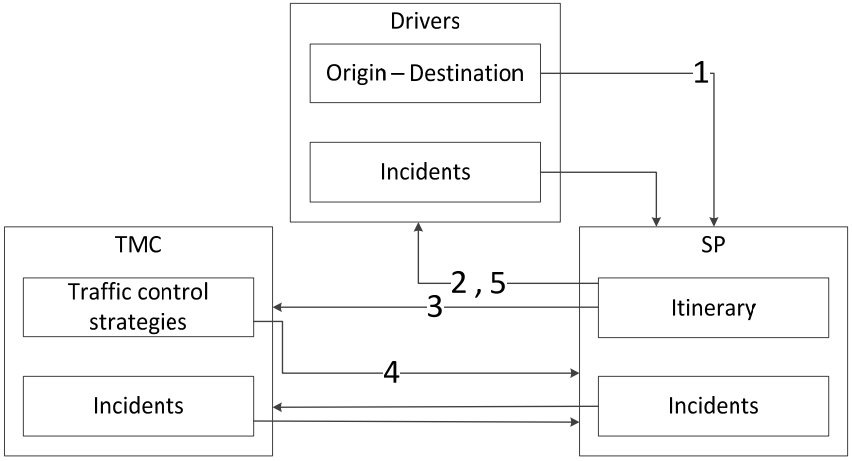
TF2 identified enablers and barriers and priorities

Short name of the barrier or enabler	Impact -5 (very severe barrier) +5 (very important enabler)	Implementation 0 (very difficult) +5 (very easy)
Technical		
High penetration of Navigation Devices	4.7	3.5
Increase in penetration of reliable traffic information	4.3	3.3
Lack of compatibility with legacy systems	-2.6	**2.0**
Lack of interface standardization for route/traffic management plan data between vehicles and service providers	**-3.2**	3.2
Lack of common standards for vehicle probe data and slow progress in standardization	-2.4	2.4
Need for a mechanism for open location data	-2.1	**1.9**
Long transition period to reach sufficient penetration of vehicles and compatible TMC's	-2.7	**1.6**
Need for correct mobile network dimensioning	-1.3	**2.0**

TF2 identified enablers and barriers and priorities

Short name of the barrier or enabler	Impact -5 (very severe barrier) +5 (very important enabler)	Implementation 0 (very difficult) +5 (very easy)
Organisational		
Progress of Cooperative ITS data policy in Europe	3.1	2.7
Lack of Security Infrastructure for Cooperative Vehicle Data	-1.3	**1.3**
Need for common data formats for intermodal traffic information	-1.4	2.7
Business-related		
No clear return of investment for involved actors	**-2.3**	3.4
Users' Privacy concerns	-1.3	3.4
Legal		
Liability problems in case of wrong data provision	-0.6	3.9
Unspecified ownership of data	**-2.0**	3.3
Conceptual		
Concerns about the reliability of exchanged data	-1.7	2.6
Political acceptability	**-2.1**	2.7

Framework feasible business scenarios & principles for sharing data



TF3 use case model

1. Collection of OD data
2. SP provide advise itinerary
3. SP provision ODs and the itineraries to TMC
4. TMC optimizes TMPs and provides to SPs
5. SP update itinerary w/ new TMP and provides optimized navigation service

Framework feasible business scenarios

Data exchange	Scenarios	Pre-conditions
1. Collection of OD data	a. Collect individual data b. Collect aggregated data	a. User permission under terms and conditions agreement
2. SP provide advise itinerary		
3. SP provision ODs and the itineraries to TMC	a. SP share data to TMC for improving (mutual) service(s) b. SP sell data to TMC (Public) operators / infra managers c. SP sell data to other SPs (real estate, marketing, etc.)	"User permission" or "aggregated (anonymized) in time period and volume"
4. TMC optimizes TMPs and provides to SPs	a. TMC share data with SP1 for improving (mutual) service(s) b. TMC sell data to SPxyz	TMC update back office system: a. (technical) ability to interact with SPs, pe: exchange of real time data; b. Traffic engineering knowledge/methods p.e.: Traffic state estimation; Load balancing routing; user equilibrium to system optimum <EC directive minimum data >
5. SP update itinerary w/ new TMP and provides optimized navigation service	a. SP is free to choose if uses new data or not p.e. longer travel time route w/ green wave instead of shorter route b. SP uses the data (for free) under pre agreed conditions, provided as an option to the driver: avoid school areas during peak time even if is shortest route; avoid event location to create buffer; c. SP is paid to use/implement the new data with a SLA agreement, p.e. implementing load balancing d. SP mandatorily implements the "public" new data	a. The exchange of information between the parties (small number of iterations) until an equilibrium point is achieved. b. SP develops the load balancing based on pre agreed policy framework

Next steps

1. List of services further developed in collaboration in with Task Force 3
2. Value chain development for the identified services/ use cases
3. Organizational architecture capturing all use cases and general principles
4. Expand “Benefits questionnaire” to rest of ERTICO members
5. Proceed in constructing feasible scenarios of business models exploring identified enablers and barriers, and based on data sharing principles

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Task Force 1:
Viability analysis and recommendations

Preliminary report

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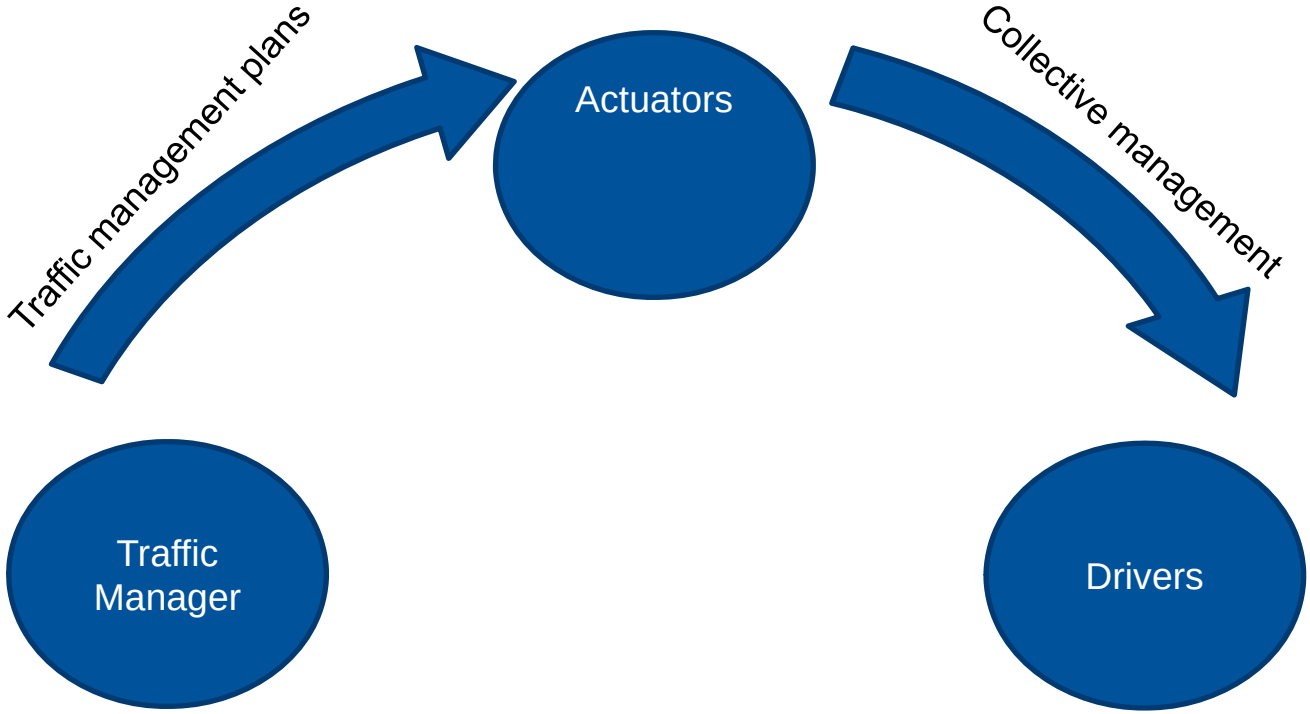
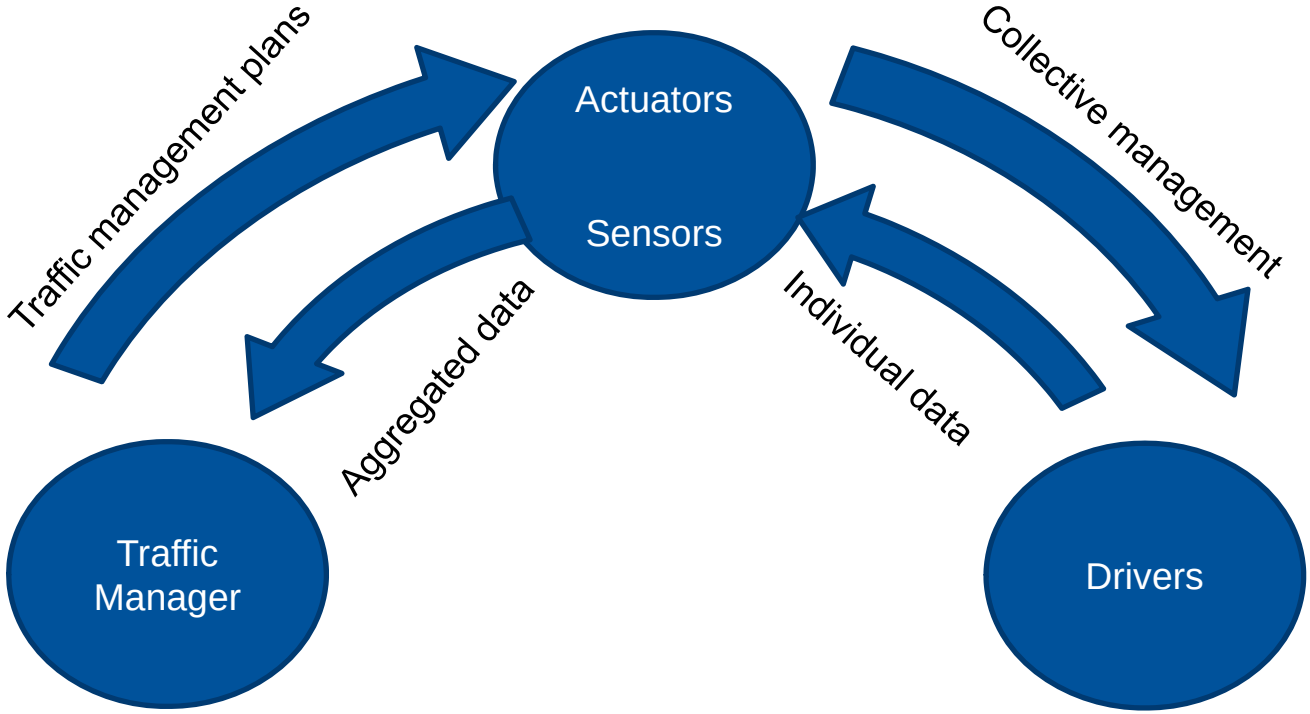
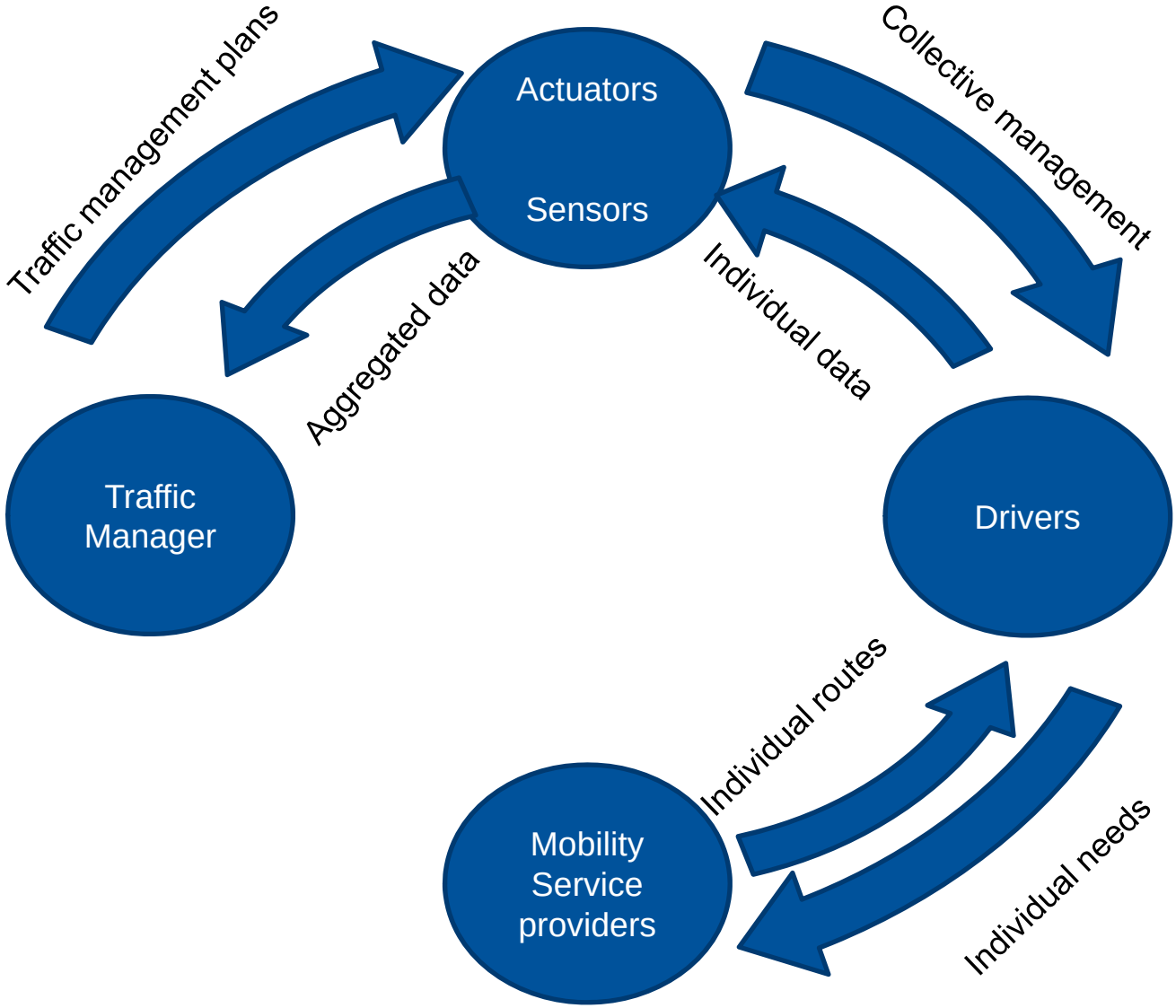
TM 1.0


Traffic management plans
Actuators
Collective management
Traffic Manager
Drivers

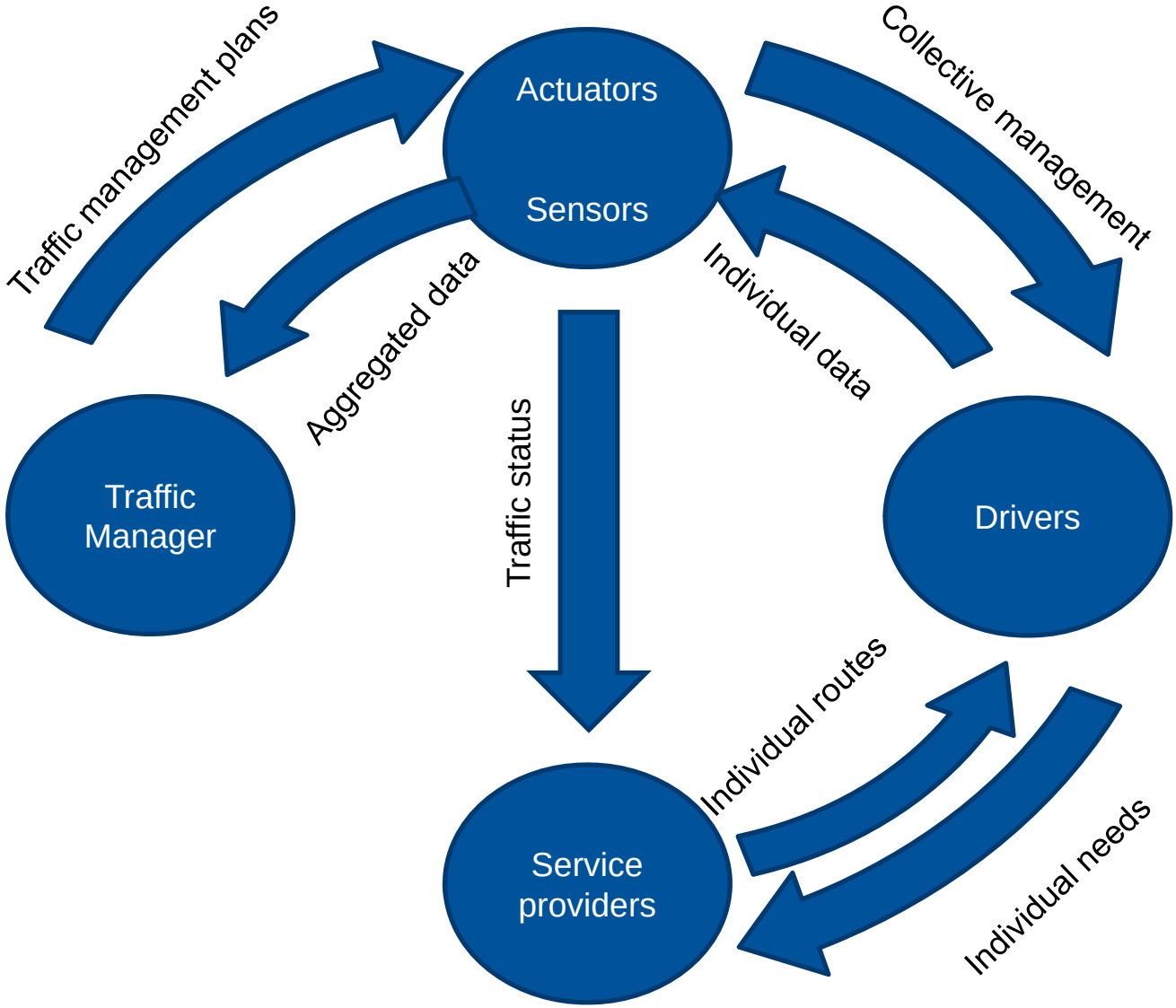
TM 1.5


Traffic management plans
Actuators
Sensors
Collective management
Aggregated data
Individual data
Traffic Manager
Drivers

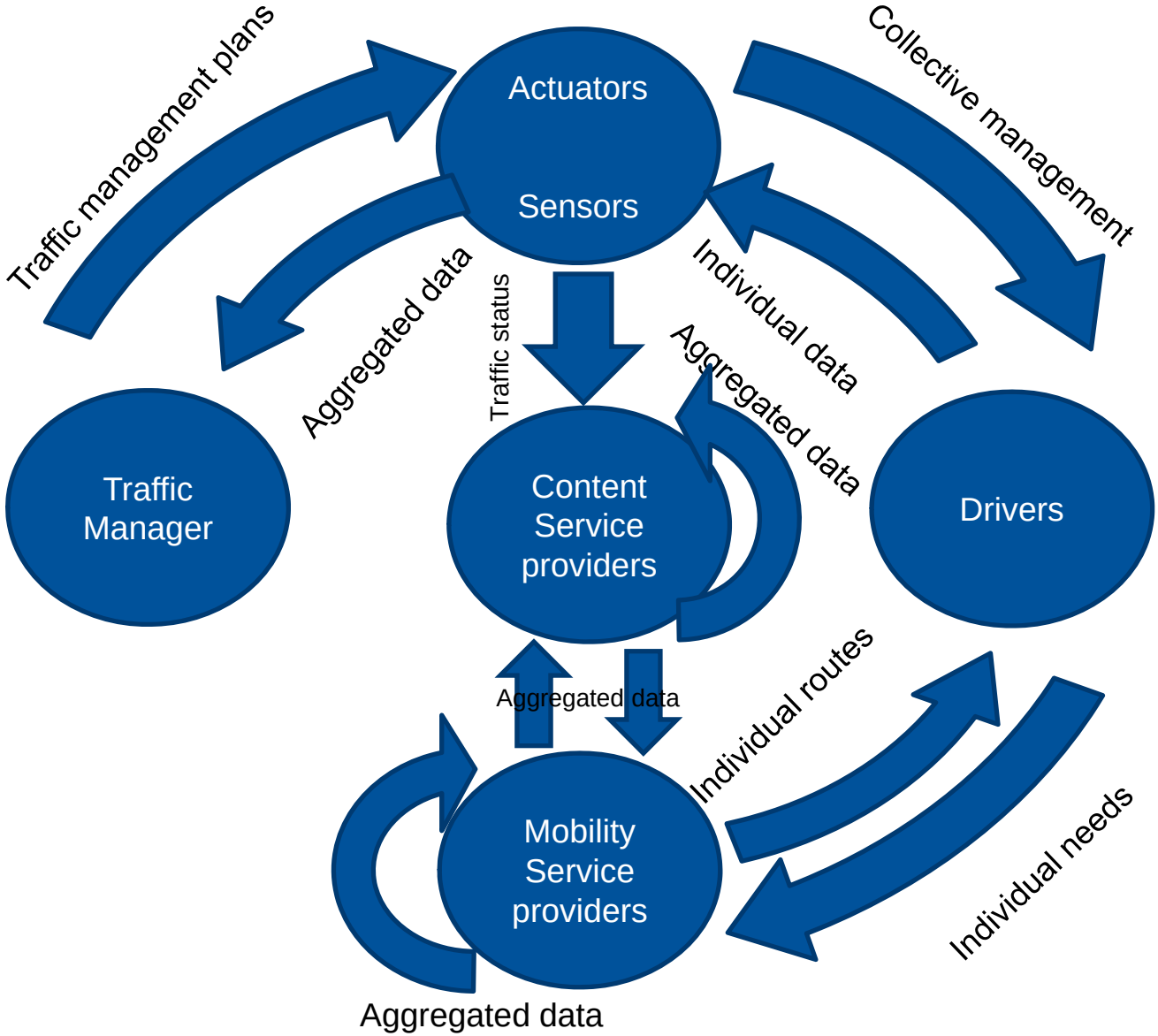
SP 1.0


Actuators
Sensors
Traffic management plans
Collective management
Aggregated data
Individual data
Traffic Manager
Drivers
Individual routes
Individual needs
Mobility Service providers

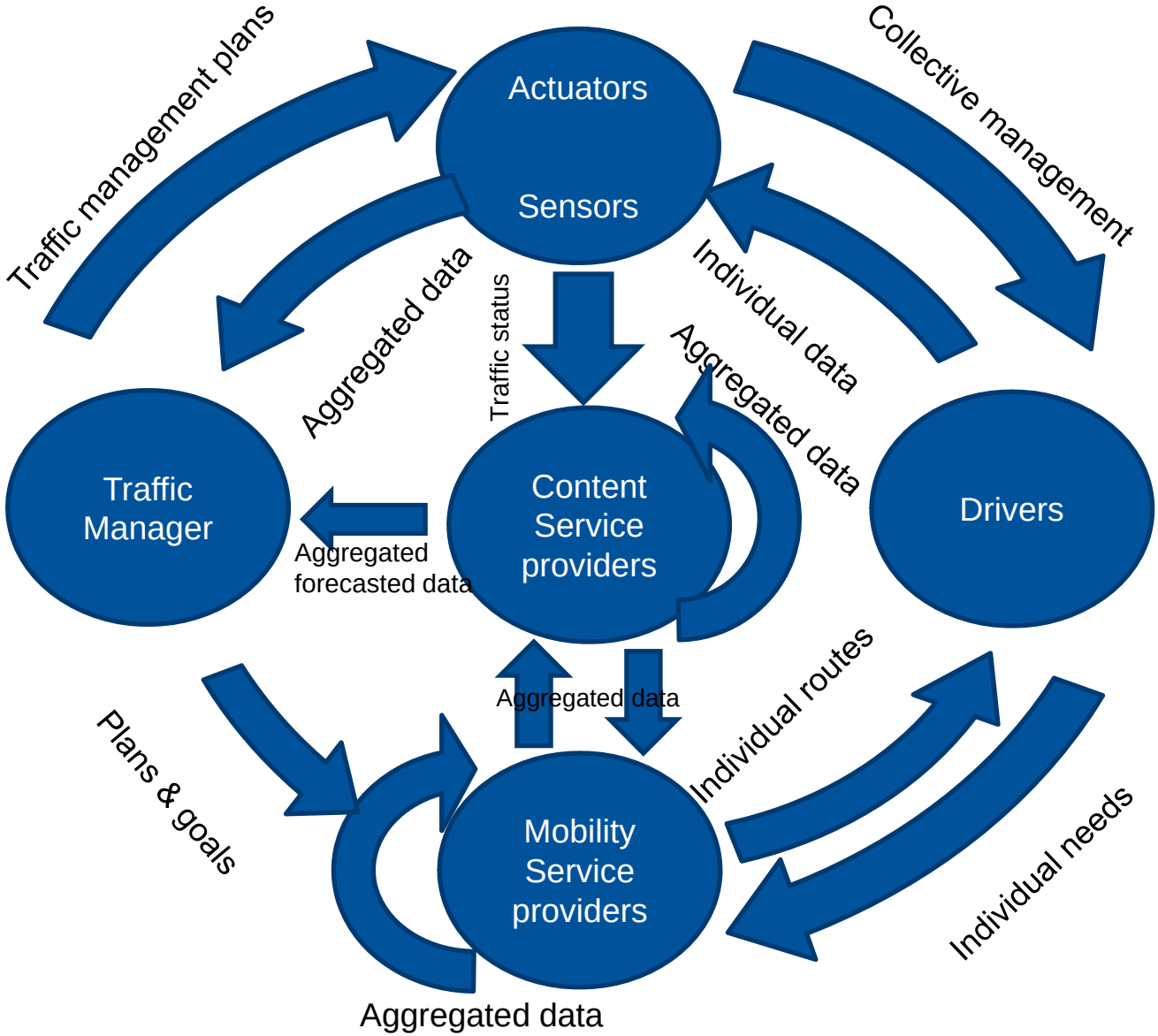
SP 1.5


Actuators
Sensors
Traffic management plans
Collective management
Aggregated data
Individual data
Traffic status
Traffic Manager
Drivers
Individual routes
Service providers
Individual needs

SP 2.0


Actuators
Sensors
Traffic management plans
Collective management
Aggregated data
Traffic status
Individual data
Aggregated data
Traffic Manager
Content Service providers
Drivers
Aggregated data
Individual routes
Individual needs
Mobility Service providers
Aggregated data

TM 2.0


Actuators
Sensors
Traffic management plans
Collective management
Aggregated data
Traffic status
Individual data
Aggregated data
Traffic Manager
Content Service providers
Drivers
Aggregated forecasted data
Aggregated data
Plans & goals
Individual routes
Mobility Service providers
Individual needs
Aggregated data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TRAFFIC MANAGEMENT

Task Force terms of reference

- The TFs will have 3-5 members including appointed leader.
- The members will collaborate in the tasks execution and production of deliverables
- The leader will coordinate the drafting of the Report(s) and interaction with Steering Board
- TFs will have meetings structure which can also be Conf Call.
- The final draft TF Report (including the interim) has to be discussed and approved before publication by the SB at its meeting.

- Expected outputs:
  - Elevator pitch for TM 2.0
  - Task Force Report: Viability analysis and recommendations