

Common Highways Agency Rijkswaterstaat Model (CHARM)

Functional Viewpoint

Detailed Specification of Functions and Datastores

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1. Introduction

This document contains a (more) detailed specification of CHARM's functions and datastores. It should be read in conjunction with the CHARM Functional Specification.

This document is intended to help the reader of the CHARM functional specification to understand specific functions and datastores in more detail, collating all the information relating to these into one place.

1.1 Function description

Each function presented in this document is described in a table, the structure of which is described below:

Reference	Name		
Overview			
Requirement			
Input dataflows		Output dataflows	
User needs		Supported Activity	
Suggested components			

Table 1: Function definition schema

The Reference value is a string that refers either to a FRAME Architecture function (string of digits separated by a dot), or a CHARM-specific functions (letter string followed by an "a" number string).

The Name is either a FRAME Name as it had been produced by the FRAME Selection tool, or a CHARM name.

The Overview defines the functionality in ability terms (the service it is able to provide). The overview section is either a FRAME Overview, as it had been produced by the Selection tool, or CHARM own, specific text defined by the CHARM team. Most of the FRAME Overview descriptions have been slightly modified, either by removing an ability because it is not required for CHARM, or, the ability is more restrictively redefined.

The Functional requirements section defines the functionality in more operational terms; how is the functionality actually provided? The requirement section is in present version often not defined as it was deemed unnecessary.

The Input dataflows section defines which data from which function flows in the function. The Output dataflows section has a similar meaning.

The User Needs section defines the services that the function has to support. In other words, to satisfy a User Need referred to in this field you have to have this function.

Supported Activity defines which business activity will be using this function. This value is derived from the User need/Function link: a User need is associated with a Business activity, thus a function needed to support a User need is needed by the activity that has that User need associated with it. The field Supported Activity provides a backward link from Functional to Business Specification.

Finally an indicative list of Suggested components has been included for each function. For explanation, see Appendix A.

1.2 Datastore description

The Datastore description has the following structure:

Reference	Name
Overview	
Structure	

The Reference field is a string. Frame datastores have prefix “D”. Non-FRAME datastores have a prefix “S”.

Name of a FRAME Datastore is the same as is used in FRAME Selection Tool¹.

The overview is a brief description of the role this data store plays.

The Structure describes data entities that will be kept in this store.

The Datastores described in the Functional Specification are described in more detail in section 3 of this document.

1.3 Functional areas

The functions and datastores are grouped into functional areas.

The functions in a functional area have in common the *type* of functionality they provide. E.g. in the functional area *External Interaction* provide either an adaptor functionality to external systems, or data gathering functionality (aggregating data from different external systems) or gateway functionality to other traffic / object management systems.

In the remainder of this document the functions of a functional area are described.

Each of the functions and datastore description is bookmarked so as it can be hyperlinked from the CHARM All Functions (in Scope).pdf document.

¹ <http://www.frame-online.net/the-architecture/selection-tool.html>

2. External Interactions Functions

2.1 Internal user interaction – human interfaces

Reference	2.1.9	Name	Provide Emergency Operator Interface
Overview	This Function shall be capable of providing the following facilities: (1) The provision of the HMI for the Emergency Operator so that emergencies and all related information can be received and managed. (2) Enable the Emergency Operator to manage the processing, classification and response to incidents or emergencies through Data Flow interfaces to other functionality. (3) Enable the Emergency Operator to request statistics about the occurrence of incidents and the responses to them.		
Functional requirements	(a) wait for request from operator and transmit it (b) wait for response and provide it to the operator.		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.2.0.5, 7.6.1.2a,	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>User interface</i>: (Industrial) portal, Audio • <i>Process and Integration</i>: Unified communications, open interfaces, B2B connections, messaging services • <i>Data layer</i>: real-time data services • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, operator platform, data management. • <i>Security</i>: Identity management, authentication, authorisation • <i>Management</i>: reporting 		

Reference	3.1.2.10	Name	Collect Inter-urban Traffic Data
Overview	<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to collect and collate traffic data from variety of the (internal) inter-urban road network equipment and external sources, such as: flow, speed, traffic volume, travel time, vehicle types</p> <p>(2) The ability to store the data (in data store D3.14)</p>		
Functional requirements	<p>(a) the presence of the trigger input data flow shall be continuously monitored</p> <p>(b) the analogue data representing raw traffic flow data obtained in (a) shall be processed into digital data such as, but not limited to, flow, speed, occupancy, headway, vehicle classification, and queue</p> <p>(c) the data for each point in the inter-urban road network at which it was produced shall be kept separate</p> <p>(d) the trigger output data flows, shall be used to send the data in (c) to the inter-urban road network traffic control and data management Functions.</p>		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.1.1, 7.1.1.3, 7.1.1.4, 7.2.4.2, 2.1.1.3, 2.1.4.1	Supported Activity	IP01
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: open interfaces, B2B connections, messaging services • <i>Data layer</i>: real-time data services • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, data management. 		

Reference	3.1.2.11	Name	Provide Updated Inter-urban data for Digital Maps
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to provide up-to-date information for digital maps and databases for segments of the inter-urban road network. (2) The ability for the information provided by this Function to include structural alteration, static speed limits and default journey times. (3) The ability to provide updated information to the digital map provider in order to be implemented in the next issue of digital maps as well as to in-vehicle devices for use in current and future planned journeys. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for receipt of the input data flows (b) when any of the data flows in (a) is received, apply any necessary processing so that the data is suitable for use by a digital map provider (c) on completion of (b), send the data to the geographic information provider in the output data flow. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	-	Supported Activity	IP01
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Open interfaces • <i>Business logic</i>: • <i>Data layer</i>: Document management, Geo services, Graphical mapping, Data translation, Data pre-processing • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, GIS data management 		

Reference	3.1.2.13.1	Name	Provide Inter-urban Road Operator Mgt Interface
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) A HMI that enables the Road Network Operator to manage the control of traffic using the inter-urban road network. (2) The HMI shall enable the Road Network Operator to provide commands that change the current inter-urban traffic control scenario and to override the use of lanes in the road network, except when it is imposed as part of an incident or demand management strategy, or to provide selective Vehicle priority. (3) The HMI shall have to ability to enable the Road Network Operator to examine and update the sequence of inter-urban traffic control scenarios that are implemented automatically, and to see the "log" of previously implemented inter-urban traffic control strategy changes. (5) The HMI shall have to ability to output requests to the Road Network Operator for a check to be made of the availability of auxiliary lanes (hard shoulders), and for the Operator to provide an available / not available response so that traffic can be directed to use it, or not. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for receipt of the inter-urban road static network data and inter-urban traffic management commands data flows from the Road Network Operator plus the operator inter-urban auxlane check request data flow from the Manage Lanes in the Inter-urban Road Network function (b) when the first data flow in (a) is received, check its contents and if it contains new and / or changes to the road network static data, send it to the Manage Inter-urban Static Road Data function in the inter-urban static data changes data flow (c) if the contents of the data flow received in (b) contains a request for the current inter-urban road network static data, send this request to the Manage Inter-urban Static Road Data function in the inter-urban static data changes data flow (d) as a result of (b) or (c), continuously monitor for receipt of the operator inter-urban road static data response data flow (e) when the data flow in (d) is received, Output its contents to the Road Network Operator in the data flow containing inter-urban static road data (f) when the second data flow in (a) is received, check its contents and if they are an update, or a request for output, send them in the planned inter-urban data update data flow to the Manage Planned Inter-urban Strategy Changes function (g) as a result of (f) continuously monitor for receipt of the planned inter-urban data output data flow (h) when the data flow in (g) is received, output its contents to the Road Network Operator in the inter-urban traffic responses data flow (i) if as a result of (f) the second data flow in (a) is found to contain command(s) for change(s) in the management of traffic, decide which function(s) should receive the commands (j) if as a result of (i) the contents are a change to the current strategy, send the contents of the data flow in the operator inter-urban management request data flow to the Manage Inter-urban Traffic Commands & Messages function (k) if as a result of (i) the contents are other changes, send the contents of the data flow in either the inter-urban operator lane override data flow to the Manage Lanes in the Inter-urban Road Network function, or in the inter-urban road legal speeds data flow to the Manage Inter-urban Road 		

	<p>Network Speeds & Headways function</p> <p>(l) as a result of (j) continuously monitor for the receipt of the operator inter-urban management response data flow and when it is received, output its contents to the Road Network Operator in the inter-urban traffic responses data flow</p> <p>(m) if the third data flow in (a) is received, output its contents to the Road Network Operator in the inter-urban traffic responses data flow</p> <p>(n) as a result of (m) continuously monitor for receipt of the inter-urban traffic management commands data flow from the Road Network Operator</p> <p>(o) when the data flow in (n) is received, output its contents to the Manage Lanes in the Inter-urban Road Network function in the inter-urban auxlane check response data flow.</p>		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.3.3	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>User interface:</i> (Industrial) portal, GIS presentation, GUI / video integration, Audio, Video • <i>Process and Integration:</i> Process modelling, Workflow management, Event handling, Unified communications, Adapters, Messaging services • <i>Business logic:</i> Event processor, Rule engine, Decision support, Tracking and Tracing, Scenario manager, Task Manager, MTM • <i>Data layer:</i> Document management, Real time data services, Geo services, Graphical mapping, Video / audio streaming • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Operator platform • <i>Security:</i> Identity management, Authentication, Authorisation, Security management, Access management • <i>Management:</i> Process Monitoring, Reporting 		

Reference	3.1.2.14.1	Name	Provide Inter-urban Road Operator Cmd Interface
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) A HMI that enables the Road Network Operator to manage the control of traffic using the inter-urban road network. (2) The HMI shall enable the Road Network Operator to provide commands that change the current inter-urban traffic control scenario and to override the use of lanes in the road network, except when it is imposed as part of an incident or demand management strategy, or to provide selective Vehicle priority. (3) The HMI shall have the ability to inform the Road Network Operator of the success or failure of the requested change. (4) The HMI shall have the ability to output requests to the Road Network Operator for a check to be made of the availability of auxiliary lanes (hard shoulders), and for the Operator to provide an available / not available response so that traffic can be directed to use it, or not. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for receipt of the inter-urban command output override or request inter-urban output monitoring data flows from the Road Network Operator (b) when the first data flow in (a) is received, check its contents to see if it is imposing or cancelling an override (c) if in (b) an override is being imposed, send the details to the Output Inter-urban Traffic Commands & Messages function in the inter-urban command override status data flow (d) if in (b) an override is being cancelled, send the cancellation request to the Output Inter-urban Traffic Commands & Messages function in the inter-urban command override status data flow (e) as a result of (c) or (d), continuously monitor for receipt of the inter-urban command override response data flow from the Output Inter-urban Traffic Commands & Messages function (f) when the data flow in (e) is received, output its contents to the Road Network Operator in the inter-urban command override response data flow (g) if the second data flow in (a) is received, check its contents and send the request for output to be monitored to the Output Inter-urban Traffic Commands & Messages function in the inter-urban command monitoring status data flow (h) as a result of (g), continuously monitor for receipt of the inter-urban command monitoring response data flow from the Output Inter-urban Traffic Commands & Messages function (i) when the data flow in (h) is received, output its contents to the Road Network Operator in the inter-urban command monitoring response data flow. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.3.5,	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>User interface</i>: (Industrial) portal, GIS presentation, GUI / video integration, Audio, Video • <i>Process and Integration</i>: Process modelling, Workflow management, Event handling, Unified communications, Adapters, Messaging services • <i>Business logic</i>: Event processor, Rule engine, Decision support, Tracking and Tracing, Scenario manager, Task Manager, MTM 		

	<ul style="list-style-type: none">• <i>Data layer:</i> Document management, Real time data services, Geo services, Graphical mapping, Video / audio streaming• <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Operator platform• <i>Security:</i> Identity management, Authentication, Authorisation, Security management, Access management• <i>Management:</i> Process Monitoring, Reporting
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Reference	3.1.2.14.2	Name	Output c&i to Drivers using Inter-urban
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to output information, and / or warnings, and / or commands to Drivers using the inter-urban road network by Signs & Signals equipment (2) The ability for the outputs to have a variety of uses ranging from providing journey time information to providing Drivers with commands for unexpected speed or lane use. The list of all messages that shall be displayed is t.b.d. (3) The ability to use several different technologies (products) to provide the outputs.. (4) The ability to accommodate through non-functional mechanisms the differentiation between the way that information and commands are provided to Drivers according to the demands of the particular implementation. (5) The ability to monitor all of the outputs and revisions to any already being output that are likely to give rise to inconsistent and incoherent messages being displayed to Drivers. (6) Specifically, this function is an adaptor that enables different types of equipment to be connected. The list of equipment types is t.b.d 		
Functional requirements	<ol style="list-style-type: none"> (a) when the msg (message) request data flow is received from the Inter-urban Traffic Control function it is determined which specific control messages have to be sent to external Variable Message Signs equipment. These control messages are device and implementation dependant and specific. This function is able to determine the appropriate set of control messages and use it for implementation of a specific VMS (b) implementation required in (a) shall be achieved through the output of the data flows cmds (commands) (c) the response rsp to (b) shall be sent to the Inter-urban Traffic Control function using the msg_response data flow (d) the contents of the outputs in (b) shall be monitored and any that might lead to inconsistent or incoherent messages being displayed to drivers, revised. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.5.1, 7.1.4.9, 7.1.5.6, 7.1.4.8, 7.1.4.3, 7.1.4.2, 7.1.3.4, 7.1.0.5 A12.10, A12.11, A12.12,A12.13 A12.14, A12.15, A12.16, A12,17, A12..2 A12.22, A12.23, A12.24 A12.25, A12,26, A12.27, A12.28, A12.29, A12.3, A12.31, A12.32, A12.33, A12.34, A12.36, A12.38, A12.39, A12 40, A12.41, A12.43, A12.44, A12.5, A12, 6, A12.7	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration:</i> Adapters, Protocol conversion, Open interfaces, Messaging services • <i>Business logic:</i> MTM 		

	<ul style="list-style-type: none">• <i>Data layer</i>: Real time data services• <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform
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Reference	3.1.6.5	Name	Provide Traffic Predictions Operator Interface
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) An HMI through which the Transport Planner can perform various tasks. (2) The HMI shall enable these tasks to include the management of the operation of Traffic Simulation Engine functionality and the modification of the road network model through the functionality that manages the store of Traffic Simulation Data. (3) The HMI shall enable the Transport Planner to request access to view both the simulation results and the current road network data for all or any of the models plus in the case of traffic data for varying periods of time and parts of the road network. 		
Functional requirements	<ol style="list-style-type: none"> (a) when any of the input data flows are received from the transport planner, process them and send the relevant data flow to either the Manage Traffic Simulation Data Store function or the Provide Traffic Simulation Engine function (b) when as a result of sending one of the data flows in (a) the response is received from the appropriate destination function, output the received data to the transport planner using the appropriate output data flow. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.3.0.6a	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>User interface:</i> (Industrial) portal, GIS presentation • <i>Business logic:</i> Traffic simulation • <i>Data layer:</i> Geo services • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform 		

Reference	3.2.11	Name	Provide Operator Interface for Incident Management
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) A HMI through which the Road Network Operator can control the management of incidents and the implementation of traffic scenarios for incident management. (2) The HMI shall enable the Road Network Operator to confirm the implementation of incident management scenarios if needed, to input and update incident data in the store of Incident Data, and to manage the development of new incident management scenarios. (3) The HMI shall enable the Road Network Operator to request and receive statistical reports on the occurrence of incidents and the used scenarios. 		
Functional requirements	<ol style="list-style-type: none"> (a) when the first trigger input data flow is received, the command shall be checked for syntax and consistency (b) when (a) is complete, the action needed shall be determined (c) if the result of (b) is that the action needed is to output incident data or produce a statistical report, the request for the retrieval of the data and preparation of the report shall be sent to the Manage Store of Incident Data function using the first trigger output data flow (d) when the result of (c) is received through the third trigger input data flow, the contents shall be output directly to the Operator (e) if the result of (b) is that implementation of an incident management strategy is to be confirmed, or a new strategy is being provided, the data shall be sent to the incident assessment Function using the second trigger output data flow (f) if the result of (b) is that new incident data or assessment "rules" are being provided then the data shall be sent to the Identification and Classification function using the third trigger output data flow (g) when the third trigger input data flow is received, the contents shall be output to the operator using the other output data flow. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	6.2.2.11, 7.2.0.5, 7.2.0.6	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>User interface:</i> (Industrial) portal, GIS presentation, GUI / video integration, Audio, Video • <i>Process and Integration:</i> Process modelling, Workflow management, Event handling, Unified communications, Adapters, Messaging services • <i>Business logic:</i> Event processor, Rule engine, Decision support, Tracking and Tracing, Scenario manager, Task Manager, MTM • <i>Data layer:</i> Document management, Real time data services, Geo services, Graphical mapping, Video / audio streaming • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Operator platform • <i>Security:</i> Identity management, Authentication, Authorisation, Security management, Access management • <i>Management:</i> Process Monitoring, Reporting 		

Reference	3.3.5	Name	Provide Demand Management Operator Interface
Overview	This Function shall be capable of provide the HMI through which the Road Network Operator may develop and implement demand related scenario's both off-line and in real time and to be informed of the effects of their implementation.		
Functional requirements	(a) when the first trigger input data flow is received, the command shall be checked for syntax and consistency (b) when (a) is complete, the request shall be sent to the Function that can complete the action using the appropriate trigger output data flow selected from the first three (c) when as a result of (b) the second or third trigger input data flows are received their contents shall be sent to the Operator using the other output data flow (d) if the second trigger output was sent in (b) then arrival of subsequent third trigger input data flow shall be awaited (e) when the data flow in (d) arrives, its contents shall be output to the Operator		
Input dataflows	tbd	Output dataflows	tbd
User needs	-	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> <i>User interface:</i> (Industrial) portal, GIS presentation <i>Business logic:</i> Event processor, Rule engine, Decision support, Tracking and Tracing, Scenario manager <i>Data layer:</i> Document management, Real time data services, Geo services, Graphical mapping <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Operator platform 		

Reference	3.4.7	Name	Provide Environment Management Operator Interface
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) A HMI through which the Road Network Operator shall be able to manage the collection of environmental data, plus its analysis and use by other functionality within the System. (2) The HMI shall enable the Road Network Operator to request and be provided with output of the data currently being collected, prediction of environmental conditions and historical data. (3) The HMI shall enable the Road Network Operator to request an analysis of the environmental data, receive the resulting suggested actions and confirm these actions. (4) The HMI shall enable the Road Network Operator to update the static data used in the prediction of environmental conditions. 		
Functional requirements	<ol style="list-style-type: none"> (a) when the input data flows from the operator are received, check them for validity (b) if anything is found in (a) the operator shall be prompted for corrections (c) when (b) is completed, the action required shall be determined (d) if the result of (c) is that the static data used by the prediction algorithm is to be updated, the second trigger output data flow shall be sent to the Manage Environmental Conditions Data Store function so that the data can be loaded into the store (e) if the result of (c) is that the Manage Environmental Conditions Data Store function must carry out an action, send the request in the first trigger output data flow (f) as a result of (e), the arrival of the second input trigger data flow shall be awaited (g) when the data flow in (f) arrives, the response shall be sent to the operator using the other output data flow (h) if the suggest environmental actions data flow arrives, output its contents to the operator and await the arrival of confirmation or alternative actions in one of the input data flows being monitored in (a) (i) when the operator provides a response to the data output in (h) send it in the confirm environmental actions data flow to the Determine Environmental Actions function. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	-	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> • <i>User interface:</i> (Industrial) portal, GIS presentation, GUI / video integration, Audio, Video • <i>Process and Integration:</i> Workflow management, Event handling, Messaging services • <i>Business logic:</i> Event processor, Rule engine, Decision support • <i>Data layer:</i> Real time data services, Geo services • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Operator platform • <i>Security:</i> Identity management, Authentication, Authorisation, Security management, Access management 		

Reference	OI 01	Name	Provide Operator Interface to Cameras
Overview	This function shall be enable the operator to access the R 01, and R02 functions (control Cameras and Collect Video Traffic Data in order to control the cameras and selection and presentation of the traffic video streams		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	-	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none">• <i>User interface:</i> GUI / video integration, Video• <i>Data layer:</i> Video / audio streaming• <i>Technical infrastructure:</i> Network services, Operator platform, Encoding / decoding		

2.2 Internal Resources Interaction

Reference	RM 01	Name	Report Status and capabilities of a resources
Overview	<p>This function shall be capable to</p> <ul style="list-style-type: none"> • Gather data from owners of a resource itself about its status, status changes and capabilities, respectively changes in resource capabilities • Store the above data in Resource Data datastore • Report to resource / resource owner and function PI 1 Inform stakeholders of any changes in status of the resource, such as that a resource has been allocated, de-allocated or deployed, a time slot has been allocated etc. <p>The function is event triggered from by a resource (status change initiated by a resource) and by a change in status value of a resource.</p>		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	A10.5.4, A10.6.2,	Supported Activity	CM02, CM04, CM06,
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration:</i> Event handling • <i>Business logic:</i> Tracking & tracing • <i>Data layer:</i> Data fusion, data translation • <i>Technical infrastructure:</i> Network services, storage, (virtual) hardware, database, application platform • <i>Management:</i> Reporting 		

Reference	RM 03	Name	Produce Briefing
Overview	<p>This function shall be capable to</p> <ul style="list-style-type: none"> gather data from Forecast Event Data, Event Data, and Resource Data about (1) Forecast / planned, (2) Current events that take place and (3) Deployment (plans). correlate all the events into a Brief log the brief in Brief Log datastore present the Brief to the resources Regional Traffic Operator, National Traffic Operator and Supporting Officer. <p>The function is time-triggered, e.g. at the change of Regional Traffic Operator team.</p>		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.3.3a, A11.1.4	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> <i>User interface:</i> (Industrial) portal <i>Data layer:</i> Document management, Real time data services, Data pre-processing, Data validation <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform <i>Management:</i> Process Monitoring, Process Analysis, Service monitoring, Reporting 		

2.3 Dissemination of Information

Reference	3.2.8	Name	Send Incident Details to Others
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to manage the output of instructions contained in a scenario to other functionality in the System in response to events that have been detected by other functionality. (2) The ability to sent instructions (command to perform traffic measures and other actions to other functionality such as that for Emergency Support,. (3) The output of incident management scenarios shall begin as soon as the strategy information is received. (4) The ability to keep a local store of the scenarios currently being implemented and delete them when their expiry time has passed, or when a strategy modification or removal indication arrives from the incident management functionality. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for the receipt of the input data flow (b) when the data flow is received in (a) check to see if it contains new information about an existing or new incident that does not indicate that the incident is now closed (c) if the check in (b) is positive, put the data that it contains into the output data flows and send them to the appropriate functionality (d) in addition to the requirement in (b), store the data locally (e) if the check in (b) shows that a previous incident is now closed, repeat (c) and delete all data about the incident from the local store 		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.0.5	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration:</i> Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services • <i>Business logic:</i> Tracking and Tracing, Scenario manager, TMC Connector, MTM • <i>Data layer:</i> Data pre-processing, Data fusion, Data validation • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform • <i>Management:</i> Process Monitoring, Process Analysis 		

Reference	3.2.9	Name	Send Incident Details to Information Providers
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to manage the output of information to External Service Providers as part of an incident strategy in response to incidents that have been detected by other functionality. (2) The ability for the Providers to also request a repeat of the output of the information and of incident data, where this applies to current or future events, i.e. not incidents involving the Emergency Services. (3) The ability for the output of the information to begin as soon as the strategy information is received. (4) The ability to keep a local store of the incident management scenarios currently being implemented and delete them when their expiry time has passed, or when a strategy modification or removal indication arrives from the incident management functionality. 		
Functional requirements	<ol style="list-style-type: none"> (a) on receipt of the first input trigger data flow all of the output data flows shall be sent (b) on receipt of any of the second to fifth input trigger data flows, the appropriate output data flows requesting strategy or incident data shall be sent (c) when the responses to (b) have been received, all of the output data flows shall be sent. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	2.1.1.1, 6.1.0.1, 6.1.0.3, 6.1.0.4, 6.1.2.3, 6.2.2.4, 6.2.2.5	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration:</i> Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services • <i>Data layer:</i> Data pre-processing, Data fusion, Data validation • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform • <i>Management:</i> Process Monitoring, Process Analysis 		

Reference	3.4.10	Name	Output Environmental Information
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to take responsibility for the output of information to Drivers and / or Travellers about environmental conditions. (2) Details of what the information output should contain and to which group(s) of users the information should be output will be provided to this Function by other functionality. (3) A HMI through which the environmental conditions information can be output to Drivers and / or Travellers. 		
Functional requirements	<p>when the environment information data flow is received, send the appropriate parts of its contents to the driver and the traveller.</p>		
Input dataflows	tbd	Output dataflows	tbd
User needs	-	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services • <i>Data layer</i>: Data pre-processing, Data fusion, Data validation • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform 		

Reference	DI 01	Name	Gather Traffic Information
Overview	<p>This function shall be able to</p> <ul style="list-style-type: none"> collect traffic information from a variety of internal and external sources for the purpose of dissemination to external users collect following traffic flow: <ul style="list-style-type: none"> flow speed traffic volume travel time vehicle types collect following event information: <ul style="list-style-type: none"> current events forecasted events clearance time current event collect weather related information collect all the above information on time scale: present, past and forecasted 		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	7.3.0.1 7.1.3.10a	Supported Activity	IP00, IP03, IP06, IP08, IP10
Suggested components	<ul style="list-style-type: none"> <i>Process and Integration:</i> Event handling, Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services <i>Business logic:</i> Event processor, Rule engine, TMC Connector, MTM <i>Data layer:</i> Real time data services, Data translation, Data pre-processing, Data fusion, Data validation <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, Application platform, Data mining, Data management <i>Security:</i> Access management <i>Management:</i> Process Monitoring, Service monitoring, Reporting 		

Reference	DI 02	Name	Gather Alternative Route Information
Overview	This function shall be able to <ul style="list-style-type: none">collect alternative route information<ul style="list-style-type: none">diversions nationaldiversions regional		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	6.1.0.4 6.1.2.3	Supported Activity	IP00, IP03, IP06, IP08, IP10
Suggested components	<ul style="list-style-type: none"><i>Process and Integration</i>: Event handling, Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services<i>Business logic</i>: Rule engine, TMC Connector, Decision support<i>Data layer</i>: Real time data services<i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, Application platform, Data mining		

Reference	DI 05	Name	Taylor Information
Overview	This function shall be able to <ul style="list-style-type: none"> transform information to a format best suited to a specific communication system used for information dissemination support following communication systems: tbd transform information to a format best suited to a specific geographical scale support following geographical scales: tbd transform information to a format best suited to a specific presentation device support following presentation devices: tbd 		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	6.1.2.6, 6.1.2.7, 6.1.2.8, 6.1.3.7, 6.1.3.8, 6.2.0.1, 6.2.0.4, 6.2.0.5, 6.2.2.1, 6.2.2.8, 6.2.2.9, 6.2.3.1, 6.2.3.5, A12.1	Supported Activity	IP00, IP03, IP06, IP08, IP10
Suggested components	<ul style="list-style-type: none"> <i>Business logic</i>: Rule engine, Pattern recognition <i>Data layer</i>: Real time data services, Geo services, Data translation, Data pre-processing <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Data management, GIS data management 		

Reference	DI 09	Name	Disseminate Information
Overview	This function shall be able to disseminate information to the appropriate (internal) actors, such as traffic operators, network managers, etc.		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	2.1.1.1, 6.1.0.1, 6.1.0.3, 6.1.0.4, 6.1.2.3, 6.1.3.8 6.2.0.1, 6.2.0.4, 6.2.0.5	Supported Activity	IP00, IP03, IP06, IP08, IP10
Suggested components	<ul style="list-style-type: none">• <i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services• <i>Business logic</i>: TMC Connector• <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform		

Reference	PI 01	Name	Inform stakeholders
Overview	The function shall be capable to inform any stakeholders on planned or predicted events.		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	6.2.2.10, 7.1.3.7, A10.6.2	Supported Activity	CM01, CM03, CM05, CM07, CM10,
Suggested components	<ul style="list-style-type: none">• <i>Process and Integration</i>: Open interfaces, B2B Connections, Messaging services• <i>Business logic</i>: Decision support system• <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform• <i>Management</i>: Reporting		

Reference	PI 02	Name	Gather, Identify and Classify Forecast and Planned Events
Overview	<p>This function shall be capable to</p> <ul style="list-style-type: none"> gather all relevant data about a forecast or planned event store data in Forecast and Planned Event Data store Identify stakeholders of the event provide an initial (first) acknowledgement of event notification to its source Initiate Allocation of Resources and, for Planned Road Works, the <i>Time Slot</i> function for handling of the event. <p>The function is event triggered by arrival of data from an actor reporting an Planned or Forecast event</p>		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	6.2.2.10, 7.1.3.7, A10.6.2	Supported Activity	CM01, CM03, CM05, CM07, CM10,
Suggested components	<ul style="list-style-type: none"> <i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services <i>Business logic</i>: Decision support system <i>Data layer</i>: Data pre-processing, Data fusion, Data validation <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform <i>Management</i>: Reporting 		

2.4 Traffic System and Objects Interaction

Reference	PI 04	Name	TIC Interaction
Overview	<p>This function shall be able to</p> <ol style="list-style-type: none"> (1) Request other TIC (regional, modal, urban, international to perform a traffic measure, or a scenario. The measures or scenarios that can be requested have been renegotiated. These negotiations are out of scope of the FS. (2) Receive a request to perform a traffic measure or a scenario and pass it to function 3.1.2.13.7 Manage Planned Inter-urban Strategy Change. The measures and scenarios that may be requested have been a priori requested. They are not part of the CHARM functionality (3) Pass the reply of the 3.1.2.13.7 to the requestor (4) Exchange traffic information with other TICs, typically information on the areas that they cover. 		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	2.1.0.1, 6.2.2.10, 7.1.0.13, 7.1.0.7	Supported Activity	CM 7, CM 10,
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Adapters, Process modelling, event handling • <i>Business logic</i>: TMC Connector, Scenario manager • <i>Technical infrastructure</i>: Network services, storage, (virtual) hardware, application platform • <i>Management</i>: Reporting 		

Reference	PI 05	Name	Bridge Management System Interaction
Overview	<p>This function shall be able to</p> <ol style="list-style-type: none"> (1) Receive a request to perform a traffic measure or a scenario and pass it to function 3.1.2.13.7 Manage Planned Inter-urban Strategy Change. The measures and scenarios that may be requested have been a priori requested. They are not part of the CHARM functionality (2) Pass the reply of the 3.1.2.13.7 to the requestor (3) Receive information on status of the .bridge that can be relevant for management of the traffic over the bridge 		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.4.6	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration:</i> Adapters, Process modelling, event handling • <i>Business logic:</i> TMC Connector, Scenario manager • <i>Technical infrastructure:</i> Network services, storage, (virtual) hardware, application platform • <i>Management:</i> Reporting 		

Reference	PI 06	Name	Tunnel Management System Interaction
Overview	This function shall be able to (1) Receive a request to perform a traffic measure or a scenario and pass it to function 3.1.2.13.7 Manage Planned Inter-urban Strategy Change. The measures and scenarios that may be requested have been a priori requested. They are not part of the CHARM functionality (2) Pass the reply of the 3.1.2.13.7 to the requestor (3) Receive information on status of the .tunnel that can be relevant for management of the traffic through the tunnel		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	-	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Adapters, Process modelling, event handling • <i>Business logic</i>: TMC Connector, Scenario manager • <i>Technical infrastructure</i>: Network services, storage, (virtual) hardware, application platform • <i>Management</i>: Reporting 		

2.5 Sensors and Actuators Interaction

Reference	3.4.1a	Name	Collect Fog Conditions
Overview	This Function shall be capable of providing the following facilities: (1) The ability to collect data about fog conditions that are relevant to the operation of the road network managed by the System. (2) The ability for some or all of the data to come from Weather Information Systems or to be detected using sensors within the road network. (3) The ability to forward the collected data to other functionality for storage.		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.1.6a	Supported Activity	
Suggested components	<ul style="list-style-type: none">• <i>Process and Integration</i>: Adapters, event handling, protocol conversion• <i>Business logic</i>: event processing• <i>Data layer</i>: data validation• <i>Technical infrastructure</i>: network services, storage, (Virtual hardware), MTM• <i>Management</i>: Reporting		

Reference	RI 01	Name	Control Camera's
Overview	This Function shall be capable of providing the following facilities: Control different types of camera's by <ul style="list-style-type: none">• Allowing a traffic operator to select a camera• Allowing to select a camera through a predefined trigger• Providing PTZ-functionality		
Functional requirements	tbd		
Input dataflows	tbd	Output dataflows	tbd
User needs	-	Supported Activity	
Suggested components	<ul style="list-style-type: none">• <i>Process and Integration:</i> Event handling, Adapters, Protocol conversion, Open interfaces, Messaging services• <i>Technical infrastructure:</i> Network services		

Reference	RI 02	Name	Collect Video Traffic Data
Overview	This Function shall be capable of providing the following facilities: (1) Collect data from camera's, possibly filtered (2) Select video data for storage (3) Store video data in D3.14 Inter-urban Traffic Data		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	-	Supported Activity	
Suggested components	<ul style="list-style-type: none">• <i>Process and Integration</i>: Event handling, Adapters, Protocol conversion, Open interfaces, Messaging services• <i>Business logic</i>: Event processor• <i>Data layer</i>: Real time data services, Video / audio streaming• <i>Technical infrastructure</i>: Network services, storage, Database, Video transcoding, Encoding / decoding		

Reference	RI 03	Name	Ramp Metering Control
Overview	This Function shall be capable of providing the following facilities: Control different types of Ramp Metering equipment by <ul style="list-style-type: none">Turning on / turning off the equipmentActivating / deactivating a given algorithm for determining the red / green cycle		
Functional requirements	(4)		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.4.2	Supported Activity	
Suggested components	<ul style="list-style-type: none"><i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, Messaging services<i>Technical infrastructure</i>: Network services		

Reference	RI 04	Name	Lighting Control
Overview	This Function shall be capable of providing the following facilities: Control different types of Lighting equipment by setting it to a given level of light emission (0-100%)		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	-	Supported Activity	
Suggested components	<ul style="list-style-type: none">• <i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, Messaging services• <i>Technical infrastructure</i>: Network services		

Reference	RI 05	Name	Barrier Control
Overview	This Function shall be capable of providing the following facilities: Control different types of barriers (up / down)		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.4.1, 7.3.1.4	Supported Activity	
Suggested components	<ul style="list-style-type: none">• <i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, Messaging services• <i>Technical infrastructure</i>: Network services		

3. Data Storage and Retrieval

3.1 Datastores

Reference	S0.2	Name	Logs
Overview	This data store shall be used in to support all functions. It shall contain details of any decision that has been taken, all actions that have been taken, incident management details, etc.		
Structure	The data in the Store shall be structured in the following way: tbd		

Reference	S0.3	Name	Resource Data
Overview	<p>This Data Store shall be used within the Resource Management (RM) area. It shall contain data describing status and capability of each resource. The capability data (what can the resource do) i shall be produced / changed by the owner of the resource. The status data shall be produced by the resource owner and by functions within the RM area. The status and capabilities will be produced / changed as their value change.</p> <p>The following resources have been identified:</p> <ul style="list-style-type: none"> • Regional Traffic Operator • National Traffic Operator • Supporting Officer • Roadside Traffic Officer (TO) • Roadside Team Manager (TM) • Business Unit (BU) • Towing Service (TS) • Emergency Contractor (EC) 		
Structure	<p>The data in store shall structured in the following way</p> <ul style="list-style-type: none"> • Regional Traffic Operator <ul style="list-style-type: none"> - status: tbd - capabilities: tbd • National Traffic Operator <ul style="list-style-type: none"> - status: tbd - capabilities: tbd • Supporting Officer <ul style="list-style-type: none"> - status: tbd - capabilities: tbd • Roadside Traffic Officer <ul style="list-style-type: none"> - status <ul style="list-style-type: none"> ▪ availability (number or character indicating available, allocated, deployed) ▪ location (characters and / or numbers, e.g. GPS / Galileo data) ▪ event allocated to (reference to incident in D.3.4 Incident Data) - capabilities: tbd • Roadside Team Manager <ul style="list-style-type: none"> - status <ul style="list-style-type: none"> ▪ availability (number or character indicating available, allocated, deployed) ▪ location (characters and / or numbers, e.g. GPS / Galileo data) ▪ event allocated to (reference to incident in D.3.4 Incident Data) - capabilities: tbd • Business Unit <ul style="list-style-type: none"> - status <ul style="list-style-type: none"> ▪ availability (number or character indicating available, allocated, deployed) ▪ event allocated to (reference to incident in D.3.4 Incident Data) - capabilities: tbd • Towing Service <ul style="list-style-type: none"> - tow truck 		

	<ul style="list-style-type: none"> ▪ status (number or character indicating available, allocated, deployed) ▪ location (number of characters and / or numbers, e.g. GPS / Galileo data) ▪ event allocated to (reference to incident in D.3.4 Incident Data) - capabilities: tbd • Emergency Contractor <ul style="list-style-type: none"> - status <ul style="list-style-type: none"> ▪ availability (number or character indicating available, allocated, deployed) ▪ event allocated to (reference to incident in D.3.4 Incident Data) - capabilities: tbd <p>The number of entries (number of each resources) is not fixed and will be changed as the number of resources change</p>
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Reference	S0.4	Name	Timeslots Data
Overview	This data store shall be used to record time slots that are available (and free) for carrying out road works		
Structure	The data in the Store shall be structured in the following way: <ul style="list-style-type: none">• road segment• time / and date• available yes / no (if not: link to planed road work for that date / time• Allowable time slots (e.g. no road works during rush hours, etc.)		

Reference	S3.9	Name	Forecast and Planned Event Data
Overview	This Data Store shall contain details of all reported forecast and planned events. It consists of two parts related to forecast and planned events.		
Structure	<p>The data for Extreme weather forecast events held in the Store shall be structured in the following way:</p> <ul style="list-style-type: none">• forecast start time and date• forecast end time and date• affected area• type of extreme weather• definition of originator of the event notification <p>The data for Crowd generating events held in the Store shall be structured in the following way:</p> <p>The data for Planned Road Works held in the Store shall be structured in the following way</p> <ul style="list-style-type: none">• planned start time and date• planned end time and date• location• type of Road Works• stakeholders• definition of originator of the event notification• allocated time slot		

Reference	S4.0	Name	Network Performance Data
Overview	This Data Store shall contain data about <ul style="list-style-type: none">target performance data, describing the required performance (on parts of) the traffic networkhistoric performance data of the networkactual performance-related data. Such as average speed and intensity of traffic per road segment and for predefined intervals in time. This data is derived from the D3.14 Inter-urban Traffic Data. This data shall be used to evaluate the performance of the network		
Structure	The data in the Store shall be structured in the following way: tbd		

Reference	S3.3	Name	Hazardous Goods, Locations and Rules
Overview	This Data Store shall contain static data about which locations and which goods are considered to be hazardous, and / or rules to determine whether a given location or a given good can be classified as hazardous or not.		
Structure	tbd		

Reference	D2.2	Name	Event and Emergency Event Data
Overview	This Data Store shall be used within the Provide Security and Emergency Facilities Area. It shall contain details of all incident / alarm notifications (including mayday calls) that have been received by the functionality in this Area. It is in two parts; un-processed and processed emergencies.		
Structure	<p>The data for un-processed emergencies held in the Store shall be structured in the following way:</p> <ul style="list-style-type: none"> • time (numbers defining hours, minutes and seconds) • date (date string) • incident location (characters and / or numbers, e.g. GPS / Galileo data) • type of vehicle involved in the incident (characters) • known status of each vehicle (characters) • description of cargo (if any) carried by each vehicle (characters) • the number of people involved in the incident (number) • health status of each person involved in the incident (characters) • any additional information relevant for emergency process (characters) • definition of originator of the incident notification (characters) • system that was the source of the incident notification (characters) <p>The data for processed emergencies held in the Store shall be structured in the following way:</p> <ul style="list-style-type: none"> • a consolidated problem description comprising: <ul style="list-style-type: none"> - time (numbers defining hours, minutes and seconds) - location (characters and / or numbers, e.g. GPS / Galileo data) - type of vehicle involved in the incident (characters) - known status of each vehicle (characters) - description of cargo (if any) carried by each vehicle (characters) - the number of people involved in the incident (number) - health status of each person involved in the incident (characters) - any additional information relevant for emergency process (characters) - a list of all associated incidents (characters) - a description of planned actions comprising: <ul style="list-style-type: none"> ▪ the emergency services that will be involved in the action, (characters) ▪ time when action will start (numbers defining hours, minutes and seconds) ▪ the number of vehicles involved (number) ▪ a description of the result of each action (characters) ▪ a list of progress reports for each action (characters) <p>It shall be possible for there to be several vehicles involved in each incident (un-processed or processed), each with their own cargos and / or numbers of occupants. Similarly it shall be possible for the number of people involved in the incident to be greater than the number of vehicle occupants if people outside the vehicles are involved in the incident. It shall be possible for a vehicle to include a bicycle or a powered two wheeled (PTW) vehicle.</p>		

Reference	D3.3	Name	Environmental Data
Overview	This Data Store shall be used within the Roadside Interaction. It shall contain data about the environmental conditions within the geographic area managed by the System. This data shall have been produced by Collect Fog Data within the Area from inputs received from the roadside equipment, and from external Weather Information Systems.		
Structure	<p>The data in the Store shall be structured in the following way:</p> <ul style="list-style-type: none">• date• time• location• temperature• humidity• wind direction• wind speed• pollution level (fine particles, CO2) levels)• noise level• environmental action detection<ul style="list-style-type: none">○ type of action (Fog, Heat, Rain, Wind, Ice, Snow, Excessive pollution, Excessive noise))○ recommended action <p>The number of entries shall be fixed by the number of times that samples are taken. It shall be possible for the number and type of pollutants recorded to vary from one location to another and from one System to another.</p>		

Reference	D3.4	Name	Event Data
Overview	This Data Store shall be used within the Manage Traffic Area. It shall contain data collected about current and predicted events (event log).		
Structure	<p>The data in the Store shall be structured as a collection of event data. Each event data item shall contain:</p> <ul style="list-style-type: none"> • event_id: an unique reference to the event • event <ul style="list-style-type: none"> ◦ event_name: type of event ◦ date: event start date ◦ time: event start time ◦ location: event location • forecast: forecast duration • actual: actual duration • severity: event severity • scenario: scenario used to handle the event • BU: handling business unit • action: scenario used to handle the event by the BU <p>The data in some of these entries shall be provided as the event state changes, whilst in others it shall be updated as the event impact progresses and remedial action is taken.</p>		

Reference	D3.5	Name	Demand Data
Overview	<p>This Data Store shall contain references on available / defined demand management scenarios.</p> <p>A scenario describes under which traffic conditions which traffic measures should be applied. A scenario is applicable (may be applied) within a scenario specific geographical area, and within scenario specific time zone.</p> <p>A scenario can be defined recursively, i.e. its definition can refer to other scenario's</p>		
Structure	<p>The data in the Store shall be structured in the following way: Per defined scenario:</p> <ul style="list-style-type: none">• (scenario) name• applicable area• applicable time zone• applicable traffic conditions• set of rules, each rule consisting of<ul style="list-style-type: none">○ condition○ action, that can be either<ul style="list-style-type: none">▪ a scenario, or▪ a traffic measure		

Reference	D3.8	Name	Interurban Road Static Data
Overview	This Data Store shall contain the static data for the inter-urban traffic road network managed by the System. The static data shall cover the actual layout and configuration of the inter-urban road network.		
Structure	<p>The data in the Store shall be structured in the following way:</p> <ul style="list-style-type: none"> • road type: (numbers and characters) • type of data: (numbers and characters) • link: <ul style="list-style-type: none"> - ID (number) - type (characters) - start location (characters and / or numbers, e.g. GPS / Galileo data) - end location (characters and / or numbers, e.g. GPS / Galileo data) - length: (number) - number of lanes / carriageways (number) - lane / carriageway width(s) (number(s)) - vehicle type usage restrictions (numbers and characters) - vehicle parking restrictions (numbers and characters) - vehicle speed limit(s) (number(s) in kph or mph) - bus lane present indicator (number or character indicating YES or NO) - presence of other objects, e.g. tunnels / bridges (numbers and characters) - obstructions, e.g. narrow road / lanes, bridges / tunnels giving low clearance, bridges with weight restrictions (characters) • date of last update (date string). <p>This data shall be used by a variety of Functions to enable traffic in the inter-urban network to be managed. It shall also be provided to the Manage Public Transport Area so that its service routes and schedules can be planned. It shall be possible for some data to also be provided to Vehicles to enable driver guidance and information to be provided.</p>		

Reference	D3.11	Name	Road Traffic Prediction Data
Overview	This Data Store shall contain various data that is to be used in modelling and simulating the traffic conditions in the road network managed by the System.		
Structure	<p>The data in the Store shall be structured in the following way:</p> <ul style="list-style-type: none"> • road network data (data for a digital roadmap using a standard format, e.g. GDF) • historic traffic data collected by other functionality in the System, among other incident-prone sections of the network • recent traffic data collected by other functionality in the System, among other incident prone sections of the network • traffic management scenarios in use when the traffic data was collected • processed traffic data that shows the origin and destination of traffic flows (number and digital roadmap data) • results from the simulation of traffic conditions in the road network managed by the System (numbers and digital roadmap data) <p>It shall be possible for this data to be produced from collected data or from input provided by the Transport Planner through the Provide Traffic Simulation Operator Interface Function.</p> <p>It shall be possible for the results data identified above to show the forecast traffic conditions produced by traffic management scenarios that were provided by the Transport Planner, or to be based on those used previously. These scenarios shall be stored in such a way that they can be associated with the results to which they are relevant. It shall also be possible for car park space requirements to be included in the results.</p>		

Reference	D3.12	Name	Event Strategy Data
Overview	This Data Store shall contain information about (1) the scenarios (their definitions) and (2) the log of scenarios as they have been used.		
Structure	<p>The Data Store should be structured in two separate and related parts: Scenario definitions and Scenario Log.</p> <p>The Scenario Definitions part should be structured as follows: For each scenario the following data is stored:</p> <ul style="list-style-type: none"> • scenario_name: a name under which the scenario can be referred to • covered_events: events that this scenario is able to handle • covered_network: part(s) of the road network where this scenario can be used (is covered by the scenario) • scenario_definition: <ul style="list-style-type: none"> - machine executable definition - operator visualisation: a definition that can be presented to an operator summarizing the role • scenario_conditions: among others <ul style="list-style-type: none"> - resources: required resources to execute the scenario (among other traffic officers, their expertise etc) - traffic_conditions: traffic conditions under which the scenario may be executed • scenario_target: definition of the traffic conditions that the execution of the scenario should aim to realise • implementation_date • implementation_time • removal_time • removal_date <p>The above shall represent the "minimum" set of information about each scenario. It shall be possible for it to be supplemented by other sets of information such as comments from the Road Network Operator. Some of the data items shall only be populated when the scenario is used, e.g. how the scenario was implemented, date / time of implementation / removal.</p> <p>A scenario is defined by specifying (1) the triples <trigger_on, action, trigger_off) and (2) the order in which the triples should be applied.</p> <p>The trigger_on is condition that, when it is satisfied, initiates the. The trigger_off is a condition that, when satisfied, ends the specified action.</p> <p>It shall be possible for the actions to be a series of commands that can be sent directly to other Functions such as those concerned with traffic management (e.g. traffic measures). Other actions shall be able to be requests for the Road Network Operator to call one or more Emergency Services, or take other action that cannot be implemented by a specific Function.</p> <p>The Scenario Log should be structured as a collection of (scenario entries). Each scenario entry should contain the following data:</p> <ul style="list-style-type: none"> • scenario_id: a unique reference to the applied scenario • scenario_name: the name of the applied scenario • scenario_change: the changes applied to the scenario by the operator • event_id: event that has been the trigger to this scenario 		

	<ul style="list-style-type: none">• start_date: date at which the scenario has been started• start_time: time at which the scenario has been started• end_date: date at which the scenario has been ended• end_time: time at which the scenario has been ended• scenario_result: actual traffic situation related to target-conditions at the end of the scenario
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Reference	D3.14	Name	Inter-urban Traffic Data
Overview	This Data Store shall contain traffic flow data and other traffic related data for the inter-urban road network. The data in the Store shall be divided into up to three parts comprising, current, historic and predicted data.		
Structure	<p>The data in the Store for current and historic data shall be structured in the following way:</p> <ul style="list-style-type: none"> • date (date string) • time (numbers defining hours, minutes and seconds) • location (characters and / or numbers, e.g. GPS / Galileo data) • vehicle flow (number in vehicles per hour) • vehicle speed (number in kph or mph) • vehicle headway (number in seconds) • road occupancy (number as a percentage) • queue presence (number or character indicating YES or NO) • vehicle count (number) <p>There shall be one set of the above data for each location in the inter-urban road network where some or all of the data shall have been obtained. Within each set there shall be both current and historic data.</p> <p>The data in the Store for predicted data shall be structured in the following way:</p> <ul style="list-style-type: none"> • predicted date (date string) • predicted time (numbers defining hours, minutes and seconds) • location (characters and / or numbers, e.g. GPS / Galileo data) • vehicle flow (number in vehicles per hour) • vehicle speed (number in kph or mph) • vehicle headway (number in seconds) • road occupancy (number as a percentage) <p>There shall be three sets of predicted data, comprising short, medium and long term predictions.</p>		

3.2 Datastore functions

Reference	3.2.10	Name	Manage Store of Incident Data
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to take responsibility for the management of data about incidents and the production of statistical reports. (2) The ability to receive data about reported incidents and updates to that data from other functionality and incident data from other entities outside the System. (3) The ability to load all the data that is received into the store of Incident Data. (4) The ability to retrieve data from the store of Incident Data for assessment, when requested by other functionality in the System. (5) When a request is received from the functionality providing the HMI for the Road Network Operator, the ability to retrieve the data from the store of Incident Data and produce the required incident statistics reports. 		
Functional requirements	<ol style="list-style-type: none"> (a) when the first trigger input data flow is received, the data that it contains shall be loaded into the store of Incident Data (b) when the second trigger input data flow arrives, if the request is for incident data the required data shall be obtained from the store of Incident Data (c) as a result of (b) the data shall be sent to the Operator interface Function in the first trigger output data flow (d) if the second trigger input data flow in (b) contains revised incident data, the data in the store of Incident Data shall be updated (e) if the second trigger input data flow in (b) requests a report, the required data shall be retrieved from the store of Incident Data (f) the data produced in (e) shall be processed into statistical form, and sent to the Operator interface Function in the first trigger output data flow (g) when the third trigger input data flow is received, the data it contains shall be loaded into the store of Incident Data (h) when the fourth trigger input data flow is received, the data about current and future incidents from the store of Incident Data shall be retrieved (i) the data retrieved in (f) shall be sent to the assessment Function in the second trigger output data flow (j) when the fifth trigger input data flow is received, the data it contains shall be loaded into the store of Incident Data (k) loading and obtaining data from the store of Incident Data shall use the other output and input data flows respectively (l) of the above, the activities in (h) and (a) shall take absolute priority over all other activities within the Function (m) the integrity and contents of the store of Incident Data shall be maintained and managed to make most efficient use of the space available whilst optimising data access time. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	A10.3.7	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Technical infrastructure:</i> Network services, Storage, (Virtual) hardware, database, Application platform • <i>Management:</i> Reporting 		

Reference	IDTM 04	Name	Manage Hazardous Goods, Locations and Rules Data
Overview	This function shall have the following abilities: <ul style="list-style-type: none"> • The ability to take responsibility for the management of Hazardous Goods data, Locations and decision Rules. • The ability to receive data the changes in the above data from other BU entities • The ability to load all the data that is received into the store. • The ability to retrieve data from the store of for assessment, when requested by other functionality in the System. • The ability to provide upon request data to the functionality providing the HMI for the Emergency, Traffic and Road Operators 		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	2.1.4.1, 7.1.4.9, 7.1.5.1, 7.2.6.1, A10.3.7	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Event handling, Unified communications, Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services • <i>Business logic</i>: Event processor, Rule engine, Decision support • <i>Data layer</i>: Document management, Data pre-processing, Data fusion, Data validation • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform • <i>Security</i>: Access management • <i>Management</i>: Process Monitoring, Process Analysis, Service monitoring, Reporting 		

Reference	3.4.1	Name	Monitor Weather Conditions
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to receive data about weather conditions (excluding fog which is done by a separate function) that are relevant to the operation of the road network managed by the System. (2) The ability for some or all of the data to come from Weather Information Systems and from function 3.4.1 Collect Fog Information (3) The ability to forward the received data to other functionality for storage. 		
Functional requirements	<ol style="list-style-type: none"> (a) when the first trigger data flow is received, the data that it contains shall be stored internally (b) the other input trigger data flow shall be continuously monitored for actual measured weather conditions (c) at periodic intervals the measured weather conditions shall be converted into digital data and collated with the data received in (a) (d) when (c) is complete, the data shall be sent to the Manage Environmental Conditions Data function using the trigger output data flow. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	2.1.1.1, 7.1.2.6a	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration:</i> Event handling, Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services • <i>Business logic:</i> Event processor • <i>Data layer:</i> Real time data services, Data pre-processing, Data fusion, Data validation. • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform • <i>Management:</i> Reporting 		

Reference	3.4.8	Name	Manage Environmental Conditions Data
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to manage the store of Environmental Conditions Data. (2) In performing this activity, the ability to collect and collate environmental data provided by other functionality and from other System(s) and load this data into the store of Environmental Conditions Data. (3) Periodically or when requested by the Road Network Operator, the ability to retrieve data from the store of Environmental Conditions Data and send it to other functionality in the System. (4) The ability to retrieve data from the store of Environmental Conditions Data and send it to other functionality in the System and when returned, load the results back into the store. (5) When confirmed by the Road Network Operator, the ability to add to the store of Environmental Conditions Data any confirmed actions to reduce the impact of environmental conditions. (6) The ability to provide the Road Network Operator with copies of the stored data when requested by the Traffic Operator 		
Functional requirements	<ol style="list-style-type: none"> (a) when any but the third or fourth input trigger flows are received, their contents shall be loaded into the Environmental Conditions Data Store (b) when the third input trigger data flow is received, the appropriate actions in (c) to (g) shall be carried according to the contents of the command (c) data shall be sent to other Functions using the first, fifth and sixth trigger output data flows (d) data shall be sent to another Area using the seventh and eighth trigger output data flows (e) data shall be sent to the prediction Function using the second trigger output data flow (f) data shall be obtained from the store (analyse it for output if so requested) and sent to the Operator interface Function using the third trigger output data flow (g) data shall be sent to another System using the last (ninth) output trigger data flow (h) the actions in (c), (d), (e) and (g) shall be carried out at periodic intervals if not requested by the Operator (i) confirmation of requested data transfers shall be provided to the Operator when they are complete (j) all periodic data transfers shall be logged for later access by the Operator (k) when data in (a) above is loaded, the pollution levels shall be checked against pre-set levels (l) if the result of (j) shows that the levels are exceeded, the data shall be sent to the incident management Function using the fourth trigger output data flow (m) if the third trigger input data flow contains changes to the periods at which data is output, or to the pre-set levels in (j) above, the changes shall be made to the values in the Function's internal store (n) the completion of (l) shall be confirmed to the Operator using the third trigger output data flow (o) the integrity and contents of the store of Environmental Conditions Data shall be maintained and managed to make most efficient use of the space available whilst optimising data access time. 		

Input dataflows	tbd		tbd
User needs	-	Supported Activity	
Suggested components	<ul style="list-style-type: none">• <i>Process and Integration</i>: Event handling, Open interfaces, B2B Connections, Messaging services• <i>Business logic</i>: Event processor, Decision support• <i>Data layer</i>: Real time data services, Data translation• <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Data management• <i>Security</i>: Access management• <i>Management</i>: Process Monitoring, Process Analysis, Service monitoring, Reporting		

Reference	3.1.2.6	Name	Manage Inter-urban Static Road Data
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to take responsibility for managing the store of Inter-urban Road Static Data that is used by inter-urban traffic management functionality. (2) Every time a new set of data is received from the Geographic Information Provider, the ability to make it available to the inter-urban traffic management functionality and to load it into the store. (3) The ability to receive changes to the data from the Road Network Operator HMI functionality. (4) The ability to load the data received from the Road Network Operator HMI functionality into the store. (5) The ability to send changes in the data for the inter-urban road network provided through the Road Network Operator HMI functionality to functionality from which it will be returned to the Geographic Information Provider for use when digital map data is provided in the future. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for receipt of the inter-urban static road data from the geographic information provider (b) when the data flow in (a) is received, load the data into the store of Inter-urban Road Static Data using the inter-urban static data update data flow, and updating the data already in the store (c) when (b) is complete, read all of the data from the store using the inter-urban static data read data flow and send it to the functionality in the Manage Traffic and other Functional Areas using the appropriate data flows (d) when the inter-urban static data changes data flow is received, repeat (b) and (c) and also send the data to the Provide Updated Inter-urban data for Digital Maps function in the data flow containing inter-urban new static data (e) when the operator inter-urban traffic static data request data flow is received, collect all of the data from the store of Inter-urban Road Static Data using the inter-urban static data update data flow, and send it to the Provide Inter-urban Traffic Operator Interface function using the operator inter-urban road static data response data flow. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	2.1.4.2	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Event handling, Open interfaces, B2B Connections, Messaging services • <i>Business logic</i>: Event processor • <i>Data layer</i>: Real time data services, Data translation • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Data management • <i>Security</i>: Access management • <i>Management</i>: Reporting 		

Reference	3.1.2.16	Name	Manage Inter-urban Traffic Data
Overview	<p>(1) The ability to manage the store of Inter-urban Traffic Data.</p> <p>(2) The ability to collect data about traffic conditions (i.e. traffic flows, road segment use, journey times, etc.) in the inter-urban road network.</p> <p>(3) The ability to use the inter-urban road network static data to enable the collected and received data to be validated, collated, fused and loaded in the store of Inter-urban Traffic Data in a coherent way that makes it easy to retrieve it for particular road segments, or larger parts of the inter-urban road network.</p> <p>(4) The ability to exchange data collected by the Function with similar functionality in another instance of the System, through the Other Related System, Inter-urban Traffic Management System.</p> <p>(5) The ability to provide the collated and fused data from the store of Inter-urban Traffic Data to other functionality, including that responsible for the output of the processed data to other parts of the System and entities outside the System.</p> <p>(6) The ability to provide current inter-urban traffic data for use in creating short and medium term predictions for that data and when received to load that data into the store of Inter-urban Traffic Data.</p>		
Functional requirements	<p>(a) continuously monitor for receipt of any of the input data flows</p> <p>(b) when any of the data flows containing data about traffic using the inter-urban road network is received, process the data, applying data fusion where the data relates to the same part of the road network</p> <p>(c) use the data received in the inter-urban static data for traffic conditions data flow to determine the location and characteristics of the part of the inter-urban road network to which the received data applies</p> <p>(d) convert the contents of data flow containing inter-urban infrastructure usage data into actual traffic flows and apply it to the correct part(s) of the inter-urban road network</p> <p>(e) load the results of (b) to (d) into the store of Inter-urban Traffic Data, to provide the current traffic flow data and fusing it with data already in the store to provide a coherent set of historic traffic data for the inter-urban network</p> <p>(f) also use the results of (b) to (d) to provide traffic data for other inter-urban traffic management systems</p> <p>(g) analyse the results of (b) to (d) to determine where traffic queues are present and from use successive collections of data to determine the speed of propagation of the tail end of the queue</p> <p>(h) use the data received in the inter-urban static data for traffic conditions data flow to determine the locations of the queues</p> <p>(i) send the results of (g) and (h) to the output warnings to the driver in the vehicle functionality</p> <p>(j) analyse the results of (b) to (d) to determine the current journey time for each segment of the inter-urban road network and store it in the store of Inter-urban Traffic Data, fusing it with similar data already in the store to provide a coherent historical record of journey times</p> <p>(k) use the results of (b) to (d) and (j) to provide the output data flows containing current traffic data that shall be sent directly to other functionality and to the function for transmission to other entities and functionality in other functional areas</p> <p>(l) periodically read the journey times from the store of Inter-urban Traffic Data and use them to update the default inter-urban road segment journey times using the default inter-urban journey time</p>		

	<p>update data flow</p> <p>(m) when the inter-urban data updates data flow is received in (a) from other inter-urban traffic systems, store it in its own part of the store of Inter-urban Traffic Data to provide a coherent historical record of inter-urban traffic data in other relevant geographic areas</p> <p>(n) when the urban to inter-urban traffic data transfer data flow is received in (a), store it in its own part of the store of Inter-urban Traffic Data to provide a coherent historical record of urban traffic data in relevant urban areas</p> <p>(o) when the data flow containing inter-urban traffic predicted data is received in (a), store it in its own part of the store of Inter-urban Traffic Data and delete any data that is no longer predicted, i.e. the time for which it is predicted is now current or in the past</p> <p>(p) when the data flow containing service area occupancy data is received in (a) store its contents in the service area part of the store of Inter-urban Traffic Data to provide a coherent historical record of service area use</p> <p>(q) when the data flow containing journey times from a cellular communications network provider is received, filter the data to remove travel times that are not between locations in the inter-urban road network, e.g. for pedestrian routes and the urban road network and check for consistency, i.e. does it fit with other data for road vehicles, or is it perhaps a cyclist</p> <p>(r) add the data that does pass the tests in (q) to the store of journey times in the store of Inter-urban Traffic Data</p> <p>(s) when the data flow containing the request current inter-urban traffic data is received, collect the requested data from the Store of Inter-urban Traffic Data and send it to the Predict Short & Long Term Inter-urban Traffic function in the data flow containing requested current inter-urban traffic data</p> <p>(t) as a result of (s) continuously monitor for receipt of the short & medium predicted inter-urban traffic data flow</p> <p>(u) when the data flow in (t) is received, load its contents into the store of Inter-urban Traffic Data</p>		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.1.1, 7.1.1.3, 7.1.1.4, 7.1.2.1, 7.1.2.3	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Event handling, Open interfaces, B2B Connections, Messaging services • <i>Business logic</i>: Event processor, Decision support • <i>Data layer</i>: Real time data services, Data translation, Data fusion • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Data management • <i>Security</i>: Access management • <i>Management</i>: Process Monitoring, Process Analysis, Service monitoring, Reporting 		

Reference	2.1.2.5	Name	Manage Event and Emergency Event Data
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ul style="list-style-type: none"> (1) The ability to manage the contents of the Store of Incident and Emergency Data. (2) The ability to receive data about incidents (e.g. eCall data) and the way that their responses are being processed (emergency plans) and update them in the Store of Incident and Emergency Data. (3) The ability to pass on incident descriptions when they are received to the functionality for planning emergency interventions. 		
Functional requirements	<ul style="list-style-type: none"> (a) store incident and emergency description when requested (b) load information from incident or emergency with the requested criteria (c) compute statistic from incident and emergency data 		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.2.1.2, 7.2.3.1, 7.2.0.7, 7.2.0.5, 7.2.6.1	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration:</i> Event handling, Open interfaces, B2B Connections, Messaging services • <i>Business logic:</i> Event processor, Decision support • <i>Data layer:</i> Real time data services, Data translation, Data fusion • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Data management • <i>Security:</i> Access management • <i>Management:</i> Process Monitoring, Process Analysis, Service monitoring, Reporting 		

Reference	3.1.2.13.6	Name	Manage Lanes in the Inter-urban Road Network
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The management of the lanes on roads in the inter-urban network (the coordination related to lane usage traffic measures) (2) The ability to enable the management of the lanes so that the most efficient use can be made of the available road space in the inter-urban road network. (3) The ability for the use of lanes to be changed in a way that is safe for vehicle operation and that causes the minimum disruption to all forms of inter-urban road traffic. (4) The ability to support the output of lane management commands that can ban the use of one or several lanes in some or the entire road network, for all or specific types of vehicles, provide keep-in-lane advice to stabilise traffic flow for all or specific types of vehicles and where available, make the auxiliary lane (sometimes called the hard shoulder) available for use. (5) The ability to support the output of lane management commands that can provide keep-in-lane advice to stabilise traffic flow for all or specific types of vehicles. (6) The ability to support the output of lane management commands that can, where available, make the auxiliary lane (sometimes called the "hard shoulder") available for use. (7) The ability to send commands to alter the use of lanes to the functionality that is responsible for the output of messages to Drivers, both at the roadside and in the Vehicle. 		
Functional requirements	<ol style="list-style-type: none"> (a) when either the first or second trigger input data flows is received, the commands shall be produced to change the use of the lanes as requested (b) the commands in (a) shall make the change of lane use in an orderly way such that the safety of vehicle and travellers is not reduced or compromised (c) the commands in (a) and (b) shall be sent to the inter-urban output actuation Function using the first trigger output data flow (d) implementation of the second trigger input data flow in (b) and (c) shall take priority over the first trigger input data flow (e) the new use of the lanes implemented in (c) shall also be sent to the Detect Urban Violation function using the second trigger output data flow. (f) keep-in-lane advice is triggered by operator or automatically at critical traffic levels (g) the operator is asked to check and confirm that whole auxiliary lane is non-occupied before making it available (h) details of changes in lane use shall be sent to other functionality so that it can be access by the Broadcaster and sent to other Areas of the System. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.5.2	Supported Activity	DTM01,
Suggested components	<ul style="list-style-type: none"> • <i>User interface</i>: GIS presentation, Workstation manager • <i>Process and Integration</i>: Workflow managment • <i>Business logic</i>: MTM, traffic forecasting • <i>Data layer</i>: Real time data services 		

	<ul style="list-style-type: none">• <i>Technical infrastructure:</i> Network services, Storage, (Virtual) hardware, database, Application platform• <i>Security:</i> Authentication, authorisation• <i>Management:</i> Reporting
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Reference	3.1.2.13.8	Name	Provide Inter-urban Ramp Metering
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to manage the traffic using an entrance to the inter-urban road network - sometimes call "entrance ramps" or "on ramps". (2) The ability to apply scenarios to manage the use of the "ramp" in support of other scenarios that are managing the inter-urban road network as a whole. (3) The ability to apply suitable and appropriate algorithms so that the flow of traffic down the "ramp" causes the least disruption possible to the traffic already using the inter-urban network. (4) The ability to use traffic data from the inter-urban road network to determine the traffic conditions on the inter-urban road network, both in the immediate vicinity of the "ramp" as well as upstream and downstream of the ramp. (5) The ability to supplement traffic data provided by other functionality with data collected by its own sensors about traffic conditions on the "ramp", on the approaches to the "ramp" and in the local part of the inter-urban road network surrounding the "ramp" and to use this data to determine local traffic conditions. (6) A suitable HMI through which commands can be sent to Drivers using the "ramp" and to those approaching the "ramp" from an upstream part of the inter-urban road network. (7) The ability for the commands to be displayed to Drivers either at the roadside (8) (8) The ability to manage one or more "ramps" and to apply different scenarios and / or algorithms at each "ramp". 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for receipt of the inter-urban local data for ramp metering data flow from the traffic entity, plus the inter-urban traffic data for ramp metering and mt inter-urban strategy details or ramp metering data flows (b) when either the first or second data flows is received, use their contents in any appropriate algorithms or other techniques to determine the optimum traffic flow on the "ramp" that will cause the least disruption to the traffic using the inter-urban road network (c) as a result of (b) output commands to drivers in the inter-urban amp metering output data flow (d) when the third input data flow is received in (a) use its contents to modify the type of management (strategy) being applied to one or all of the ramps. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	A12.20	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, Messaging services • <i>Business logic</i>: Scenario manager • <i>Technical infrastructure</i>: Network services • <i>Management</i>: Process monitoring, reporting 		

Reference	3.1.2.13.5	Name	Manage Inter-urban Traffic Commands & Messages
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to provide traffic control facilities that enable the traffic to be managed so that the most efficient use is made of the inter-urban road network. (2) The ability to manage the implementation of traffic management scenarios for the inter-urban road network in a planned sequence according to the time of day and day of week. (3) The ability for the traffic management scenarios to include control of access to the inter-urban network (ramp metering), plus commands to manage the use of lanes in the carriageway (including the hard shoulder) and the maximum speeds for vehicles in each lane. (4) The ability for these scenarios to be overridden by the Road Network Operator through the functionality providing their interface, as well as by inputs from the incident, demand and access management functionality. (5) The ability to use current, historic and predicted traffic data from the inter-urban network and to change in real-time the actual traffic management commands being sent for output to take account of variations in this data. (6) The ability to provide details of the current and previous implemented traffic management scenarios on some or all parts of the inter-urban road network to the Road Network Operator through the functionality that provides their interface. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for receipt of any of the input data flows (b) when the planned inter-urban traffic management request data flow is received in (a), action the strategy that it contains, by sending all or part of its contents in the inter-urban tunnel inputs, inter-urban bridge inputs, inter-urban crossing inhibit, inter-urban strategy details, inter-urban strategies in use, inter-urban strategy details for ramp metering, inter-urban zone access vehicle list, inter-urban lane management requests, inter-urban speed and headway settings, or inter-urban traffic management strategy, inter-urban to urban traffic commands data flows (c) when the data flow containing inter-urban static data is received in (a), store its contents for internal use (d) when the inter-urban zoning strategy data flow is received in (a), output its contents to the Check Access to Inter-urban Zones function in the inter-urban zone access vehicle list data flow (e) when any of the bridge inter-urban inputs, tunnel inter-urban inputs, inter-urban environmental inputs, or inter-urban demand management strategy data flows are received in (a), use their contents to modify the current traffic management strategy, and repeat (b) (f) when the data flow containing predicted inter-urban network data is received in (a), store its contents for internal use in calculating recommended routes and send these in the inter-urban recommended routes data flow to the Plan Trip Details function (g) when either of the urban to inter-urban commands, or inter-urban traffic management strategy data flows are received in (a), use their contents to modify the current traffic management strategy, and repeat (b) (h) when the operator inter-urban management request data flow is received in (a), use their contents to modify the current traffic management strategy, repeat (b) and output the response to the 		

	Provide Inter-urban Road Operator Mgt Interface function in the operator inter-urban management response data flow.		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.4.9, 7.1.0.5, 7.1.4.8, 7.1.4.1, 7.1.5.5, 2.1.2.2, 7.1.0.12, 7.1.0.13	Supported Activity	DTM01,
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Process modelling, Workflow management, Event handling, Adapters, Protocol conversion, Open interfaces, Messaging services • <i>Business logic</i>: Event processor, Rule engine, Decision support, Pattern recognition, Tracking and Tracing, Scenario manager, Traffic forecasting, Task Manager, MTM • <i>Data layer</i>: Real time data services, Geo services, Graphical mapping • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Operator platform • <i>Management</i>: Process Monitoring, Process Analysis, Service monitoring, Reporting 		

Reference	3.1.2.13.4	Name	Manage Inter-urban Road Network Speeds & Headways
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to provide the management of Vehicle speed and headway settings within the inter-urban road network. (2) The ability to receive commands to implement legal speed settings, plus both suggested speed and headway settings from either the functionality providing the Road Network Operator interface, or the inter-urban traffic management functionality, or as part of an incident, demand management, or environmental strategy. (3) The ability to ensure that requests from the Road Network Operator take priority and override those from the inter-urban traffic control functionality, but not override those that are part of an incident, demand management, or environmental strategy. (4) The ability to send speed and headway settings to the inter-urban functionality that is responsible for the output of messages to Drivers at the roadside, as well as to other functionality from which it can be sent to other parts of the system and to the Broadcaster. (5) The ability to send legal speed settings to the digital map data provider entity in case it needs to be used in future digital map updates. 		
Functional requirements	<ol style="list-style-type: none"> (a) when either the first or second trigger input data flows is received, the commands shall be produced to change the use of the lanes as requested (b) the commands in (a) shall make the change of lane use in an orderly way such that the safety of vehicle and travellers is not reduced or compromised (c) the commands in (a) and (b) shall be sent to the inter-urban output actuation Function using the first trigger output data flow (d) implementation of the second trigger input data flow in (b) and (c) shall take priority over the first trigger input data flow (e) the new use of the lanes implemented in (c) shall also be sent to the Detect Urban Violation function using the second trigger output data flow. (f) keep-in-lane advice is triggered by operator or automatically at critical traffic levels (g) the operator is asked to check and confirm that whole auxiliary lane is non-occupied before making it available (h) details of changes in lane use shall be sent to other functionality so that it can be access by the Broadcaster and sent to other Areas of the System. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.7.3	Supported Activity	DTM01
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Process modelling, Workflow management, Event handling, Adapters, Protocol conversion, Open interfaces, Messaging services • <i>Business logic</i>: Event processor, Rule engine, Decision support, Pattern recognition, Tracking and Tracing, Scenario manager, Traffic forecasting, Task Manager, MTM • <i>Data layer</i>: Real time data services, Geo services, Graphical mapping • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Operator platform • <i>Management</i>: Process Monitoring, Process Analysis, Service monitoring, Reporting 		

Reference	3.3.9	Name	Manage Demand Management Data Store
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to manage the store of Demand Management Data. (2) The ability for the data about the use of transport modes that is received to be loaded directly into the store of Demand Management Data. (3) The ability for the received data to be sent to the functionality responsible for reviewing demand management strategies. (4) The ability to extract data from the Demand Management Data and send it to the appropriate functionality for use in the development of new demand management strategies. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for the arrival of the data flow containing the updated demand data (b) when the data flow in (a) arrives, load the data into the store of Demand Data (c) send all of the data to the Analyse Data function and wait for it to respond with strategy criteria in the request demand strategy data flow (d) when the data flow in (c) is received search through the available strategies in the store of Demand Data (e) if a suitable strategy is found in (d) send it to the Demand Management Strategy Implementation function (f) if no suitable strategy is found in (d) send the data for demand strategy development to the Produce Demand Management Strategy function (g) when as a result of (f) the developed demand strategy data flow is received, load it into the store of Demand Data and also send it to the Demand Management Strategy Implementation function (h) when any of data flows containing other the requests for data and / or strategies is received, respond by sending what was requested to the function that sent the data flow (i) when the request for the implementation of a particular strategy is received from the Provide Operator Interface function, implement (e) for that strategy. 		
Input dataflows	tbd		tbd
User needs	-	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration:</i> Event handling, Open interfaces, B2B Connections, Messaging services • <i>Business logic:</i> Event processor, Decision support • <i>Data layer:</i> Real time data services, Data translation, Data fusion • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Data management • <i>Security:</i> Access management • <i>Management:</i> Process Monitoring, Process Analysis, Service monitoring, Reporting 		

Reference	3.1.6.4	Name	Process Traffic Prediction Data Store
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to manage the use of the store of Road Traffic Simulation Data. (2) The ability to load into the store the road network model and traffic data from other functionality in a way that keeps the data coherent and consistent. (3) It shall be possible for there to be more than one model of the same road network to enable various road configurations to be assessed for the effect on traffic. (4) The ability to enable the Traffic Simulation Engine functionality to obtain the data it needs to run simulations for each road network model and to store the results. (5) The ability to enable the Transport Planner to have access to the data in the store in a controlled manner so that changes can be made to the road network model and the results extracted for output to other functionality (6) If necessary the ability to be able to exchange data from the store with similar functionality in another instance of the System. 		
Functional requirements	<ol style="list-style-type: none"> (a) Continuously monitor for the frequent arrival of the collected traffic data traffic predictions from the inter-urban and / or the urban road network (b) Continuously monitor for the occasional arrival of the data flow containing the road network static data (c) use the data from (b) to build a model of the road network into which the data from (a) can be fused, i.e. the traffic flow data can be allocated to its correct part of the road network (d) whenever either of the data flows in (a) arrives, fuse the data that they contain into the model produced by (c) when (d) has been completed, send the collected traffic data to the Manage Traffic Simulation Data Store function in the data flow for processed road traffic data. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	2.1.1.3	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Process modelling, Event handling, Open interfaces, B2B Connections, Messaging services • <i>Business logic</i>: Event processor, Rule engine, Decision support, Pattern recognition, Traffic forecasting, Traffic simulation, Traffic network evaluation • <i>Data layer</i>: Data fusion, Data validation • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Data mining • <i>Management</i>: Reporting 		

Reference	3.1.2.9	Name	Output Inter-urban Traffic Data
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to periodically receive data about current traffic conditions in the inter-urban road network from the functionality that manages the store of Inter-urban Traffic Data, plus the functionality that manages lane use and maximum speeds within the inter-urban road network. (2) The ability to immediately output the data which has been received to other parts of the System or to entities that are outside of the System. (3) When a request is received from the Broadcaster Traffic and Travel Information Provider, the ability to output the latest set of data that is available about inter-urban traffic conditions. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for the receipt of the any of the input data flows (b) when the data flow inter-urban traffic information request is received in (a), output the current traffic information to the broadcaster using the data flow containing inter-urban traffic data (c) when the inter-urban traffic data for output data flow is received in (a), store its contents locally updating any previously received data that has been changed (d) when (c) is complete, output the revised version of the inter-urban traffic data to functionality in other Functional Areas, the broadcaster and the traffic and travel information provide in the appropriate output data flows (e) when either the inter-urban lane instructions or the inter-urban speed limit changes data flows are received in (a), repeat (c) and (d) for the data that they contain. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	6.2.2.9, 2.1.1.1	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, Messaging services • <i>Data layer</i>: Real time data services • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform 		

Reference	3.1.2.14.4	Name	Output Inter-urban Traffic Commands & Messages
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ul style="list-style-type: none"> (a) The ability to co-ordinate execution of traffic measures (sent for output) within an area so that a safe and most efficient use is made of the inter-urban road network in the area. (b) The traffic measures should be executed either by the following (external equipment) Variable Message Signs, Barriers, Lighting and Ramp Metering (c) The ability for the execution of the traffic measures to be overridden by the Road Network Operator through the functionality providing their interface (d) The ability to use current, historic and predicted traffic data / rules from the inter-urban network and to change in real-time the actual traffic management commands being sent for output to take account of variations in this data. (e) The ability to continuously adapt the management of the inter-urban road network to suit the actual detected traffic conditions. (f) The ability to provide details of the current and previous modes of control on some or all parts of the inter-urban road network to the Road Network Operator through the functionality that provides their interface. (g) The ability to monitor the results of the output of commands, so that alternative action can be taken if they are not followed. 		
Functional requirements	<ul style="list-style-type: none"> (a) continuously monitor for receipt of either of the inter-urban command monitoring or override data flows from the Provide Inter-urban Road Operator Cmd Interface function, or either of the "strategy details" data flows, or the inter-urban incident strategy, emergency route, or coned area strategy request data flow, or the current inter-urban traffic conditions data flow (b) when the selected inter-urban strategy details data flow is received in (a), check its contents and implement them by sending the inter-urban traffic management l&s request data to the Output Messages & Commands to Inter-urban Roads functions, RI 03 Ramp Metering Control, RI 04 Lighting Control, or RI 05 Barrier Control (c) as a result of (b) continuously monitor for receipt of the response data flows (d) when either of the data flows in (c) is received check its contents and if the Output in (b) is not being performed correctly, send the details to the Manage Inter-urban Traffic Commands & Messages function in the inter-urban strategy command response failure data flow, plus also send details of the failure in the inter-urban strategy command output failure data flow to the Evaluate Need for Equipment Maintenance function (e) when any of the inter-urban incident strategy, emergency route, or coned area strategy request data flows is received in (a), check its contents and use them to override the outputs produced in (b) (f) as a result of (e) repeat (c) and (d) (g) when the current inter-urban traffic conditions data flow is received in (a) use its contents to modify any of the outputs being generated in (b) only (h) when the inter-urban command monitoring data flow is received in (a), check its contents and if they are a request for monitoring to start commence providing the contents of the output data flows in (b) to the Provide Inter-urban Road Operator Cmd Interface function in the 		

	data flow containing inter-urban command monitoring data (i) if the contents of the data flow in (h) were a request to stop a previously requested monitoring, then cease the activity in (h) (j) when the inter-urban command override data flow is received in (a), check its contents and if they are a request for an override, implement it unless any of the data flows in (e) area being actioned, in which case ignore the request (k) (k) send the results of the action in (j) to the Provide Inter-urban Road Operator Cmd Interface function in the data flow containing inter-urban command override response		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.0.12, 2.1.3.1, 7.1.5.1, 7.1.0.5, 7.1.5.5, 7.1.4.8, 7.1.4.1, 7.1.4.2, 7.1.4.9	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, Messaging services • <i>Data layer</i>: Real time data services • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform 		

Reference	3.3.13	Name	Output Demand Management Information
Overview	This Function shall be capable of providing the following facilities: (1) The ability to take responsibility for the output of information to Drivers and / or Travellers as part of a demand management strategy. (2) The ability for other functionality to provide details of what the information output should contain and to which group(s) of users the information should be output.		
Functional requirements	when the demand management information data flow is received, send the appropriate parts of its contents to the driver and the traveller.		
Input dataflows	tbd		tbd
User needs	-	Supported Activity	
Suggested components	<ul style="list-style-type: none">• <i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, Messaging services• <i>Data layer</i>: Real time data services• <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform		

4. Event Detection and Handling

Reference	3.4.11	Name	Analyse Environmental Data and Implement Actions
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to analyse (e.g. check if threshold values have been reached) the environmental data when in the store of D3.3 Environmental Data to see if any action is needed (among others Weather Event detection) (2) The ability to send the results of the analysis and any recommended action to the functionality providing the HMI for the Road Network Operator for confirmation of the action. (3) When conformation of the recommended action is received from the functionality providing the HMI for the Road Network Operator, the ability to send the data to other functionality in the System. (4) The ability to send a copy of the confirmed actions to the functionality that is managing the store of Environmental Data for loading into the data store. (5) If included in the recommended action, the ability to send the data about the environmental conditions to the functionality in the System that provides the HMI through which it can be output to Drivers and / or Travellers.. 		
Functional requirements	<ol style="list-style-type: none"> (a) when the environmental data for analysis data flow is received, process its contents and determine if any actions are needed (b) if as a result of (a) actions are needed, determine those that would be the most suitable and send them in the suggest environmental actions data flow to the Provide Environment Management Operator Interface function (c) if the contents of the confirm environmental actions data flow received in response to (b) contain a negative response, re-examine the actions that could be taken and if possible suggest alternatives (d) if the contents in (c) contain a positive response then implement the actions that were determined in (b) and send out the appropriate data flows to other Manage Traffic functionality and to functionality in other Functional Areas (e) also put any information that needs to be output into the environmental information data flow and send it to the Output Environmental Information function. 		
Input dataflows	tbd		tbd
User needs	2.1.1.1, 7.1.2.5a, 7.1.2.6a	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration:</i> Workflow management, Event handling, Messaging services • <i>Business logic:</i> Event processor, Rule engine, Decision support, Pattern recognition • <i>Data layer:</i> Real time data services, Geo services, Graphical mapping, Data translation • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Data management • <i>Management:</i> Reporting 		

Reference	IDTM 01	Name	Decide Hazardous Goods
Overview	This function shall be able to determine whether or not hazardous goods are included in the event data that has been received.		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	7.2.6.1, 7.3.0.1	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none">• <i>User interface</i>: GUI / video integration• <i>Business logic</i>: Decision support, Audio, video• <i>Data layer</i>: Video / audio streaming• <i>Technical infrastructure</i>: Network services		

Reference	IDTM 02	Name	Decide Hazardous Locations
Overview	This function shall be able to decide whether or not an event location can be classified as a hazardous location.		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	7.2.6.1	Supported Activity	
Suggested components	<ul style="list-style-type: none">• <i>Business logic</i>: Decision support• <i>Data layer</i>: Document management, Geo services, Graphical mapping• <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform• <i>Management</i>: Reporting		

Reference	3.2.13	Name	Classify and Identify Events
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to identify and classify incidents. (2) The ability to use data about potential incidents that is provided by other functionality in other parts of the System, or data that it collects directly for itself. (3) The ability for the data from other parts of the System to have been received directly from terminators, or has been processed by other functionality from inputs that it has received. (4) The ability to determine that there is a good chance that the received data shows that an incident has occurred. (5) The ability to process the data to identify and classify the particular type of incident that it has been detected, according to the source using its own internal "rules" that may relate to some form of approved standard. (6) As part of the identification process, the ability to combine data that sensibly belongs to the same incident, e.g. the progressive advance of congestion following an accident. (7) The ability to analyse data about the weather to see if it will create a hazard for Vehicles. (8) When the identification and classification of the incident has been completed, the ability to send the data about it for storage and subsequent assessment of the necessary mitigation strategies by other functionality. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for receipt of any of the input data flows (b) when any of the data flows containing incident data is received in (a) analyse the data compare it with other data and build a "picture" of a possible incident (c) the analysis in (b) shall include the amalgamation of data that appears to be about two incidents into that for a single incident, e.g. the progressive formation of congestion due to a single incident (d) when the strike details or accident information data flows are received from the multi-modal system terminator, convert their contents into an incident in terms of the likely effect on road congestion and then make it an incident (e) when the weather data for incidents data flow is received from the weather systems terminator, analyse its contents to see if the expected weather conditions are likely to cause a hazard to drivers and if so, convert the data into that for an incident (f) when any of the data flows containing maintenance data is received in (a) convert it into roadworks data (g) when the data flow containing event data is received from the event organiser actor, determine its likely impact on the flow if traffic in the road network so that it can become an incident when the event occurs (h) when the data flow containing data from vehicles that are reporting themselves as incidents is received in (a), convert this data into data into that for an incident (i) when the environmental incident inputs data flow is received, analyse its contents to see if the consequences of the environmental incident are likely to cause a hazard to drivers and if so, convert the data into that for an incident (j) when the data flow containing incident detection data is received, 		

	<p>check to see if it is related to data previously processed and if so amalgamate into that data so that "duplicate" incidents are not reported</p> <p>(k) as a result of (b) to (j) send the data about the incident in the data flow containing new incident data to the Manage Store of Incident Data function.</p>		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.2.2.2, 7.2.0.1b	Supported Activity	IP04
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services • <i>Business logic</i>: Event processor, Rule engine, Decision support, Pattern recognition, TMC Connector, MTM • <i>Data layer</i>: Real time data services, Geo services, Graphical mapping, Data validation • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Data mining • <i>Management</i>: Reporting 		

Reference	IDTM 03	Name	Validate Event Information
Overview	The ability to validate event data that has been received is correct and accurately describes the event. Usually this is done with the aid of an operator.- results of event and event analysis are passed to Traffic Operator interface (function 3.1.2.14.1) and confirmed / rejected by the Operator.		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	7.2.0.7	Supported Activity	
Suggested components	<ul style="list-style-type: none">• <i>User interface:</i> (Industrial) portal, GIS presentation, GUI / video integration, Audio, Video• <i>Process and Integration:</i> Workflow management, Messaging services• <i>Business logic:</i> Decision support, Task Manager, MTM• <i>Data layer:</i> Data validation, Video / audio streaming• <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Operator platform• <i>Security:</i> Identity management, Authentication, Authorisation		

Reference	IDTM 05	Name	Report Event Analysis Data
Overview	This function shall be able to report results of the event and results of event analysis to other internal functions.		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	7.2.2.3, A10.1.1	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none">• <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform• <i>Management:</i> Reporting		

Reference	3.2.12	Name	Detect Incidents from Data
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to analyse the data that it receives about traffic conditions in the road network and that is stored in datastore D3.14 Inter-urban Traffic data to see if can detect that possibly incidents have occurred. (2) In the analysis of the data to detect events, the ability to enable the use of both data provided by other functionality (among others Environmental Data) and video image data as inputs. (3) The ability to analyse all types of data for patterns that suggest the occurrence of an event and the ability for such patterns to be linked to the same event if they occur in adjacent sections of the road network. (4) The ability for the term "event" to include anything that is likely to impede the normal flow of traffic, including Traffic Congestion, Vehicle Breakdown, Animal incursion, Human Incursion, Hazardous spillage, Debris, Wide / long loads, and Ghost drivers", i.e. Vehicles travelling against the proscribed direction of traffic flow, Exceptional environmental (5) The following incidents should be detected automatically (algorithmically): tbd (6) The ability to send details of a detected incident occurrence to the classification and storage functionality. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for the receipt of data flows containing traffic data from other functionality (b) when any of the data flows in (a) are received, store the data internally and analyse it against other data already received to see if there is any abnormality in the flow of traffic using standard forms of analysis (c) if any abnormality is found as a result of (b) check that it is not related to other abnormalities elsewhere in the road network, e.g. in an adjacent downstream road segment (d) if related occurrences are found in (c) combine them together as part of the same incident (e) as a result of (b) and (d) store the possible incident occurrence locally for future use in the analysis of data that is subsequently received in (b) (f) also continuously monitor the input of data about traffic flow in the presence indication data flow (g) analyse it to determine if there is any abnormality in the flow of traffic including vehicles travelling against the proscribed flow, i.e. "ghost drivers", using standard forms of analysis (h) if a possible incident is detected in (g) store the possible incident occurrence locally for future use in the analysis of data that is subsequently received in (f) (i) as a result of (e) and (h) send details of the detected possible incident tot he Classify and Identify Incidents function in the data flow containing incident detection data 		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.0.5, 7.2.0.6, 7.2.5.1, 7.1.1.8a, 7.1.7.7a, 7.2.0.1a, 7.2.0.1b	Supported Activity	IP04
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration:</i> Adapters, Protocol conversion, Open 		

	<p>interfaces, B2B Connections, Messaging services</p> <ul style="list-style-type: none"> • <i>Business logic</i>: Event processor, Rule engine, Decision support, Pattern recognition, TMC Connector, MTM • <i>Data layer</i>: Real time data services, Geo services, Graphical mapping, Data validation • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Data mining • <i>Management</i>: Reporting
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Reference	2.1.2.3	Name	Plan Emergency Event Intervention
Overview	<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to define and / or build the emergency plan that defines how the Emergency Services will respond a particular incident.</p> <p>(2) As part of the definition of the emergency plan, be able to select the required emergency services, use pre-defined response procedures, request (green wave) routes for Emergency Vehicles and request that the routes are implemented.</p> <p>(3) The ability to contact the required emergency services and establish with them the action plans.</p>		
Functional requirements	<p>(a) wait for an emergency to be planned</p> <p>(b) load all information on emergency</p> <p>(c) choose the right procedure for the emergency</p> <p>(d) inside the procedure:</p> <ul style="list-style-type: none"> - contact emergency services - plan their intervention : select the emergency route (pre-defined route or new computed one if needed) - send the selected route to emergency driver - store the plan - request for emergency processing. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.2.6.1, 7.2.2.1, 7.2.1.3	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> • <i>User interface</i>: (Industrial) portal, Audio • <i>Process and Integration</i>: Process modelling, Workflow management, Event handling, Open interfaces, B2B Connections, Messaging services • <i>Business logic</i>: Rule engine, Decision support, Tracking and Tracing, Scenario manager, Traffic forecasting, TMC Connector, Task Manager • <i>Data layer</i>: Document management, Real time data services, Geo services, Graphical mapping, Data translation • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Operator platform • <i>Management</i>: Process Monitoring, Process Analysis, Service monitoring, Reporting 		

Reference	2.1.2.4	Name	Process Emergency Progress Reports
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ul style="list-style-type: none"> (1) The ability to provide the full acknowledgement of the response to incidents to the originators. (2) The ability to prepare reports about the current progress with the response to incidents, i.e. how the emergency plan is being implemented. (3) The ability to provide updates to the functionality that provides the management of road traffic in the geographic area where the incident occurred. 		
Functional requirements	<ul style="list-style-type: none"> (a) wait for an emergency to process (b) load all information on emergency (c) send fully informed acknowledgement to traveller and authorities (d) receive progress reports from emergency services (e) analyse them in order to verify that process is OK (f) collect them to send a global progress report to emergency services and relevant authorities (g) in case of any problem request for e-classification or re-planning (h) store all information on process. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.2.1.3	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>User interface:</i> (Industrial) portal, Audio • <i>Process and Integration:</i> Process modelling, Workflow management, Event handling, Open interfaces, B2B Connections, Messaging services • <i>Business logic:</i> Rule engine, Decision support, Tracking and Tracing, Scenario manager, Traffic forecasting, TMC Connector, Task Manager • <i>Data layer:</i> Document management, Real time data services, Geo services, Graphical mapping, Data translation • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Operator platform • <i>Management:</i> Process Monitoring, Process Analysis, Service monitoring, Reporting 		

Reference	2.1.2.1	Name	Identify and Classify Emergencies
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to collect incident notifications from a variety of sources. (2) The capability to filter and obtain associated information (e.g. location, cargo status, Vehicle identification, Traveller identification) to produce the data needed for the planning of the appropriate response from the Emergency Services. (3) The ability to provide an initial (first) acknowledgement of incident notification to its source, e.g. eCall from inside or outside the Vehicle. (4) The ability to classify incidents and to provide data about them to other functionality so that the appropriate response can be planned and implemented and traffic management action can be taken (5) The ability to store all gathered information and log the initial responses 		
Functional requirements	<ol style="list-style-type: none"> (a) receive mayday call / incident notification (b) send immediate acknowledgement and incident notification for traffic management purpose (c) request for storage of the incident (d) associate to each one a confidence parameter (e) gather incident and increase associate confidence parameter (f) when confidence is right create an emergency (g) complete information on involved vehicle and traveller (h) request for storage of the emergency (i) request for emergency planning. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.2.0.5, 7.2.0.7, 7.2.2.3, 7.2.2.2, 7.2.6.1, 7.2.2.1	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services • <i>Business logic</i>: Event processor, Rule engine, Decision support, Pattern recognition, TMC Connector, MTM • <i>Data layer</i>: Real time data services, Geo services, Graphical mapping, Data validation • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Data mining • <i>Management</i>: Reporting 		

Reference	RM 02	Name	(De)-Allocate Time Slot
Overview	<p>This function shall be capable to</p> <ul style="list-style-type: none"> • Receive request for a time slot for Planned Road Works event. The information about event is contained in within a datastore Forecast and Planned Event Data . • Identify stakeholders involved in the Planned Road Works event (from Forecast and Planned Event Data) • Apply rules that are a part of TimeSlot to decide whether there is a conflict-free time slot • If no free time slot is available negotiate the conflict with the stakeholders • Allocate the free time slot • Inform stakeholders about the time slot allocation <p>This function will also be used to de-allocate a time slot (changing value in TimeSlot)</p> <p>The function is event triggered from A.5</p>		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	A10.5.1a, A10.6.1, A10.5.1, A10.6.2	Supported Activity	CM02
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration:</i> Process modelling, Workflow management, Event handling, Open interfaces, B2B Connections, Messaging services • <i>Business logic:</i> Event processor, Rule engine, Decision support, Pattern recognition, Traffic forecasting • <i>Data layer:</i> Document management, Geo services • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform • <i>Management:</i> Reporting 		

Reference	RM 04	Name	De-allocate Resource
Overview	<p>This function shall be capable to</p> <ul style="list-style-type: none"> • receive a report from the deployed resource when the action for which the resource has been allocated has been completed • report to resource owner that the resources is not required • change the status of the resource as <i>available</i> <p>This function can be applied to resources Roadside Traffic Officer, Roadside Team Manager, Business Unit, Towing Service and Emergency Contractor</p> <p>The function is event triggered (report of task completion)</p>		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	A10.4.4	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Process modelling, Workflow management, Event handling, Open interfaces, B2B Connections, Messaging services • <i>Business logic</i>: Event processor, Rule engine, Decision support, Pattern recognition, Traffic forecasting • <i>Data layer</i>: Document management, Geo services • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform • <i>Management</i>: Reporting 		

Reference	RM 05	Name	Deploy Resource
Overview	<p>This function shall be capable to</p> <ul style="list-style-type: none"> • receive a report by the resource that it is ready to be deployed • direct the resource to the event scene • brief the resource on the event and the required action • monitor the arrival time to the event's location • upon the arrival of the resource to the event's location mark the resource status as <i>deployed</i> <p>This function can be applied to deployment of resources Roadside Traffic Officer, Roadside Team Manager, Towing Service and Emergency Contractor.</p> <p>The function is event triggered (report by resource of being ready to deploy)</p>		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	A10.1.3, A10.4.5, A10.4.6, A10.7.1	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>User interface</i>: (Industrial) portal, GIS presentation, Audio • <i>Process and Integration</i>: Messaging services • <i>Business logic</i>: Tracking and Tracing • <i>Data layer</i>: Real time data services • <i>Technical infrastructure</i>: Network services, Operator platform 		

Reference	RM 06	Name	Allocate Resource
Overview	<p>This function shall be capable to</p> <ul style="list-style-type: none"> • receive resource allocation request • receive data describing (1) the resource that has to be allocated, (2) the event to which it has to be allocated and (3) the type of action that has to be taken • look-up in the Resource Data whether such a resource is available (compare status and capabilities with the requested resource) • if such a resource is available, changes the status of the resource to allocated and inform the resource owner about the allocation. <p>This function can be applied to resources Roadside Traffic Officer, Roadside Team Manager, Business Unit, Towing Service and Emergency Contractor.</p> <p>The function is event triggered by resource allocation request.</p>		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.3.7, 6.2.2.10, A10.5.4, A10.5.1a, A10.6.1, A10.5.1, A10.6.2	Supported Activity	CM02, CM04, CM06, CM09, CM12, CM13
Suggested components	<ul style="list-style-type: none"> • <i>User interface:</i> (Industrial) portal, GIS presentation, Audio • <i>Process and Integration:</i> Messaging services • <i>Business logic:</i> Tracking and Tracing, Decision support, Rule engine • <i>Data layer:</i> Real time data services • <i>Technical infrastructure:</i> Network services, Operator platform 		

5. Scenarios

Reference	IDTM 09	Name	Define Scenarios
Overview	This function shall be able to: (1) support the initial definition of a control scenario (using information on the road network and available traffic measures) (2) Test the scenario by simulation and adjust the scenario according to the outcome (3) adjust the scenario on the basis of real outcomes in practise when the scenario has been deployed		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	2.1.2.2, 2.1.3.1, 7.1.4.8, 7.1.4.9, 7.1.5.1, 7.2.4.1 7.3.0.7a, A14.1.1 A14.2.1, A14.3.1, A14.4.1, A14.4.2 A14.4.3, A14.4.4 A14.4.5	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> <i>User interface:</i> (Industrial) portal, GIS presentation <i>Business logic:</i> Scenario manager, traffic forecasting, traffic simulation <i>Data layer:</i> Graphical mapping, Geo services <i>Technical infrastructure:</i> Network services, Storage, (Virtual) hardware, database, Application platform 		

Reference	3.1.2.13.7	Name	Manage Planned Inter-urban Traffic Scenario Change
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to provide facilities that enable inter-urban traffic management scenarios to be implemented automatically in a timed sequence. (2) The ability for the sequence mechanism to permit the implementation to be by any combination of time of day, day of week, day of month, or day of year. (3) The ability for the content and detail of the sequences of management comments that are to be implemented by time of day, to be received from the functionality that provides the Traffic Operator interface. (4) The ability to provide on request a response to the functionality that provides the Traffic Operator interface details of the time of day sequences that are currently available for use. (5) The ability to send requests for implementation of traffic control scenarios to the inter-urban traffic management and access control functionality. 		
Functional requirements	<ol style="list-style-type: none"> (a) when the first trigger input data flow is received the command that it contains shall be checked (b) if the result of (a) is that the current available sequences are to be changed, then this shall be implemented (c) completion of (b) shall be confirmed using the second trigger output data flow (d) if the result of (a) is that details of the current sequences are to be output, this shall be sent to the inter-urban traffic and access control Functions using the first and third trigger output data flows (e) periodically, the sequences shall be scanned and the next one to be implemented for the current day and time shall be determined (f) when the day and time determined in (e) arrives, the control strategy(ies) requested in the sequence shall be sent to the inter-urban traffic and access control Functions using the first and third trigger output data flows (g) when the second trigger input data flow is received the data for the new or revised inter-urban traffic management strategy shall be checked for format and consistency (h) if the result of (g) is acceptable, the strategy shall be made available for selection when required (i) if the result of (g) is not acceptable, then details shall be output using the first trigger output data flow (j) the actions in (e) and (f) shall take priority over all other actions carried out by this Function. 		
Input dataflows (from: data1 data2 ...))	tbd	Output dataflows	tbd
User needs	A10.3.5, A10.3.6, A10.3.8	Supported Activity	DTM 05
Suggested components	<ul style="list-style-type: none"> • <i>User interface:</i> (Industrial) portal, GIS presentation, GUI / video integration, Audio, Video • <i>Process and Integration:</i> Unified communications, Messaging services • <i>Business logic:</i> Rule engine, Decision support, Scenario manager, Task Manager • <i>Data layer:</i> Real time data services, Geo services, Graphical mapping • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Operator platform • <i>Security:</i> Identity management, Authentication, Authorisation • <i>Management:</i> Process Monitoring, Process Analysis, Service monitoring 		

Reference	3.2.6	Name	Assess Incidents and Devise Responses
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to manage the assessment of incident data and to devise scenarios in response to incidents that have been detected by other functionality. (2) The ability to periodically review the data that has been collected about incidents and decide if any mitigation action is needed. (3) When mitigation action is needed the ability to either use an existing incident management scenario, or devise a new one. (4) The ability for an incident management scenario to involve a number of measures including changes to the current traffic management scenario, output of warning messages, plus the sending of comments and warnings to other functionality within the System. (5) The ability for the recipients of the warnings and comments shall be defined by the Road Network Operator through the functionality providing the HMI. (6) The ability for the recipients of the warnings and comments to vary from one scenario to another. (7) The ability to check the data and information that it sends for output as part of a scenario to ensure that it is consistent, i.e. all of the traffic measures and warning messages are coherent and do not contradict each other. (8) Before implementing a scenario, the ability to require that confirmation of its use is received from the functionality providing the HMI for the Road Network Operator. (9) The ability to create incident management scenarios either in anticipation of an incident or event, or because none of the existing scenarios are suitable, following a request from the Road Network Operator received through the functionality providing their HMI. (10) The ability to continually monitor the data that is being collected so that it can remove scenarios when incidents or events are not longer in progress. (11) When all the scenarios that have been implemented for a particular incident or event have been removed the ability to inform the Road Network Operator to signify that the incident or event has finished, using the functionality providing their HMI. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for the receipt of the inter-urban traffic data for incidents, urban traffic data for incidents and incident strategy data flows (b) when any of the data flows in (a) is received, store the data that they contain internally for future use (c) periodically send the data flow containing the request for stored incident data to the Manage Store of Incident Data function to collect new incident data from storage (d) when the response to (c) the incident data for assessment data flow is received, the data it contains shall be assessed for the need to take action on current or future incidents taking into account the data received in (a), tunnel conditions and the strategies being implemented by other incident management functionality (e) if as a result of (d) an incident management strategy needs to be implemented, the load incident strategies data flow shall be sent to retrieve the strategies that already exist (f) as a result of (e) the contents of the read incident strategies data flow shall be assessed to see if there is an appropriate incident strategy to implement (g) if no suitable strategy is found (f) the operator shall be informed by sending a no suitable strategy indication in the incident command response data flow to the Provide Operator Interface for Incident Management function (h) if as a result of (f) a strategy is found, then the confirm incident strategy implementation data flow shall be sent to the Provide Operator Interface function (i) if as a result of (h) the incident strategy implementation confirmed data flow is received, indicating that the strategy in (h) shall be implemented, this shall be 		

	<p>achieved by sending which ever of the incident strategy for.... data flows will send implementation commands to the appropriate functionality and to other incident management functionality through the incident strategy data flow</p> <p>(j) whilst carrying out (i), the contents of each of the output data flows shall be checked to ensure that their contents are consistent, compatible and coherent</p> <p>(k) following (h), (i) and (j) details of the action taken shall be sent back to the Manage Store of Incident Data function for storage using the data flow containing updated incident data and the incident strategy implemented data flow sent to the Provide Operator Interface function</p> <p>(l) following (k), if the incident data for assessment data flow is received, (d) shall be repeated and if necessary (h) to (j) shall be repeated</p> <p>(m) if as a result of (g), request incident strategy creation data flow is received, an appropriate strategy shall be created, taking account of the contents of the data flows identified in (a), and shall be sent to the store of Incident Strategy Data using the load incident strategies data flow</p> <p>(n) as a result of (m) the incident strategy created data flow shall be sent to the Provide Operator Interface function and a response awaited in the implement requested strategy data flow</p> <p>(o) when the response in (n) is received, the strategy in (m) shall be implemented, this shall be achieved by sending which ever of the incident strategy for.... data flows will send implementation commands to the appropriate functionality and to other incident management functionality through the incident strategy data flow</p> <p>(p) if the implement requested strategy data flow is received, the strategy shall be retrieved from the store of Incident Strategy Data and (h) through (k) repeated</p> <p>(q) if the implementation strategy command is received containing the identity of a strategy to be deleted, it shall be removed from the store of Incident Strategy Data and the incident strategy removed data flow sent to the Provide Operator Interface function.</p>		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.0.5, A10.3.4	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>User interface:</i> (Industrial) portal, GIS presentation, GUI / video integration, Audio, Video • <i>Process and Integration:</i> Unified communications, Messaging services • <i>Business logic:</i> Rule engine, Decision support, Scenario manager, Task Manager • <i>Data layer:</i> Real time data services, Geo services, Graphical mapping • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Operator platform • <i>Security:</i> Identity management, Authentication, Authorisation • <i>Management:</i> Process Monitoring, Process Analysis, Service monitoring 		

Reference	3.2.7	Name	Provide Incident Mitigations to Traffic Management
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to manage the output of instructions from an incident scenario to other functionality in the System in response to incidents that have been detected and classified by other functionality. (2) The ability for the instructions included in the incident management scenario to be output to require the replacement of, or changes to, any traffic management scenario that are currently in operation. (3) The ability for the output of the incident management scenario to begin as soon as the scenario information is received. (4) The ability to keep a local store of the strategies currently being implemented and delete them when their expiry time has passed, or when a strategy modification or removal indication arrives from the incident management functionality. 		
Functional requirements	(a) on receipt of the input trigger data flow all of the output data flows shall be sent.		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.2.2.3	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> • <i>User interface:</i> (Industrial) portal • <i>Process and Integration:</i> Process modelling, Workflow management, Event handling, Messaging services • <i>Business logic:</i> Event processor, Rule engine, Decision support, Pattern recognition, Scenario manager, Task Manager, MTM • <i>Data layer:</i> Document management, Real time data services, Geo services • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Operator platform • <i>Security:</i> Identity management, Authentication, Authorisation • <i>Management:</i> Process Monitoring, Process Analysis, Service monitoring, Reporting 		

6. Demand

Reference	3.3.6	Name	Analyse Data to find Demand Management Strategy
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to decide which Demand Management Strategy that is to be implemented. (2) The ability to make the decision about which Strategy to implement by analysing the data being collected and stored in the store of Demand Data. (3) If no suitable Demand Management Strategy can be found to implement, the ability to respond to the request with an indication that the Transport Planner should be informed. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for the arrival of the demand data for checking data flow (b) when the data flow in (a) is received analyse the data and send the request strategies data flow containing a list of the criteria to be met by strategies that would manage the demand that the data indicates is present (c) when the requested strategy arrives 		
Input dataflows	tbd		tbd
User needs	7.1.4.8, 7.1.4.9 7.1.5.1, A10.3.6	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> • <i>Business logic</i>: Decision support, Scenario manager • <i>Technical infrastructure</i>: Network services, Storage, (Virtual) hardware, database, Application platform 		

Reference	3.3.7	Name	Demand Management Strategy Implementation
Overview	This Function shall be capable of providing the following facilities: (1) The ability to implement demand management strategies when requested by the Road Network Operator. (2) The ability to achieve the implementation of demand management strategies by sending data about what action is required to other functionality in the System.		
Functional requirements	(a) when the demand management strategy for implementation data flow is received, start to implement the specified strategy, using the contents of the data flow (b) implement the strategy in (a) by sending out the required relevant output data flows the broadcaster, functionality in other Functional Areas and other Manage Traffic functionality (c) also send the demand management information data flow to the Demand Management Information function (d) finally send the demand management strategy response to the Provide Demand Management Operator Interface function.		
Input dataflows	tbd		tbd
User needs	7.3.0.1	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> <i>Business logic:</i> Decision support, Scenario manager <i>Technical infrastructure:</i> Network services, Storage, (Virtual) hardware, database, Application platform 		

Reference	3.3.8	Name	Produce Demand Management Strategy
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to produce new scenario as a result of a request received from the functionality providing the HMI for the Transport Planner. (2) The ability for the new demand management scenarios that are produced to encourage a re-distribution of the use of travel modes away from the current highly used mode(s). (3) The ability to use data about the current usage of different transport modes in the preparation of the new demand management scenarios. (4) The ability to assess the data about the current usage of different transport modes against "rules" for distribution provided by the Transport Planner through the functionality providing their HMI. (5) The ability to send the resulting new demand management strategies to the functionality that manages the store of Demand Management Data. 		
Functional requirements	<ol style="list-style-type: none"> (a) when the first trigger input data flow is received, the current mode use data shall be requested from the Manage Demand Management Data Store function, using the second trigger output data flow (b) when the response is received (via a second trigger input data flow) a new demand management strategy shall be produced according to the previously defined "rules" (c) when (b) is complete, the new demand management strategy shall be sent to the Manage Demand Management Data Store function (d) if included in the data flow received in (a), the strategy produced in (c) shall also be sent to the Demand Management Strategy Implementation function (e) if the second trigger input data flow is received, the internal data store shall be updated with the data that it contains so that it can be used in future strategy development (f) the data provided in (d) may include "rules" for a re-distribution of the demand from travellers away from the current highly loaded mode(s) 		
Input dataflows	tbd		tbd
User needs	2.1.3.1, 7.3.0.5	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Business logic</i>: Decision support, Scenario manager • <i>Technical infrastructure</i>: Network services, Storage, (Virtual) hardware, database, Application platform 		

Reference	3.3.1	Name	Receive Information on Travel Factors
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to receive data about the use of transport modes by Travellers in the geographic area served by the System from other functionality in the System, and / or external entities such as the Weather Service and Multi-Modal Systems. (2) The ability to check the received data for consistency before being sent to another part of the System functionality for storage. (3) The ability to integrate consequences of the changed Travel factors by calculating (forecasting) the capacity demand. 		
Functional requirements	<ol style="list-style-type: none"> (a) when any of the trigger flows is received, the data shall be collected and checked for consistency (b) the time and date stamps shall be added if found to be missing (c) similarly the source identity shall be added if it is not found in the data, using the origin Function of the data flow (d) if the location is not included in the data, it shall be marked as "unknown" (e) when (b) through to (d) are complete the data shall be sent for storage using the trigger output data flow. 		
Input dataflows	tbd		tbd
User needs	-	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services • <i>Business logic</i>: Traffic forecasting, TMC Connector • <i>Data layer</i>: Real time data services, Geo services, Data validation • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Data management 		

Reference	3.3.10	Name	Review Demand Management Strategy Effects
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to review the effectiveness of demand management strategies. (2) The ability to carry out this review at the request of the Transport Planner who must have specified the data about the use of transport modes that is to be analysed. (3) The ability to send the results of the analysis of the effectiveness of demand management strategies to functionality providing the HMI for the Transport Planner. 		
Functional requirements	<ol style="list-style-type: none"> (a) when the run strategy effectiveness analysis data flow is received from the Provide Transport Planner Interface function, send a request for the required travel data and strategies to the Manage Demand Management Data Store function (b) when the response to the data flow sent in (a) is received, process the data to determine the effect that the specified strategy has had on the demand for travel in the road network (c) when (b) has been completed send the results in the strategy effectiveness results data flow to the Provide Transport Planner Interface function. 		
Input dataflows	tbd		tbd
User needs	-	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> • <i>User interface:</i> (Industrial) portal • <i>Business logic:</i> Traffic network evaluation • <i>Data layer:</i> Document management • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform, Operator platform, Data mining • <i>Security:</i> Identity management, Authentication, Authorisation • <i>Management:</i> Reporting 		

Reference	3.3.11	Name	Simulate Demand Management Strategy
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to simulate the imposition of a demand management strategy by calculating among others Capacity, Spare Capacity, Bottlenecks and Impact in terms of traffic flows speed etc. (2) The ability to carry out its simulations at the request of the Transport Planner who must specify the existing strategy that is to be simulated. (3) The ability to perform these simulation on (national, regional or sub-regional parts of the) network (4) The ability to send the results of the simulation to the functionality providing the HMI for the Transport Planner (5) The ability to send the results of the simulations Traffic Officer 		
Functional requirements	<ol style="list-style-type: none"> (a) when the run demand strategy simulation data flow is received, send the request for data and strategies for simulation data flow tot he Manage Demand Management Data Store function (b) when the data and strategy for simulation data flows have been received, run the simulation to show what is expected to happen when the strategy is implemented (c) when (b) is completed, send the results in the demand strategy simulation results data flow to the Provide Transport Planner Interface function (d) if the new demand strategy for simulation data flow is received, send the request for data for simulation data flow tot he Manage Demand Management Data Store function (e) repeat (b) and (c). 		
Input dataflows	tbd		tbd
User needs	7.3.0.5	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> • <i>User interface</i>: (Industrial) portal • <i>Business logic</i>: Traffic simulation • <i>Data layer</i>: Document management • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Operator platform, Data mining • <i>Security</i>: Identity management, Authentication, Authorisation • <i>Management</i>: Reporting 		

7. Performance

Reference	IDTM 06	Name	Gather Network Performance Data
Overview	This function shall be able to gather / collect data on the performance of the network and prepare it for comparison.		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	10.7.7	Supported Activity	
Suggested components	<ul style="list-style-type: none">• <i>Process and Integration</i>: Messaging services• <i>Business logic</i>: Traffic network evaluation• <i>Technical infrastructure</i>: Network services, Storage, (Virtual) hardware, database, Application platform• <i>Management</i>: Reporting, process monitoring, process analysis		

Reference	IDTM 07	Name	Compare Network Performance Data
Overview	This function shall be able to compare gathered network performance data and compare it (real-time) to earlier set thresholds. If thresholds are passed this may result in traffic measures to deploy.		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	A10.7.5	Supported Activity	
Suggested components	<ul style="list-style-type: none">• <i>Process and Integration</i>: Event handling, Messaging services• <i>Business logic</i>: Pattern recognition, Traffic network evaluation• <i>Data layer</i>: Real time data services, Data translation, Data pre-processing, Data fusion, Data validation• <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform• <i>Management</i>: Process Monitoring, Process Analysis		

Reference	IDTM 08	Name	Report Network Performance Data
Overview	This function shall be able to report results of the network performance comparison.		
Functional requirements			
Input dataflows	tbd	Output dataflows	tbd
User needs	10.7.8	Supported Activity	
Suggested components	<ul style="list-style-type: none">• <i>Process and Integration:</i> Messaging services• <i>Technical infrastructure:</i> Network services• <i>Management:</i> Reporting		

Reference	3.1.6.1	Name	Process Road Network Static Data
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to receive road network static data from both urban and inter-urban functionality (2) The ability to process the received data so that it can be used in the road network model by the Traffic Simulation Engine functionality. (3) When the data has been processed it shall be sent to the functionality that manages the store of Traffic Simulation Data from where it can be obtained by the Traffic Simulation Engine functionality. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for the arrival of the data flows containing static data for the inter-urban and / or urban road network (b) when either of the data flows in (a) is received, process the data into a coherent set that represents the road network managed by the system, integrating the new data with any that was received previously (c) when (b) is complete, send include the data in the network data for simulation data flow and send it to the store of Manage Traffic Simulation Data. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	-	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Messaging services • <i>Business logic</i>: Traffic simulation • <i>Data layer</i>: Document management, Real time data services, Geo services, Graphical mapping • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Data management, GIS data management. 		

8. Prediction

Reference	3.1.6.3	Name	Create Traffic Predictions with Simulation Methods
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to use a road network model and traffic data to provide predictions of traffic conditions for the road network, among other incident-proneness of a network section, event clearance time (2) The ability to provide the prediction on the basis the current and historical traffic data plus road network data (3) The ability to provide short and medium term predictions. (4) The ability to use this data as input to predict what the traffic conditions shall be like as a result of various traffic management scenarios, e.g road (national, regional, and (sub)regional) reduction, events / incidents that are provided by the Transport Planner, or have been used in the past in all or part of the road network. (5) When completed the ability to send the predicted traffic conditions and associated scenarios to the functionality managing the store of Traffic Simulation Data.. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for the arrival of the operator simulation commands data flow (b) when the data flow in (a) arrives, start to carryout the instructions that it contains (c) send the request road data for simulation data flow to the Manage Traffic Simulation Data Store function (d) when as a result of (c) the road data for simulation data flow is received, produce a simulation of the traffic conditions that will exist in the road network according to the static and collected road data plus the traffic management strategies currently being used, and the traffic management and / or road network scenario(s) included in the operator simulation commands (e) when (d) is complete, send the simulation results back to the Manage Traffic Simulation Data Store function and send the simulation responses data flow to the Provide Operator Interface function. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	7.1.2.4, 7.1.2.2	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>User interface</i>: GIS presentation • <i>Process and Integration</i>: Open interfaces • <i>Business logic</i>: Traffic forecasting • <i>Data layer</i>: data translation • <i>Technical infrastructure</i>: Network services, Storage, (Virtual) hardware, database, Application platform 		

Reference	3.4.4	Name	Predict Environmental Conditions
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to use data collected and stored by other functionality to predict the environmental conditions that will occur in and around the road network managed by the System. (2) The ability to use this collected and stored data with one or more algorithms and static data provided by the Road Network Operator to predict the environmental conditions that will be experienced by Travellers and / or Drivers. (3) The ability to send the data providing the predicted environmental conditions for storage by other functionality in the System. 		
Functional requirements	<ol style="list-style-type: none"> (a) when the first trigger input data flow is received, the data shall be stored internally (b) when (a) is complete the prediction algorithm shall be run using the received data (c) the prediction algorithm must take account of such things as current and forecast weather conditions and the effects of the local terrain (d) the predictions resulting from (c) shall be sent to the Manage Environmental Conditions Data Store function in the output trigger data flow (e) when the second trigger flow is received, the static data stored internally within the Function and used by the prediction algorithm shall be updated. 		
Input dataflows	tbd		tbd
User needs		Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration:</i> Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services • <i>Business logic:</i> Rule engine, Decision support, Pattern recognition • <i>Data layer:</i> Geo services, Data validation • <i>Technical infrastructure:</i> Network services, storage, Database, (Virtual) hardware, application platform • <i>Management:</i> Reporting 		

Reference	3.1.2.15	Name	Predict Short & Medium Term Inter-urban Conditions
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to create short and medium term predictions of inter-urban traffic data. The following predictions should be possible: traffic conditions (i.e. traffic flows, road segment use, journey times, etc.), event location, frequency and probability (2) The ability to create the predictions of short and medium term inter-urban traffic data using algorithms that may be different in content and scope. (3) The ability to request and use current inter-urban traffic data as the starting point for the predictions of short and medium term inter-urban traffic data. (4) The ability to repeat the creation of the predicted short and medium term inter-urban traffic data at (frequent?) periodic intervals. 		
Functional requirements	<ol style="list-style-type: none"> (a) at (frequent?) periodic intervals send the data flow containing the request inter-urban traffic data to the Manage Inter-urban Traffic Data function (b) as a result of (a) continuously monitor for the receipt of the data flow containing the requested inter-urban traffic data (c) when the data flow in (b) is received, create the predictions of short and medium term inter-urban traffic data using appropriate algorithms that may be different in content and scope (d) when (c) is complete, put the results in the short & medium predicted inter-urban traffic data flow and send it to the Manage Inter-urban Traffic Data function. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	2.1.3.1, 7.1.2.2, 7.3.0.5, 7.1.5.9a, 7.3.0.6a	Supported Activity	tbd
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services • <i>Business logic</i>: Rule engine, Decision support, Pattern recognition, Traffic forecasting, Traffic simulation • <i>Data layer</i>: Geo services, Data validation • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform • <i>Management</i>: Reporting 		

Reference	3.1.6.2	Name	Process Road Traffic Data
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to receive real-time traffic data from inter-urban functionality. (2) The ability to process the received data so that it can be used in the road network model by the Traffic Simulation Engine functionality. (3) It shall be possible for the processing to include the generation of origin / destination data for the road network and indications of unusual changes in current traffic data based on historical data. (4) When the data has been processed, the ability for the data to be sent to the functionality that manages the store of Traffic Simulation Data. (5) It shall be possible for road network (model) data to be provided and for historic traffic data to be provided periodically by the functionality managing the store of Traffic Simulation Data for use in the processing of the traffic data. 		
Functional requirements	<ol style="list-style-type: none"> (a) continuously monitor for the frequent arrival of the collected traffic data traffic predictions from the inter-urban and / or the urban road network (b) continuously monitor for the occasional arrival of the data flow containing the road network static data (c) use the data from (b) to build a model of the road network into which the data from (a) can be fused, i.e. the traffic flow data can be allocated to its correct part of the road network (d) whenever either of the data flows in (a) arrives, fuse the data that they contain into the model produced by (c) when (d) has been completed, send the collected traffic data to the Manage Traffic Simulation Data Store function in the data flow for processed road traffic data. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	-	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Event handling, Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services • <i>Business logic</i>: Traffic simulation • <i>Data layer</i>: Real time data services • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Data management • <i>Management</i>: Process Monitoring, Process Analysis 		

Reference	3.1.6.6	Name	Process Traffic Prediction Results
Overview	<p>This Function shall be capable of providing the following facilities:</p> <ol style="list-style-type: none"> (1) The ability to receive from the functionality managing the store of Traffic Simulation Data the results of a simulation that have been produced by the Traffic Simulation Engine functionality. (2) The ability to process these results to provide coherent and comprehensive information about forecasts of traffic conditions and traffic management scenarios. (3) The ability to automatically send this information to the appropriate functionality in the System. 		
Functional requirements	<ol style="list-style-type: none"> (a) monitor for the receipt of the traffic simulation results for processing data flow (b) when the data flow is received, process the data it contains to produce and send each of the output data flows (c) include in the forecast traffic conditions data sent to the traffic and travel information provider data from which a traffic model can be produced. 		
Input dataflows	tbd	Output dataflows	tbd
User needs	-	Supported Activity	
Suggested components	<ul style="list-style-type: none"> • <i>Process and Integration</i>: Event handling, Adapters, Protocol conversion, Open interfaces, B2B Connections, Messaging services • <i>Business logic</i>: Traffic simulation • <i>Data layer</i>: Real time data services • <i>Technical infrastructure</i>: Network services, storage, Database, (Virtual) hardware, application platform, Data management 		

9. Annex A: Suggested components

The 'Suggested components' section of each Function description indicates generalised (COTS) components that may prove useful for implementing this function. The section is aimed at providing insight and inspiration, not least to non-traditional ITS suppliers. It is by no means a requirement that such components be used to implement any particular function, nor a guarantee that they suffice.

Suggested components are grouped into the following categories, or layers:

Layer	Description
User Interface (MMI)	Any component that the user sees and interacts with. MMI stands for Man Machine Interface. MMI provides graphical user interfaces, voice, video, input devices and control devices.
Process and Integration	Business functions that heavily rely on functions that the business logic provides. The business process and integration layer contains no technology, is an extremely thin layer and is highly flexible.
Business logic	Basic functions and their technical implementation. The business logic layer provides the building blocks that are needed to build the required business functions with as little effort as possible.
Data	All data is contained in the data layer. Also basic data handling (translation, validation, etc.) is part of this layer.
Technical Infrastructure (TI)	Provides generic building blocks that are needed to operate systems.
Security	Provides security related components and arrangements that are needed to provide protection of systems against unauthorised use.
Management	Provides management-related components and arrangements that are needed to perform corrective and adaptive maintenance to systems.

Below, suggested components (sorted by category) are described individually.

User Interface	
(Industrial) Portal	The (industrial) portal supports web-based and geographical presentation along with GUI and video integration, handling big and or multiple screens and workstation management
GIS presentation	Adds the capability to generate user interfaces with geographical features such as road maps and schematic presentations of road sections.
GUI / video integration	Adds the capability to integrate different sources, maps and video in real time
Workstation manager	Provides the operator in a control room to adapt the look &

	feel of a user interface for both personalisation and specific needs of business processes.
Audio	Provides the operator with audio communication facilities such as microphone, speakers and selection tools.
Video	Provides the operator the facilities to select and control video streams and operate camera's (pan / tilt / zoom).

Process and Integration

Process modelling	Provides a means to define processes based on available process steps. Both system supported process steps and unsupported process steps can be modelled. System supporting process steps are implemented in the business logic layer.
Workflow management	Provides a means to define and (dynamically) maintain workflows for operators.
Event handling	Provides the basic functions for event handling, such as event notification, subscription and routing.
Unified communications	Provides all means to communicate by text, voice and / or video with other operators as well as people outside the TMC.
Adapters	Specific adaption for connecting legacy equipment.
Adapter Framework	A collection of tools and examples to build adapters suited for connecting via the integration layer.
Protocol conversion	Provides services that are needed to use legacy road side equipment.
Open Interfaces	Well defined and described interfaces (on all levels) to connect to the business logic or data layer
B2B connections	Provides standard mechanisms to connect business applications, in case of TMC for instance a TMC connector.
Messaging services	An infrastructure that provides mechanisms that system components use to exchange data with other system components.

Data

Document management	Provides the storage and retrieval of documents.
Real time data services	The provision of real time data services towards the business logic.
Geo services	Provides geographical storage and retrieval of data
Graphical Mapping	Provides geographical mapping of objects and data based on coordinates.
Data translation	Provides translation of data element between different information models.
Data pre-processing	Provides mechanisms to pre-process data for more efficient handling and / or storage.
Data fusion	Provides mechanisms to merge different data sources together in an intelligent way to produce richer data.
Data validation	Provides mechanisms to ensure that exchanged data is

	syntactically and semantically correct. Validation to ensure that data is pragmatically correct is not supported.
Video / audio streaming	Provides uniform interfaces for streaming media.

Business Logic	
Event processor	Provides specialised services for processing and correlating events to be feed to for instance rule engines and decision support systems.
Rule Engine	Provides services to define and execute rules. Defining preferable by a graphical interface.
Decision Support	Provides support for decision making by interpreting and presenting data in a business processes relevant way.
Pattern Recognition	Provides a self learning service that recognizes patterns in video and / or event streams a can act upon these recognized patters by giving triggers.
Tracking and Tracing	Provides a graphical presentation of the location of for instance the traffic officers and can determine the closest available traffic officer.
Scenario Manager	Provides services to define and deploy traffic management scenarios.
Traffic forecasting	Provides a forecast of the traffic, minimally based on actual traffic, time of day, historic data, weather information and planned events.
Traffic Simulation	Provides a simulation of the traffic based upon the deployment of a specific scenario.
Traffic network evaluation	Provides evaluation of the traffic on the network and gives recommendations about scenario's to be deployed
TMC connector	(Standards based) connector for interoperability with other traffic management centres.
Task manager	Provides the means to assign tasks to specific operators and shift tasks based on workload.
MTM	A legacy system that provides control of matrix signs and mechanical signs via a Rijkswaterstaat proprietary protocol.

Technical Infrastructure Services	
Network services	The services provided by the physical infrastructure that provides transport of data via wired, wireless and cellular connections.
Storage	Provides storage of information, as well real time as well historical.
(Virtual) hardware	The hardware provision, preferable virtual but when needed physical. Provides (virtual) servers / workstations / operator stations.
Database	Provides database platform, relational, real time and spatial.
Application platform	Provides all means to run applications.
Operator platform	Provides the complete environment needed by the operators, consisting of (virtual) hardware, audio / video

	means and selection / control means.
Data mining	Provides the mechanisms to search through big amounts of data.
Video transcoding	Provides adaptation of video streams for specific types of use. Examples are redistribution of video to 3 rd parties and adaptation of video streams for use on tablets and smart phones.
Encoding / decoding	Provides services to transport voice.
Data management	Provides specialised services for handling, storage and distribution of data.
GIS data management	Provides specialised services for handling, storage and distribution of geographic data

Security	
Identity management	Provides the means to manage identities and connect to existing identity management systems (for instance AD).
Authentication	Provides the means to enforce authentication of users.
Authorisation	Provides the means to define user based and role based access authorisations for users.
Security management	Provides the means and arrangements that are needed to protect system components against unauthorised use.
Access management	Provides the means to manage access to system components for both users and other system components.

Management	
Process monitoring	Provides the means to monitor the business processes and defined workflows.
Process analysis	Provides to means to analyze the business processes and workflows, report on them and recommend possible improvements.
Service monitoring	Monitors the performance, behaviour and use of the services.
Reporting	A comprehensive reporting tool which is capable of providing integrated reports on services and processes.