

ANNEX 2 - Selected Functions

Number	Name	Description	User Needs
		<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to collect incident notifications from a variety of sources.</p> <p>(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.</p> <p>(3) The ability to provide an initial (first) acknowledgement of incident notification to its source, e.g. eCall from inside or outside the Vehicle.</p> <p>(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.</p> <p>This Function shall be capable of providing the following facilities:</p>	
2.1.2.1	Identify and Classify Emergencies	<p>(1) The ability for the Road Network Operator to manage the control of traffic in the urban road network by changing the current urban traffic control strategy, except when it is imposed as part of an incident or demand management strategy, or to provide selective vehicle priority.</p> <p>(2) The ability of the Road Network Operator to examine and update the sequence of urban traffic control strategies that are implemented automatically, to see the "log" of previously implemented urban traffic control strategy changes and to provide data that will be used to update the store of Urban Road Static Data through the Manage Urban Static Traffic Data Function.</p> <p>(3) The provision of information to the Road Network Operator about the success or failure of any requested changes.</p> <p>(4) The ability of the Road Network Operator to request and be provided with the current contents of the store of Urban Road Static Data through the Manage Urban Static Traffic Data Function.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.2.0.7, 7.2.2.1, 7.2.2.3
3.1.1.5.10	Provide Urban Traffic Operator interface	<p>(1) The ability to provide the management of vehicle speed and headway settings within the urban road network.</p> <p>(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 urban traffic management functionality, or as part of an incident, demand management, or environmental strategy.</p> <p>(3) The ability to ensure that requests from the functionality providing the Road Network Operator interface take priority and override those from the urban traffic management functionality, but not those that are part of an incident, demand management, or environmental strategy.</p> <p>(4) The ability to send speed and headway settings to the functionality that is responsible for the output of messages to Drivers of vehicles using the urban road network, both at the roadside and in the Vehicle, as well as to other functionality from which it can be sent to other parts of the system, to the Broadcaster entity.</p> <p>(5) The ability to send the legal speed settings to the digital map data provider entity in case it needs to be used in future digital map updates.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.3.5
3.1.1.5.18	Manage Urban Traffic Speeds and Headways	<p>(1) The ability to collect information for output to Drivers, Cyclists and Pedestrians from some or all of other functionality in the Manage Traffic Functional Area, functionality in the Provide Advanced Driver Assistance Functional Area and input from the Multi-Modal Crossings Actor.</p> <p>(2) The output of consistent and coherent information and/or commands to Drivers using the urban road network.</p> <p>(3) The ability for the outputs to be used to provide such things as, journey time information, commands for unexpected speed or lane use, weather condition and road surface warnings, etc.</p> <p>(4) The output of warning messages about the activity of a particular Vehicle will include its identity.</p> <p>(5) The ability to output data containing information and/or warning messages plus commands to other functionality for subsequent output to Vehicles as they pass by.</p> <p>(6) The ability of the outputs to make use of different display technologies, other than those in the Vehicle.</p> <p>(7) The monitoring of its operation and the reporting of any abnormalities to Maintenance Management functionality.</p> <p>(8) The reporting of a fault to the Maintenance Management facility if a Vehicle reports that what is being output by the Function is not the same as what is being received in the Vehicle.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.7.2
3.1.1.5.20	Output c&i to Drivers using Urban Roads	<p>(1) The provision of conventional "traffic light" type outputs to Drivers, Cyclists and Pedestrians using the urban road network.</p> <p>(2) The ability to send the "traffic light" type outputs directly to Vehicles for output to Drivers using in-Vehicle devices.</p> <p>(3) The ability to change the duration and sequence of the outputs according to data received from the following inputs:</p> <p>(a) Vehicle presence data from local Traffic via its own sensors;</p> <p>(b) Commands from the Implement Urban Traffic Commands Function;</p> <p>(c) Requests for local priority from Emergency Services (Centres and Vehicles), Public Transport Vehicles and Other Vehicles.</p> <p>(4) The assignment of priority of response to these inputs depending on their presence and when more than one is present, what the input from the Traffic Command Function allows.</p> <p>(5) The ability to respond to any of the above inputs according to the priority assignment, until the input that is being given priority is no longer present, in which case the Function shall implement the next highest priority input to produce the outputs.</p> <p>(6) The ability to use its own internal timings when none of the inputs identified above are available.</p> <p>(7) The ability to temporarily implement changes in the sequence of the outputs to accommodate "green wave" requests and to revert to using the highest priority inputs once the request has been fulfilled.</p> <p>(8) The ability to respond with an indication of whether or not a local priority request received from an Other Vehicle will be fulfilled and to fulfil priority requests from Other Vehicles based on the order in which they have been received, providing "failure" responses to those that have not been fulfilled.</p> <p>(9) The ability to provide an indication of the recommended speed profile for the Other Vehicle to arrive at the junction when the signal is green, based on data provided in its request for local priority.</p> <p>(10) The ability to give Emergency Vehicles the highest priority, followed by Public Transport Vehicles and lastly Other Vehicles when more than one local priority request is received.</p> <p>(11) The ability of the Road Network Operator to vary the order of priority in which requests are fulfilled whether they come from the same or different types of Vehicles.</p> <p>(12) The ability to send information about local priority requests that it has received to adjacent down stream instances of its functionality.</p> <p>(13) The ability to receive information about local priority requests from functionality located upstream of itself and to prepare for the arrival of the Vehicle, by temporarily adjusting its operating sequence so that it can be given priority at the most appropriate time so as not to impede the Vehicle's progress.</p> <p>(14) The ability to respond to local inputs from Pedestrians if and when it is permitted within the sequence of outputs required by the Implement Urban Traffic Commands Function.</p> <p>(15) The ability to monitor its operation and report any malfunction to the Maintenance Management functionality.</p> <p>(16) The ability to ensure that all outputs are consistent, coherent and do not in anyway compromise the safe use of the urban road network, e.g. by ensuring that no green conflicts are produced.</p>	6.2.3.8, 7.1.0.2, 7.1.0.5
3.1.1.5.22	Output s&g Commands to Urban Roads	<p>(1) The provision of conventional "traffic light" type outputs to Drivers, Cyclists and Pedestrians using the urban road network.</p> <p>(2) The ability to send the "traffic light" type outputs directly to Vehicles for output to Drivers using in-Vehicle devices.</p> <p>(3) The ability to change the duration and sequence of the outputs according to data received from the following inputs:</p> <p>(a) Vehicle presence data from local Traffic via its own sensors;</p> <p>(b) Commands from the Implement Urban Traffic Commands Function;</p> <p>(c) Requests for local priority from Emergency Services (Centres and Vehicles), Public Transport Vehicles and Other Vehicles.</p> <p>(4) The assignment of priority of response to these inputs depending on their presence and when more than one is present, what the input from the Traffic Command Function allows.</p> <p>(5) The ability to respond to any of the above inputs according to the priority assignment, until the input that is being given priority is no longer present, in which case the Function shall implement the next highest priority input to produce the outputs.</p> <p>(6) The ability to use its own internal timings when none of the inputs identified above are available.</p> <p>(7) The ability to temporarily implement changes in the sequence of the outputs to accommodate "green wave" requests and to revert to using the highest priority inputs once the request has been fulfilled.</p> <p>(8) The ability to respond with an indication of whether or not a local priority request received from an Other Vehicle will be fulfilled and to fulfil priority requests from Other Vehicles based on the order in which they have been received, providing "failure" responses to those that have not been fulfilled.</p> <p>(9) The ability to provide an indication of the recommended speed profile for the Other Vehicle to arrive at the junction when the signal is green, based on data provided in its request for local priority.</p> <p>(10) The ability to give Emergency Vehicles the highest priority, followed by Public Transport Vehicles and lastly Other Vehicles when more than one local priority request is received.</p> <p>(11) The ability of the Road Network Operator to vary the order of priority in which requests are fulfilled whether they come from the same or different types of Vehicles.</p> <p>(12) The ability to send information about local priority requests that it has received to adjacent down stream instances of its functionality.</p> <p>(13) The ability to receive information about local priority requests from functionality located upstream of itself and to prepare for the arrival of the Vehicle, by temporarily adjusting its operating sequence so that it can be given priority at the most appropriate time so as not to impede the Vehicle's progress.</p> <p>(14) The ability to respond to local inputs from Pedestrians if and when it is permitted within the sequence of outputs required by the Implement Urban Traffic Commands Function.</p> <p>(15) The ability to monitor its operation and report any malfunction to the Maintenance Management functionality.</p> <p>(16) The ability to ensure that all outputs are consistent, coherent and do not in anyway compromise the safe use of the urban road network, e.g. by ensuring that no green conflicts are produced.</p>	7.1.0.2, 7.1.0.5, 7.5.2.1

		<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The provision of traffic management that enable Vehicles to make the most efficient use of the urban road network.</p> <p>(2) The automatic implementation of strategies for traffic management in a planned sequence according to the time of day and day of week.</p> <p>(3) The ability to output data for "stop&go" and/or "commands & information" messages directly to Vehicles so that their contents can be output to Drivers by an in-vehicle display mechanism.</p> <p>(4) The ability of the Road Network Operator to override the automatic implementation of one or more strategies using inputs made through the HMI provided by the Provide Urban Traffic Operator Interface Function.</p> <p>(5) The ability for the automatic strategy implementation to be temporarily overridden by inputs requiring green wave routes to be implemented for selected Vehicles.</p> <p>(6) The ability for the automatic strategy implementation to be overridden by requests for changes to the way that traffic is managed that are received from functionality in the Manage Incidents and Manage Demand High-level Functions in the Manage Traffic Functional Area.</p> <p>(7) The ability for the Road Network Operator to define the order of priority for the various inputs that can override the automatic strategy implementation.</p> <p>(8) The ability to adapt the traffic management strategies to suit the current and predicted traffic conditions using real-time data to identify the need for and content of the adaptations (adaptive traffic control).</p> <p>(9) The ability to apply traffic management strategies to some or all of the urban road network managed by the System.</p> <p>(10) The ability to monitor the results from the implementation of strategies so that if necessary corrective action can be taken if the content of strategies are not followed.</p> <p>(11) The provision of details of the current and previously implemented strategies on some or all parts of the urban road network to the Road Network Operator through the Provide Urban Traffic Operator Interface Function.</p>	2.1.2.2, 2.1.3.1, 7.1.0.12, 7.1.0.2, 7.1.0.4, 7.1.0.5, 7.1.5.7, 7.1.5.8, 7.1.5.9
3.1.1.5.24	Implement Urban Traffic Strategies		
		<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The management of the store of Urban Road Static Data for use by the urban traffic management functionality.</p> <p>(2) The entry into the store of new and/or updated road network static data received from the Geographic Information Provider and/or the Road Network Operator via the operator interface functionality.</p> <p>(3) The provision from the store of current and/or updated road network static data that was provided by the Geographic Information Provider to the urban traffic management and road maintenance functionalities, plus the functionality in the Provide Support for Cooperative Systems, Manage Public Transport Operations and Provide Traveller Journey Assistance Functional Areas.</p> <p>(4) The provision of new and/or updated road network static data provided by the Road Network Operator to the functionality that will send the data to the Geographic Information Provider so that it can be used when digital map data is provided in the future.</p> <p>(5) The collection and loading into the store of static data about traffic regulations (i.e. speeds, access restrictions for certain Vehicle types to particular urban road segments, etc.) provided by the Road Network Operator, and its subsequent distribution to the functionality in the Provide Support for Law Enforcement, Provide Electronic Payment Facilities and Provide Support for Host Vehicle Systems Functional Areas.</p>	7.1.7.4
3.1.1.6	Manage Urban Static Traffic Data		
		<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The collection of Floating Car Data (FCD) and Extended Floating Car Data (XFCDD) from suitable equipped Vehicles that are using the urban road network.</p> <p>(2) The Function shall expect the data to be the raw input data provided by functionality in the Vehicle and to contain location information, time plus Vehicle identity and status data.</p> <p>(3) The processing of the collected data to provide actual traffic flow data, e.g. flow, speed, for the urban road network, Vehicle status data, e.g. broken down, other road related data, e.g. rain, fog, slippery road, ice and to detect incidents.</p> <p>(4) The checking of the collected data for coherence and consistency both for individual Vehicles and for the traffic as a whole in each segment of the urban road network.</p> <p>(5) The exchange of data with the Monitor Urban FCD/XFCDD Source Vehicles Function to confirm that the collected data actually comes from the Vehicles whose identities are included in the data, and to discard all data except traffic flow data from Vehicles being driven safely.</p> <p>(6) The provision of the processed and collected data to the Detect Incidents from Data and Urban Traffic Data Management Functions.</p> <p>(7) The ability to make all processed data anonymous so that the movement through the urban road network of specific Vehicles cannot be identified.</p> <p>This Function shall be capable of providing the following facilities:</p> <p>(1) The output of data about current traffic conditions in the urban road network received from the Urban Traffic Data Management Function and data about speed limits and lane use received from the Manage Urban Traffic Speeds and Headways and Manage Urban Road Network Lanes Functions respectively.</p> <p>(2) Both sets of outputs shall be sent as soon as new data is received to functionality in the Provide Support for Host Vehicle Systems, Provide Support for Cooperative Systems, Provide Electronic Payment Facilities and Provide Traveller Journey Assistance Functional Areas, plus the Broadcast and Traffic and Travel Information Provider.</p> <p>(3) Both sets of outputs shall also be sent as soon as new data is received to the Broadcaster and Traffic and Travel Information Provider, or to the Broadcaster when it provides a request.</p> <p>This Function shall be capable of providing the following facilities:</p> <p>(1) The collection of traffic flow data from sensors that are located within the urban road network managed by the System.</p> <p>(2) The sensors shall be capable of detecting the presence of all types of road Vehicle, from Bicycles to Heavy Goods Vehicles.</p> <p>(3) The processing of the raw input data provided by the sensors into actual traffic flow data, i.e. vehicle flow rates, vehicle speeds, etc.</p> <p>(4) The supply of the processed raw input data to other functionality in the Manage Traffic Functional Area for collation and use.</p>	7.4.1.15
3.1.1.8	Collect Urban Data from Vehicles		
3.1.1.9	Output Urban Traffic Data		7.5.1.28
3.1.1.10	Collect Urban Traffic Data	<p>Note that this Function shall not collect any data directly from Vehicles. It shall assume that all Vehicles are passive and not capable of providing data themselves.</p> <p>This Function shall be capable of providing the following facilities:</p> <p>(1) The provision of up-to-date information for digital maps and related databases for segments of the urban road network managed by the System to the Geographic Information Provider.</p> <p>(2) The information shall include such things as structural alterations, static speed limits and default journey times.</p> <p>(3) The information shall be provided in a way that it can be used by the Geographic Information Provider in subsequent issues of digital maps and any other related data they provide for use by in-vehicle devices.</p>	2.1.1.3, 7.1.1.1, 7.1.5.7
3.1.1.11	Provide Updated Urban data for Digital Maps		

		<p>This Function shall be capable of providing the following facilities:</p> <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 urban road network and car park data from other functionality in the Manage Traffic Functional Area.</p> <p>(3) The ability to receive data about traffic conditions (i.e. traffic flows, predicted road segment use (from trip plans), journey times, etc.) from functionality in the Provide Electronic Payment Facilities, Provide Support for Host Vehicle Systems and Provide Traveller Journey Assistance Functional Areas, plus the Cellular Communications Provider.</p> <p>(4) The ability to collate and fuse all data that is collected and received, using the inter-urban road network static data as a mechanism for achieving this where necessary.</p> <p>(5) The ability to exchange data collected by the Function with similar functionality in another instance of the System, through the Other Related System, Urban Traffic Management System.</p> <p>(6) The ability to load the collated and fused data into the store of Urban Traffic Data in a coherent way that makes it easy to retrieve it for particular road segments, or larger parts of the urban road network.</p> <p>(7) The ability to provide the collated and fused data from the store of Urban Traffic Data to other functionality in the Manage Traffic area, either for its own use, or for sending to functionality in other Functional Areas and to entities outside the System.</p> <p>(8) The ability to provide current 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 Urban Traffic Data.</p> <p>This Function shall be capable of providing the following facilities:</p>	
3.1.1.14	Manage Urban Traffic Data	<p>(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.</p> <p>(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.</p> <p>(3) The ability to receive changes to the data from the Road Network Operator HMI functionality.</p> <p>(4) The ability to load the data received from the Road Network Operator HMI functionality into the store.</p> <p>(5) The ability to send the data received from the Road Network Operator HMI functionality, together with vehicle access regulations for the inter-urban road network to electronic payment functionality.</p> <p>(6) 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.</p> <p>(7) When vehicle location data is received, the ability to send data about traffic regulations that apply to segments of the inter-urban road network in the geographic area relevant to the location to Driver assistance functionality.</p> <p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to collect Floating Car Data (FCD) and Extended Floating Car Data (XFCDD) about Vehicles that are using the inter-urban road network.</p> <p>(2) The ability to collect the data as raw input from functionality within the Vehicles.</p> <p>(3) The raw input data shall be expected to contain location information, time and Vehicle status data.</p> <p>(4) The ability to process the collected data to provide actual traffic flow data, e.g. flow, speed, for the inter-urban road network, Vehicle status data, e.g. broken down, other road related data, e.g. rain, fog, slippery road, ice and to detect incidents.</p> <p>(5) As part of this processing, the ability to check the coherence and consistency of the data both for individual Vehicles and for the traffic as a whole in each segment of the inter-urban road network.</p> <p>(6) The ability to also check that the data it receives is actually coming from the Vehicle whose ID comes with it and that the safety behaviour of the Vehicle is acceptable.</p> <p>(7) If any of these checks fail, the ability for the data received for that Vehicle to be discarded, except if it is traffic flow data and the Vehicle is being driven safely.</p> <p>(8) The ability to pass the processed data to the incident management functionality for collation and to other traffic management functionality for use in managing the traffic using the inter-urban road network.</p> <p>(9) The ability to make all processed data anonymous so that the movement through the urban road network of specific Vehicles cannot be identified.</p> <p>This Function shall be capable of providing the following facilities:</p>	2.1.1.1, 2.1.1.3, 6.1.2.6, 6.2.2.9, 7.1.0.12, 7.1.0.7, 7.1.11.4, 7.1.2.1, 7.1.5.7, 7.4.1.15
3.1.2.6	Manage Inter-urban Static Road Data		7.1.7.4
3.1.2.8	Collect Inter-urban Data from Vehicles		7.4.1.15, 7.5.1.3
3.1.2.9	Output Inter-urban Traffic Data	<p>(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.</p> <p>(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.</p> <p>(3) When a request is received from the Broadcaster entity, the ability to output the latest set of data that is available about inter-urban traffic conditions.</p> <p>This Function shall be capable of providing the following facilities:</p>	2.1.1.1, 6.1.2.6, 6.2.2.9, 7.5.1.28, 7.6.2.4
3.1.2.10	Collect Inter-urban Traffic Data	<p>(1) The ability to collect traffic data from the inter-urban road network.</p> <p>(2) The ability for sensors within this Function to provide the data as raw input and for the sensors to be capable of detecting the presence of all types of road vehicle, from bicycles to heavy freight vehicles.</p> <p>(3) The ability to process the raw input data provided by the sensors to provide actual traffic flow data, e.g. flow, speed, etc.</p> <p>(4) The ability to pass this processed data to other functionality for collation and use in traffic control.</p> <p>This Function shall be capable of providing the following facilities:</p>	2.1.1.3, 7.1.1.1, 7.1.5.7, 7.5.1.3
3.1.2.13.1	Provide Inter-urban Road Operator Mgt Interface	<p>(1) A HMI that enables the Road Network Operator to manage the control of traffic using the inter-urban road network.</p> <p>(2) The HMI shall enable the Road Network Operator to provide commands that change the current inter-urban traffic control strategy 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.</p> <p>(3) The HMI shall have the ability to inform the Road Network Operator of the success or failure of the requested change.</p> <p>(4) The HMI shall have to ability to enable the Road Network Operator to examine and update the sequence of inter-urban traffic control strategies that are implemented automatically, and to see the "log" of previously implemented inter-urban traffic control strategy changes.</p> <p>(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.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.3.5
3.1.2.13.5	Manage Inter-urban Traffic Commands & Messages	<p>(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.</p> <p>(2) The ability to manage the implementation of traffic management strategies for the inter-urban road network in a planned sequence according to the time of day and day of week.</p> <p>(3) The ability for the traffic management strategies 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.</p> <p>(4) The ability for these strategies 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.</p> <p>(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.</p> <p>(6) The ability to provide details of the current and previous implemented traffic management strategies on some or all parts of the inter-urban road network to the Road Network Operator through the functionality that provides their interface.</p>	2.1.2.2, 7.1.0.12, 7.1.0.2, 7.1.0.4, 7.1.0.5, 7.1.5.7, 7.1.5.8, 7.1.5.9

		This Function shall be capable of providing the following facilities:	
		<p>(1) The ability to output information, and/or warnings, and/or commands to Drivers using the inter-urban road network by mechanisms other than In-vehicle displays.</p> <p>(2) At the same time, the ability to forward the information, and/or warnings, and/or commands to be sent to other functionality for subsequent output to approaching Vehicles and for use by In-vehicle displays.</p> <p>(3) 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.</p> <p>(3) The ability to use several different technologies to provide the outputs but not through any in-vehicle technology as this will be provided separately.</p> <p>(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.</p> <p>(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.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.0.2, 7.1.0.5
3.1.2.14.2	Output c&i to Drivers using Inter-urban Roads		
		<p>(1) The ability to send for output the contents of traffic management strategies so that the most efficient use is made of the inter-urban road network.</p> <p>(2) The ability for the management strategies to include the output of messages to Drivers that will enable the use of road carriageway lanes, vehicle speeds and vehicle headways to be managed.</p> <p>(3) The ability for these strategies to be overridden by the Road Network Operator through the functionality providing their interface, as well as by requests for access or use of particular lanes as part of a green wave route request for Emergency Vehicles.</p> <p>(4) 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.</p> <p>(5) The ability to continuously adapt the management of the inter-urban road network to suit the actual detected traffic conditions.</p> <p>(6) 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.</p> <p>(7) The ability to monitor the results of the output of commands, so that alternative action can be taken if they are not followed.</p> <p>This Function shall be capable of providing the following facilities:</p>	2.1.3.1, 7.1.0.12, 7.1.0.2, 7.1.0.4, 7.1.0.5, 7.1.5.8
3.1.2.14.4	Output Inter-urban Traffic Commands & Messages		
		<p>(1) The ability to create short and medium term predictions of inter-urban traffic data.</p> <p>(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.</p> <p>(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.</p> <p>(4) The ability to repeat the creation of the predicted short and medium term inter-urban traffic data at (frequent?) periodic intervals.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.5.1.3
3.1.2.15	Predict Short & Medium Term Inter-urban Conditions		
		<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 and service area vehicle occupation data from other functionality in the Manage Traffic Functional Area.</p> <p>(3) The ability to receive data about traffic conditions (i.e. traffic flows, predicted road segment use (from trip plans), journey times, etc.) from functionality in the Provide Electronic Payment Facilities, Provide Support for Host Vehicle Systems and Provide Traveller Journey Assistance Functional Areas, plus the Cellular Communications Provider.</p> <p>(4) The ability to use the inter-urban road network static data to enable the collected and received data to be 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>(5) 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>(6) 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>(7) 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> <p>This Function shall be capable of providing the following facilities:</p>	2.1.1.3, 7.1.0.7, 7.1.2.1, 7.1.5.7, 7.4.1.15, 7.5.1.3, 7.6.2.4
3.1.2.16	Manage Inter-urban Traffic Data		
		<p>(1) The ability to detect vehicles using the entrances and exits of car parks in the urban road network.</p> <p>(2) The ability to collect the data as raw input by sensors that are capable of detecting the passage and presence of all types of road vehicle, from bicycles to Heavy Goods Vehicles (HGV's).</p> <p>(3) The ability to process the data to provide actual vehicle count data, i.e. numbers of vehicles, using the entrances and exits of each car park.</p> <p>(4) The ability to send the processed data to other functionality for collation and use in traffic management.</p> <p>This Function shall be capable of providing the following facilities:</p>	2.1.1.3, 7.1.11.1
3.1.4.1	Monitor numbers of vehicles in Car Parks		
		<p>(1) The ability to process the data collected from the car park entrances and exists to calculate the actual and historic car park occupancies.</p> <p>(2) The ability to translate the actual occupancy into the car park "status".</p> <p>(3) The ability for the translation to enable the functionality that outputs information about the car park occupancy to show either spaces or "state" according to the type of equipment that is available and/or the requirements of the Parking Operator.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.11.1, 7.1.11.4
3.1.4.4	Calculate Car Park Occupancy and Status		
		<p>(1) The ability to manage the use of the store of Urban Car Park Data.</p> <p>(2) The ability to load the store both static and real-time data and to extract (read) this data from the store when requested by other functionality.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.11.4
3.1.4.8	Mange Urban Parking Data Store		
		<p>(1) The ability to provide output of information about car parks to Vehicle Drivers, which shall be updated as soon as new data is received.</p> <p>(2) The ability to output information about relevant service areas, if it is available from other functionality.</p> <p>(3) The ability for the output to show either the current car park occupancy (number of spaces) or the current status depending on what is required by the Parking Operator.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.4.4
3.1.4.9	Output Car Park Information to Drivers		
		<p>(1) The ability to collect traffic data from the entrances and exits of service area vehicle parks in the inter-urban road network.</p> <p>(2) The ability to collect this data as raw input by sensors that are capable of detecting the passage of all types of road Vehicle, from Bicycles to Heavy Freight Vehicles.</p> <p>(3) The ability for the raw input data to be processed to provide actual traffic count data, i.e. numbers of vehicles, at the entrances and exits of each service area vehicle park.</p> <p>(4) The ability for the resulting data to be passed to other functionality for collation and use in inter-urban traffic control.</p> <p>This Function shall be capable of providing the following facilities:</p>	2.1.1.3
3.1.5.1	Monitor Service Area Vehicle Occupation		
		<p>(1) The ability to translate service area occupancy levels into service area "states".</p> <p>(2) The ability for the translation to enable the information output functionality to show either spaces or "state" according to the type of equipment that is available.</p> <p>(3) The ability for the occupancy levels to be provided by the service area occupancy monitoring functionality.</p>	7.1.4.4
3.1.5.2	Calculate Service Area Occupancy and Status		

		<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to provide output of information about service areas to Drivers, which shall be updated as soon as new data is received.</p> <p>(2) The ability for the information to be output about car parks, if it is available from other functionality.</p> <p>(3) The ability for the information output to show either the current service area occupancy (number of spaces) or the current status depending on what is required by the Parking Operator.</p> <p>(4) The ability for the Parking Operator to select which car park occupancies and/or status are displayed.</p> <p>(5) The ability for the way in which the information is displayed to be selected from options such as, "all", "cars/motorcycles", "buses/coaches" and "HGV's".</p> <p>This Function shall be capable of providing the following facilities:</p>	
3.1.5.3	Output Service Area Messages		
3.1.6.2	Process Road Traffic Data	<p>(1) The ability to receive real-time traffic data from both urban and inter-urban functionality.</p> <p>(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.</p> <p>(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.</p> <p>(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 from where it can be obtained by the Traffic Simulation Engine functionality.</p> <p>(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.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.6.1
3.1.6.4	Manage Traffic Prediction Data Store	<p>(1) The ability to manage the use of the store of Road Traffic Simulation Data.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(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, either by specific request or following the automatic generation of new results by the Traffic Simulation Engine functionality.</p> <p>(6) If necessary the ability to be able to exchange data from the store with similar functionality in another instance of the System.</p> <p>This Function shall be capable of providing the following facilities:</p>	2.1.0.3, 7.1.0.1
3.1.6.5	Provide Traffic Predictions Operator Interface	<p>(1) An HMI through which the Transport Planner can perform various tasks.</p> <p>(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.</p> <p>(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.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.0.1
3.1.6.6	Process Traffic Prediction Results	<p>(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.</p> <p>(2) The ability to process these results to provide coherent and comprehensive information about forecasts of traffic conditions and traffic management strategies.</p> <p>(3) The ability to automatically send this information to the appropriate functionality in the System.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.2.8
3.2.6	Assess Incidents and Devise Responses	<p>(1) The ability to manage the assessment of incident data and to devise strategies in response to incidents that have been detected by other functionality.</p> <p>(2) The ability to periodically review the data that has been collected about incidents and decide if any mitigation action is needed.</p> <p>(3) When mitigation action is needed the ability to either use an existing incident management strategy, or devise a new one.</p> <p>(4) The ability for an incident management strategy to involve a number of measures including changes to the current traffic management strategy, output of warning messages, plus the sending of comments and warnings to other functionality within the System.</p> <p>(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.</p> <p>(6) The ability for the recipients of the warnings and comments to vary from one strategy to another.</p> <p>(7) The ability to check the data and information that it sends for output as part of a strategy to ensure that it is consistent, i.e. all of the actions and warning messages are coherent and do not contradict each other.</p> <p>(8) Before implementing a strategy, the ability to require that confirmation of its use is received from the functionality providing the HMI for the Road Network Operator.</p> <p>(9) The ability to create incident management strategies either in anticipation of an incident or event, or because none of the existing strategies are suitable, following a request from the Road Network Operator received through the functionality providing their HMI.</p> <p>(10) The ability to continually monitor the data that is being collected so that it can remove strategies when incidents or events are not longer in progress.</p> <p>(11) When all the strategies 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.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.2.0.1, 7.4.1.35, 7.5.1.3, 7.5.1.8, 7.5.1.9, 7.6.2.4
3.2.7	Provide Incident Mitigations to Traffic Management	<p>(1) The ability to manage the output of instructions from an incident strategy to other functionality in the System in response to incidents that have been detected and classified by other functionality.</p> <p>(2) The ability for the instructions included in the incident management strategies to be output to require the replacement of, or changes to, any traffic management strategies that are currently in operation.</p> <p>(3) The ability for the output of the incident management strategies to begin as soon as the strategy information is received.</p> <p>(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.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.2.0.1, 7.2.2.3, 7.4.1.35
3.2.8	Send Incident Details to Others	<p>(1) The ability to manage the output of instructions contained in an incident strategy to other functionality in the System in response to incidents that have been detected by other functionality.</p> <p>(2) The ability for the instructions that are sent out to require the output of information to other functionality such as that for Emergency Support, Public Transport Management and Traveller Assistance.</p> <p>(3) The output of incident management strategies shall begin as soon as the strategy information is received.</p> <p>(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.</p>	7.2.0.1, 7.2.2.3, 7.4.1.35, 7.5.1.9

		This Function shall be capable of providing the following facilities:	
3.2.9	Send Incident Details to Information Providers	<p>(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.</p> <p>(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.</p> <p>(3) The ability for the output of the information to begin as soon as the strategy information is received.</p> <p>(4) The ability to keep a local store of the incident management 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.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.2.0.1, 7.2.2.1, 7.2.2.3, 7.6.2.4
3.2.10	Manage Store of Incident Data	<p>(1) The ability to take responsibility for the management of data about incidents and the production of statistical reports.</p> <p>(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.</p> <p>(3) The ability to load all the data that is received into the store of Incident Data.</p> <p>(4) The ability to retrieve data from the store of Incident Data for assessment, when requested by other functionality in the System.</p> <p>(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.</p> <p>This Function shall be capable of providing the following facilities:</p>	6.2.2.11, 7.2.2.1
3.2.12	Detect Incidents from Data	<p>(1) The ability to analyse the data that it receives about traffic conditions in the road network to see if can detect that possibly incidents have occurred.</p> <p>(2) In the analysis of the data to detect incidents, the ability to enable the use of both data provided by other functionality and video image data as inputs.</p> <p>(3) The ability to analyse all types of data for patterns that suggest the occurrence of an incident and the ability for such patterns to be linked to the same incident if they occur in adjacent sections of the road network.</p> <p>(4) The ability for the term "incident" to include anything that is likely to impede the normal flow of traffic, including such things as wide/long loads and "ghost drivers", i.e. Vehicles travelling against the proscribed direction of traffic flow.</p> <p>(5) The ability to send details of a detected incident occurrence to the classification and storage functionality.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.2.0.1, 7.2.0.6, 7.2.5.1, 7.5.1.3
3.2.13	Classify and Identify Incidents	<p>(1) The ability to identify and classify incidents.</p> <p>(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.</p> <p>(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.</p> <p>(4) The ability to determine that there is a good chance that the received data shows that an incident has occurred.</p> <p>(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.</p> <p>(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.</p> <p>(7) The ability to analyse data about the weather to see if it will create a hazard for Vehicles.</p> <p>(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.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.2.0.6, 7.2.0.7, 7.2.2.1, 7.2.5.1, 7.5.1.3
3.2.14	Send Incident Details to Vehicles	<p>(1) The ability to manage the output of instructions contained in an incident strategy to other functionality in the Vehicle in response to incidents that have been detected by other functionality.</p> <p>(2) The ability for the instructions that are sent out to require the output of information to the Drivers.</p> <p>(3) The ability for the output of the instructions to Vehicles to begin as soon as the strategy information has been received, but only if it is relevant for the geographic location of the road network that is being managed by the System.</p> <p>(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 management functionality.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.4.1.35, 7.5.1.8
3.3.1	Receive Information on Travel Factors	<p>(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.</p> <p>(2) The ability to check the received data for consistency before being sent to another part of the System functionality for storage.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.3.0.2
3.3.5	Provide Demand Management Operator Interface	<p>(1) A HMI through which the Road Network Operator can control the management of traveller demand for transport modes.</p> <p>(2) The HMI shall enable the Road Network Operator to develop and implement demand strategies both off-line and in real time and to be informed of the effects of their implementation.</p> <p>(3) The HMI shall provide facilities that enable reports on the use of transport modes to be produced using stored data.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.3.0.2
3.3.6	Analyse Data to find Demand Management Strategy	<p>(1) The ability to decide which Demand Management Strategy that is to be implemented.</p> <p>(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.</p> <p>(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.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.3.0.3
3.3.7	Demand Management Strategy Implementation	<p>(1) The ability to implement demand management strategies when requested by the Road Network Operator.</p> <p>(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.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.3.0.1, 7.3.3.1, 7.3.4.1
3.3.9	Manage Demand Management Data Store	<p>(1) The ability to manage the store of Demand Management Data.</p> <p>(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.</p> <p>(3) The ability for the received data to be sent to the functionality responsible for reviewing demand management strategies.</p> <p>(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.</p> <p>This Function shall be capable of providing the following facilities:</p>	
3.3.10	Review Demand Management Strategy Effects	<p>(1) The ability to review the effectiveness of demand management strategies.</p> <p>(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.</p> <p>(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.</p>	2.1.3.1

		This Function shall be capable of providing the following facilities:	
3.3.13	Output Demand Management Information	<p>(1) The ability to take responsibility for the output of information to Drivers and/or Travellers as part of a demand management strategy.</p> <p>(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.</p> <p>This Function shall be capable of providing the following facilities:</p>	6.1.1.2, 7.3.0.1, 7.3.3.1
3.4.1	Monitor Weather Conditions	<p>(1) The ability to collect data about weather conditions that are relevant to the operation of the road network managed by the System.</p> <p>(2) The ability for some or all of the data to come from Weather Systems or to be detected using sensors within the road network.</p> <p>(3) The ability to forward the collected data to other functionality for storage.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.1.6, 7.5.1.3
3.4.2	Monitor Atmospheric Pollution	<p>(1) The ability to provide data about atmospheric pollution in the road network.</p> <p>(2) The ability to provide the data about atmospheric pollution by continuously monitoring the weather conditions using sensors.</p> <p>(3) The ability to send the data resulting from the weather conditions monitoring to other functionality within the System for storage.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.5.9
3.4.7	Provide Environment Management Operator Interface	<p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(4) The HMI shall enable the Road Network Operator to update the static data used in the prediction of environmental conditions.</p> <p>This Function shall be capable of providing the following facilities:</p>	
3.4.8	Manage Environmental Conditions Data Store	<p>(1) The ability to manage the store of Environmental Conditions Data.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(6) The ability to provide the Road Network Operator with copies of the stored data when requested by the Operator.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.0.4, 7.1.1.7, 7.5.1.3
3.4.10	Output Environmental Information	<p>(1) The ability to take responsibility for the output of information to Drivers and/or Travellers about environmental conditions.</p> <p>(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.</p> <p>(3) A HMI through which the environmental conditions information can be output to Drivers and/or Travellers.</p> <p>This Function shall be capable of providing the following facilities:</p>	6.1.2.13, 7.6.2.6
3.4.11	Analyse Environmental Data and Implement Actions	<p>(1) The ability to analyse the environmental data when it is received from the functionality managing the store of Environmental Conditions data to see if any action is needed.</p> <p>(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.</p> <p>(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.</p> <p>(4) The ability to send a copy of the confirmed actions to the functionality that is managing the store of Environmental Conditions for loading into the data store.</p> <p>(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.</p> <p>This Function shall be capable of providing the following facilities:</p>	7.1.0.4, 7.1.1.7, 7.5.1.3, 7.6.2.4, 7.6.2.6
3.5.8	Provide Maintenance Data Store Management	<p>(1) The ability to take responsibility for the management of the store of Maintenance Data.</p> <p>(2) The ability for the store of Maintenance Data to contain databases of maintenance operations, plus the road network, infrastructure and road-side equipment.</p> <p>(3) The ability for other maintenance functionality to obtain data from the store of Maintenance Data and for its contents to be changed through the operator interface functionality and HMI</p> <p>(4) The ability to update the data about maintenance activities using provided by other functionality and by the Maintenance Organisation.</p> <p>This Function shall be capable of providing the following facilities:</p>	2.2.0.4
3.5.12	Evaluate Need for Equipment Maintenance	<p>(1) The ability to evaluate the need for maintenance of roadside and other equipment and request any needed repair activities.</p> <p>(2) The ability to collect information about equipment faults provided by other functionality in the System and to compare these with information about the activities needed to fix them.</p> <p>(3) The ability to maintain a record of preventative maintenance activities that may be required from time to time by the equipment.</p> <p>(4) From this comparison faults with recommended activities and the list of preventative maintenance, the ability to produce a list of actual maintenance work that needs to be carried out.</p> <p>(5) If the application of these activities is confirmed by the Road Maintenance Operator, the ability to request the Maintenance Organisation to carry out the work.</p> <p>(6) The ability to keep a list of the status of all outstanding roadside equipment faults and make this list available to the Road Maintenance Operator on request through the store of Maintenance Data.</p> <p>(7) The ability to update the list of all outstanding roadside equipment faults with information that it receives from the Maintenance Organisation.</p> <p>This Function shall be capable of providing the following facilities:</p>	
5.12.7	Communicate with In-vehicle Systems	<p>(1) The ability to provide an interface between the systems inside the Vehicle and other functionality in the Host Vehicle.</p> <p>(2) The ability to extract a variety of data from the Vehicle Systems through a "read only" interface, so that the integrity and safety of the systems themselves and the Vehicle cannot be compromised.</p> <p>(3) The ability to continuously analyse the data from the Vehicle Systems and provide the relevant parts to other functionality in the Host Vehicle.</p>	7.4.1.3, 8.5.3.4

		<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to enable the Vehicle to determine its position. (2) The ability to determine the Vehicle position with the accuracy required by other functionality to provide their specific services to the Vehicle but as a minimum shall enable the Vehicle to determine its position relative to lanes in the road carriageway. (3) The ability to use data from the Location Data Source, In-vehicle system and its own sensors to determine a "dead reckoning" position and for generally improving positioning accuracy and reliability. (4) The ability to use map data to provide "map matching" so that the actual identity of the part of the road network in which the Vehicle is currently positioned can be determined. (5) The ability to provide updated position information to other functionality as soon as a change occurs.</p>	7.4.1.3
5.13.6	Determine Vehicle Position	<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to use the inputs received from other functionality to produce data about the Vehicle such as its current speed, location, identity plus other information such as road and traffic states, location on a Vehicle Trip Plan, e.g. at a way point. (2) The ability to send this data to the Manage Traffic and Provide Traveller Journey Assistance functionality in the System, as well as to the Monitor Vehicle Safety Behaviour Function. (3) The ability to send the data to the Monitor Vehicle Safety Behaviour Function either at periodic intervals or triggered by events, depending on how often the input (raw) data changes so that Vehicles become probes within the road network. (4) If data about such things as road friction, aquaplaning, Vehicle breakdown and traffic incidents are not provided by the Vehicle systems, the ability to attempt to determine them from the data that it has received. (5) The ability to compose and send acknowledgement messages resulting from instructions received by Vehicles and displayed to Drivers. (6) The ability to send acknowledgement messages resulting from instructions received by Vehicles and displayed to Drivers to the Law Enforcement functionality in case there is a violation is detected as a result of instructions sent to Drivers.</p>	6.1.2.5, 6.2.2.10, 7.4.1.15, 8.5.3.4
5.13.7	Prepare Extended Floating Car Data	<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to take responsibility for processing information from sensors that detect the atmospheric conditions near to the Host Vehicle, i.e. the Vehicle in which it is operating. (2) The ability to process the sensor data to determine such things as temperature, wind strength and direction (taking account of the Host Vehicle's direction of travel), the presence of rain, etc. (3) Once processing is complete, the ability to send the data in digital form to the Determine and store local Host Vehicle Conditions Function.</p> <p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to take responsibility for collecting all of the data about the situation around the Host Vehicle (i.e. the Vehicle in which it is operating) produced by sensors in the Host Vehicle. (2) The ability for the data about the situation around the Host Vehicle to include such things as the location and trajectories of other Vehicles, other road users, Pedestrians and Vulnerable Road Users, plus weather, road surface conditions and stationary objects that are near to the Host Vehicle. (3) The ability to store the collected data locally, i.e. within itself. (4) The ability to continuously update the data as it changes, even if the Host Vehicle is stationary. (5) The ability to take responsibility for the addition of the actual geographic location of the Host Vehicle, to the data it has collected about the situation surrounding it.</p>	7.4.1.5
5.15.1.4	Detect Atmospheric Conditions near Host Vehicle	<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to receive dynamic warnings and instructions about various situations and events that will affect the progress of the Vehicle through the road network. (2) The ability to filter these dynamic warnings and instructions according to the current Vehicle location. (3) The ability to send the filtered dynamic warnings and instructions for display to the Driver. (4) The ability to process warnings that include accidents, incidents, wrong-way drivers, hazardous weather conditions, roadworks, predicted traffic conditions and congestion. (5) The ability for each item of information sent for output to the Driver to be given a priority level based on such things as their relevance to the location of the Vehicle, the likelihood that the Vehicle will encounter them, and their possible affect on the safety of the Vehicle and its occupants. (6) The ability to filter the warnings and instructions so that only those that are appropriate and relevant to the current location of the Vehicle are sent for output to the Driver.</p>	7.4.1.5, 7.5.1.8, 7.5.1.9
5.15.1	Manage Communication from Vehicle to Driver	<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to receive the currently valid warnings, lane instructions and traffic regulations for the section of the road network in which the Vehicle is currently located or is about to enter. (2) A HMI through which the messages to the Driver can be displayed according to the determined priority of messages. (3) The ability of the HMI to use replicas of the appropriate international roadside signage (according to ISO TS14823:2008) and not "custom" versions of roadside signage in the displays to the Driver. (4) The ability of the HMI to display the outputs in a way that avoids overloading or distracting the Driver with too much or irrelevant information. (5) The HMI shall enable the Driver to request output of the most relevant outputs about incidents. (6) The ability for the HMI to display a message to the Driver saying that a particular service is unavailable, when no data that is relevant to that service has been received for a suitable period of time.</p>	7.4.1.35, 7.5.1.8, 7.5.1.9
5.16.2	Output Commands and Dynamic Warnings	<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to follow the progress of the Traveller as they move along the previously planned and requested trip and implement each part of the trip plan using the stored plan data. (2) The ability to use a variety of tracking methods to determine the actual location of the Traveller. (3) The ability to follow the time schedule in the trip plan, i.e. use a form of dead reckoning, if no suitable tracking method is available. (4) If required by the trip plan, the ability to provide detailed route guidance which it shall send to the Traveller Interface Function for output to the Traveller. (5) If the a revised version of the trip plan currently being implemented is received, the ability to stop current trip plan and commence implementing the revised one from the current location of the Traveller. (6) The ability to use a previously created trip plan to follow and provide guidance to the Traveller, even when their location moves outside the geographic area covered by the service provider that created the trip plan.</p>	6.2.0.7, 7.6.2.4
6.3.10	Implement Trip Plan and Track Traveller	<p>This Function shall be capable of providing the following facilities:</p> <p>(1) A HMI through which the Traveller can request the implementation of a trip plan, be given trip navigation instructions or manage changes to the trip plan that is currently being implemented. (2) The ability for the HMI to output in whatever form best suits the Traveller the instructions for implementing the trip plan that are provided by the Implement Trip Plan and Track Traveller function. (3) If a proposal is received for revising the trip plan that is being implemented, the ability of the HMI to display details of the proposed changes to the Traveller and send back the response that is received to the Manage Revised Trip Plan Creation for Traveller function. (4) The ability for the HMI to receive requests for changes to the trip plan from the Traveller and also send them to the Manage Revised Trip Plan Creation for Traveller function.</p>	6.1.0.3, 6.2.0.4, 6.2.0.5, 6.2.2.1, 6.2.3.2, 6.2.3.3, 6.2.3.4, 6.2.3.5
6.3.13	Provide Traveller Trip Interface		

		This Function shall be capable of providing the following facilities:	
6.5.3.3	Collect PT Data	<p>(1) The ability to collect Public Transport travel data for use in the preparation of trip plans for Travellers.</p> <p>(2) The ability to collect the data as it arrives from functionality in the Manage Public Transport Operations Functional Area.</p> <p>(3) The ability to load the data that has been collected into the store of PT Trip Planning Data and to manage all of the data in that store.</p> <p>This Function shall be capable of providing the following facilities:</p>	6.1.2.5, 6.2.0.3, 6.2.1.3, 6.2.3.3, 6.2.3.4, 6.2.3.5
6.5.3.7	Enable Operator Access to Trip Planning Data	<p>(1) A HMI that enables the Travel Information Operator to have access to the contents of the stores of Road Trip Planning Data and PT Trip Planning Data.</p> <p>(2) The ability for the Operator to review and update the data in the stores including the provision of static data for the urban and inter-urban road networks car parks and service areas, where this is not available from the Manage Traffic Functional Area.</p> <p>(3) The ability for the Operator to obtain reports on the current contents of the stores, including in particular details of any active events or incidents that are affecting Travellers trip plans.</p> <p>(4) The HMI shall not enable the Operator to have access to the personal data about Travellers who either have made, or are in the process of planning trips.</p> <p>(5) However the HMI shall enable the Operator to change any stored criteria used to plan trips, e.g. preferences for particular transport modes.</p> <p>This Function shall be capable of providing the following facilities:</p>	6.1.2.9, 6.2.2.11, 6.2.2.12
6.5.3.8	Collect Data About Road Traffic	<p>(1) The ability to collect road based travel data for use in the preparation of trip plans for Travellers, as well as for Freight and Emergency Vehicles.</p> <p>(2) The ability to collect the data as it arrives from functionality in the Manage Traffic Functional Area.</p> <p>(3) The ability to load the collected data into the store of Road Trip Planning Data and to manage all of the data in that store.</p> <p>This Function shall be capable of providing the following facilities:</p>	6.1.2.13, 6.1.2.5, 6.2.0.3, 6.2.0.4, 6.2.2.10, 6.2.3.3, 6.2.3.4, 7.3.4.1
6.5.3.9	Plan Trip Details	<p>(1) The ability to manage the production of trip plans based on data provided by the Traveller through functionality in other parts of the system.</p> <p>(2) The ability to prepare trip plans for journeys that are either one way, or for a return trip (including weeks/months ahead), and that take advantage of late opening hours, special facilities etc.</p> <p>(3) The ability to check the criteria provided by the Traveller and obtain information for the specified modes to be used in the requested trip, but taking account of the trip planning criteria that have been set up by the Travel Information Operator.</p> <p>(4) The ability to use data from the store of Road Trip Planning Data and/or the store of PT Trip Planning Data, plus also to collect information about Points of Interest (POI) and Personal Services (PS) from External Service Providers.</p> <p>(5) Where specified by the Traveller the ability to request information about the services provided by other transport modes, tolls plus other charges if they will need to be paid in order to complete the proposed trip, and to pass all of this information on to the Provide Traveller Information functionality.</p> <p>(6) The ability to create trip plans for cyclists and pedestrians using the road network data and related perturbations, but disregarding traffic incident information.</p> <p>(7) The ability to revise a part completed trip plan when a Traveller departs in any way from its contents, or travel conditions change, starting from the current Traveller location and mode of travel.</p> <p>(8) The ability to exchange journey time data for each segment of the road network with its implementation in other devices and to plan trips when the only traffic related data that is available this journey time data.</p> <p>This Function shall be capable of providing the following facilities:</p>	6.1.1.2, 6.1.2.13, 6.1.2.5, 6.2.0.4, 6.2.1.3, 6.2.2.10, 6.2.2.9, 6.2.3.2, 6.2.3.3, 6.2.3.4, 6.2.3.5, 6.4.0.1, 6.4.1.6, 7.3.0.1, 7.3.4.1
6.5.3.10	Obtain Data for Traveller Information	<p>(1) The ability to obtain data for use in the provision of information to Travellers that will be provided by the Traveller Information functionality.</p> <p>(2) The ability to periodically pass to Traveller Information functionality the data that it has obtained from the store of Road Trip Planning Data and the store of PT Trip Planning Data, plus data about Points of Interest (POI) and Personal Services (PS) that it has been provided to it by the Plan Traveller Trip Function.</p> <p>This Function shall be capable of providing the following facilities:</p>	
6.5.3.13	Provide Data & Routes to Fleet Operators & Drivers	<p>(1) The ability to provide data and routes to functionality serving Fleet Operators and Drivers at their request and contribute information about freight and hazardous goods that may be relevant to general trip planning.</p> <p>(2) On request from Fleet Operators and Drivers the ability to provide data that shall comprise specific items such as pollution, traffic and weather conditions, for which the Function shall obtain the current values from the store of Road Trip Planning Data.</p> <p>(3) When data is received from the Manage Freight and Fleet Operations functionality, the ability to store it in the store of Road Trip Planning Data.</p> <p>(4) On request from functionality connected to the Freight Operator and Hazardous Goods Vehicle Driver the Functions the ability to prepare routes using the parameters provided in the request and data from the store of Road Trip Planning Data.</p> <p>This Function shall be capable of providing the following facilities:</p>	6.1.2.5, 6.2.0.3, 6.2.3.2, 6.2.3.3, 6.2.3.4, 6.2.3.5
6.5.10	Provide Traveller Trip Planning Interface	<p>(1) A HMI through which the Traveller can initiate and manage the trip planning process.</p> <p>(2) Using the HMI, the ability of the Traveller to define the parameters that are to be used to plan a trip, including origin, destination, places to be visited during the trip before the destination is reached (way points, transport modes to be used, departure time, arrival time, services to be booked, and whatever else is deemed interesting for trip satisfaction).</p> <p>(3) The ability for the Traveller to use the HMI to request that these parameters are entered into the store of General Trip Preferences Data or to use data in this store to supplement that being provided for a particular trip.</p> <p>(4) When complete, the ability to send the requirements to the Trip Planning functionality so that the trip plan can be prepared.</p> <p>(5) The ability to use the HMI to present the prepared trip plan to the Traveller and for the Traveller to be able to refine any of the requirements and re-plan the trip until it fulfils their needs in an iterative way.</p> <p>(6) The ability to store successive trip plans internally so that they can be re-called by the Traveller if later versions turn out to be unsatisfactory.</p> <p>(7) Once a trip plan has been accepted by the Traveller, the Function shall send the details to the Function responsible for producing the travel itinerary or to the Function responsible for making any bookings that are included in the trip plan and/or paying for the trip planning process.</p> <p>(8) The ability for the Traveller to use the HMI to reject a trip plan and close the trip planning activity at any time and to delete any requirements that have been provided.</p> <p>(9) The ability for the Traveller to be informed through the HMI about any payments that are needed, either for the trip planning process itself, or for services that the Traveller has specified for inclusion in the trip.</p> <p>(10) It shall be possible for the Traveller to be asked to pay for the trip planning process either before it starts, or once a successful trip plan has been produced.</p> <p>(11) The ability of the Traveller to use the HMI to initiate payment for the trip planning service and/or any services that are required as part of the trip, and to be informed of the success or failure of the payment process.</p> <p>(12) If the payment process fails, the ability to cancel the trip(s) that have been planned and to inform the Traveller of this through the HMI.</p>	6.1.0.5, 6.1.1.2, 6.1.2.7, 6.1.3.8, 6.2.1.3, 6.2.2.9, 6.2.3.2, 6.2.3.3, 6.2.3.4, 6.2.3.5, 6.4.0.1, 7.3.0.1

		This Function shall be capable of providing the following facilities:	
6.6.1	Provide Traveller Information Interface	<p>(1) A HMI through which the Traveller may obtain information about travel conditions.</p> <p>(2) The ability to provide information for all current modes of travel in the area served by the System, including those not managed by the System, e.g. heavy rail, air and maritime.</p> <p>(3) The HMI shall enable the Traveller to request output of information and if desired may select criteria for its output.</p> <p>(4) The HMI shall no enable information to be output without a request from the Traveller.</p> <p>(5) The ability to obtain the relevant information from the store of Travel Information Data, or if not in the store then through a request from the Produce Travel Information Function.</p> <p>(6) If the current location is known then the ability to filter the information from the store of Travel Information Data to that which is location specific before output, although the filtering criteria shall be configurable by the Traveller.</p> <p>(7) The HMI shall enable the Traveller to configure the output so that it can be provided against a map background, or in different languages.</p> <p>(8) The HMI shall generate the output in a form that is easy to understand and be suitable for those with disabilities.</p>	6.1.0.3, 6.1.0.5, 6.1.2.13, 6.1.2.6, 6.1.2.7, 6.1.2.8
		This Function shall be capable of providing the following facilities:	
6.6.2	Produce Travel Information	<p>(1) The ability to produce travel information using inputs it receives from other Functional Areas.</p> <p>(2) The ability to modify the inputs according to filters set by the Travel Information Operator to reflect policy and other factors, so that for example information about certain types of services, travel modes, Personal Services, or Points of Interest are not included in what is sent for output to the Traveller.</p> <p>(3) When the information is ready, the ability to respond to an Operator request that it is sent to a particular Output Travel Information Function, which may be at a specific location.</p> <p>(4) The ability for the Operator to request that the information is sent to the store of Travel Information Data for use by the Provide Traveller Information Interface Function when the Traveller requests travel information.</p>	6.1.2.13
6.6.3	Output Travel Information	<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to take responsibility for the output of information about road conditions, PT services, conditions of other transport modes, Points of Interest (POI) and Personal Services (PS) to Travellers.</p> <p>(2) The information output to the Traveller shall be provided by the Travel Information Operator through the Produce Traveller Information Function.</p> <p>(3) The ability to output the information in a form that is easy to understand and be suitable for those with disabilities.</p> <p>(4) The ability to continuously display the particular information that is being output until replaced by other information or the output is cancelled by the Operator.</p>	6.1.2.13
6.6.4	Manage Travel Information Data Store	<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to take responsibility for maintaining the store of Travel Information Data.</p> <p>(2) The ability to update the store contents with data that is received from the Produce Travel Information Function and the Travel Information Operator through the Provide Travel Information Operator Interface Function.</p> <p>(3) The ability to output travel information to Travellers when a request is received through the Provide Traveller Information Interface Function.</p> <p>(4) The ability to output travel information to the Output Travel Information Function at the request of the Travel Information Operator.</p> <p>(5) The ability to provide data from the store to the Provide Travel Information Operator Interface Function as a result of a request from the Travel Information Operator.</p>	
6.7.1	Define Traveller's General Trip Preferences	<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability for the Traveller to specify a set of factual data to be used as General Trip Preferences (GTP) for use each time they want to plan a trip.</p> <p>(2) There shall be no requirement for the Traveller to do this more than once and the data shall be used as a preparation to full personalisation.</p> <p>(3) Once a planned trip has been completed, the ability to ask the Traveller for any comments on the performance of the trip and any changes that are needed to the GTP data.</p> <p>(4) The ability to enable the Traveller to receive an output of their current GTP data and to amend that data, even if this is not the result of the performance of a planned trip.</p>	6.1.0.5, 6.1.2.8, 6.1.3.8, 6.2.3.2, 6.2.3.3, 6.2.3.4, 6.2.3.5, 6.2.3.6, 6.4.2.2
6.7.2	Evaluate Trip After Completion	<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to evaluate the success of the trip planning and implementation.</p> <p>(2) The evaluation shall be based on data provided by the Support Trip functionality and optional input from the Traveller collected after the trip has been completed.</p> <p>(3) The ability to collect any required input as comments on the trip and on the support given using the Define Traveller's General Trip Preferences functionality.</p> <p>(4) The ability to send the results of the analysis of the trip performance for output to the Travel Information Operator through the Enable Operator Access to General Trip Preferences functionality.</p>	6.1.0.5
6.7.4	Manage General Trip Preferences Storage	<p>This Function shall be capable of providing the following facilities:</p> <p>(1) The ability to manage the store of General Trip Preferences (GTP) Data.</p> <p>(2) The data in this store shall be available for Travellers to use for every trip that they plan.</p> <p>(3) The ability to keep the preferences for each Traveller separate and only allow the data for each Traveller to be entered, accessed and updated by the Traveller that owns it.</p> <p>(4) The ability to respond to any request from the Travel Information Operator for a copy of the data in the store of General Trip Preferences (GTP) Data with all of it, but with the identity of each Traveller and other personal data (e.g. payment details, contact information) removed in order to comply with the relevant EU Data Protection directives.</p>	