



# Italian Motorways DATEX Working Group

## TMP Management by DATEX Exchange

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**Version: 1.0**

**Date: 8<sup>th</sup> of February 2013**



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## VERSION CONTROL

VERSION	DATE	CHANGES	Author
0.1	23 November 2012	First draft of this document.	Autostrade Tech
0.2	19 Dicembre 2012	Approval by DATEX IT group	DATEX IT Motorway group
1.0	8 February 2013	Final issue version 1.0	Autostrade Tech

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## 1. ABSTRACT

In the frame of ESG2, a supporting action was created to analyze the viability of the use of DATEX II in Traffic Management Plans. This work was initiated as task of ESG2 group TMS ( Traffic Management Systems) and ESG5 DATEX II.

The activity had been further developed in a coordinated way between: the TMS-SA03 “DATEX II and TMPs” [1] and the Activity 5.3 “Support to TMPs” from ESG5.

From ESG5 WI5.3 a proposal to manage TMP with DATEX II had been presented to EGS2 Technical Group in 2011-2012; The DATEX Italian team composed by several Motorway Operators and Road Operators ( ANAS ) had started reviewing it.

Some concerns had been elaborated by Italian Motorways operators, widening the principles of DATEX as Data Exchange for operational purposes and a global management of Information and Operation among Centres and specific operations for TMP management with DATEX II has been elaborated and is the object of this document.



## 2. INTRODUCTION

The Italian motorway companies have set up a working group in order to develop the architecture and technology choices to ensure the information and safety management in emergency high-impact situations, as these for their characteristics and location in the network must be managed in cooperation between several road operators.

The aim of the working group was to assess the requirements and propose possible solutions for the management of information and messages on VMS for high-impact situations, through the use of rerouting and other operations to reduce the effects of the traffic disturbing situations.

The Traffic Management Centers (TCC Traffic Control Center in English or Italian Sale Radio – CRI - Radio Information Centres) are a organizational entity of the Road Operators who have to guarantee the best roadways operating conditions and help to ensure continuity of infrastructure availability and best customer satisfaction in the use of the service, by the management of internal and external information flows.

To reach this objective it is necessary to ensure to drivers:

- quality,
- timeliness
- consistency

of mobility information provided by the main Media (VMS, radio, video, press, automatic responder, website) and for this purpose it is necessary to monitor in the information entered by the operators and to control the information disseminated outside.



### 3. OPERATIONAL USE OF DATEX AND FEEDBACK NEEDS

#### Feedback information usage in information processing for operational scope

Exchanging traffic data aiming to help managing the road, means that information is exchanged to be processed by the receiving system for one or more purposes such as:

- to inform the Traffic Control Centre Operator of the situation that is being taken in the neighboring
  - to help him evaluate and prevent impact that may affect its competence.
- to request for Network Management Operations
  - To inform drivers about safety and security behavior to be held at the situation location for users who are approaching a specific reported situation.
    - On broadcast and personalized Information channels (Radio, Bulletins, Call Centers, TMC, web, devices)
    - On VMS

In the first case, i.e. information exchange only for internal usage, we expect no further action / processing but there is still a need for having information about the data and/or information having been correctly received / interpreted ( e.g. they are consistent to predefined DATEX II profile ) and the exchanged information had been correctly displayed on the system GUI and/or operators acknowledged for this information being understood.

Furthermore in case of operational exchanges aimed at the actions implementation at the receiver TCC ( either manually operated and/or automatically by the system) it is useful and required in some applications that processing outcomes at receiver side are tracked back to the supplier, because these steps can have a value on the legal and liability level, so the supplier is informed about the processing results and acknowledge of requested operations by the receiver system.

For both cases there is a need for the Client ( i.e. Information Consumer ) system to prepare a feedback of information to be published back to the Supplier ( i.e. Producer System ) to give feedback about the status of the processing of information exchanged by the various applications such as for example:

- Viewing and Understanding the operator Road (TMC Operator ACK)
- Processing by a system of information delivery (such as channel Radio / RDS-TMC / streaming via Web)
- Processing for spreading on VMS
- Effective dissemination through specific VMS, in case of no higher priority information.

## Italian multi-level Framework for Operational Data Exchange

As a premise, it must be said that at the level of European study the purpose of DATEX is "the exchange of data between centers" and that it is assumed that this scope is completed by the transfer of data and / or information between a system so called Supplier and a system that receives so called Receiver / Client.

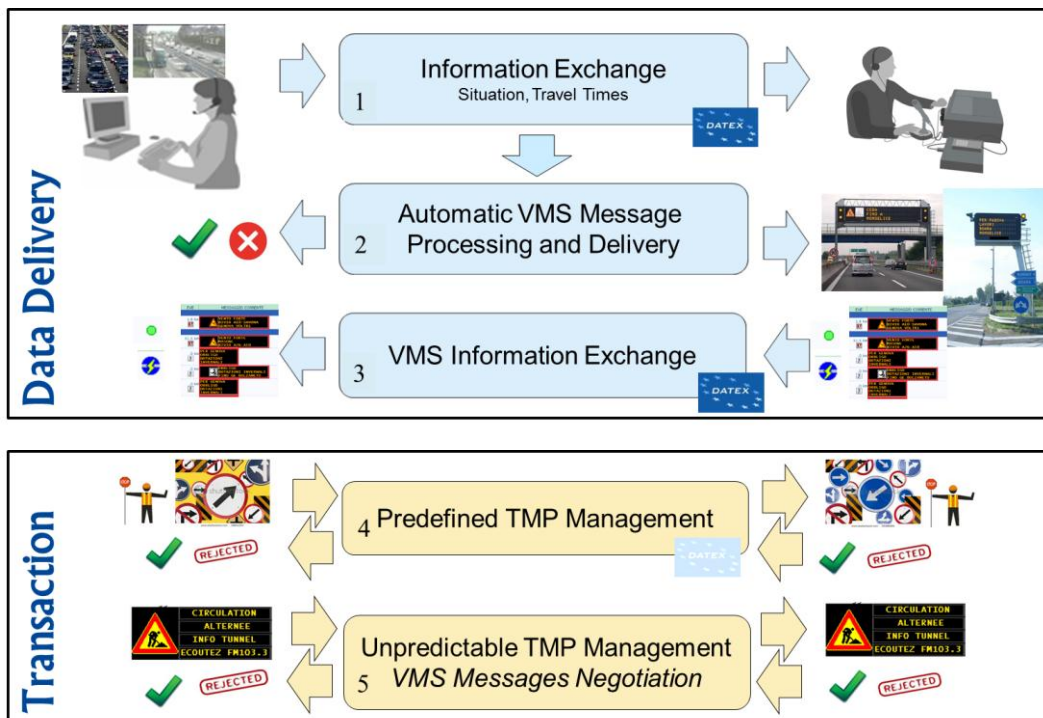
As fully explained at the previous paragraph, for operational purposes data exchange instead it should be noted that the objective of the use of the data is not negligible in the definition of exchange and that the correct receipt must be provided with the proper understanding and processing of data for the purpose for which it is exchanged: see, for example, the use of this information for the activation of information services or for the implementation of operations designed to influence the state of the network (such as the display of messages on the PMV about closures and re-routing alternative).

Italian Motorways Operators assumed that the information exchanged for operational purposes is transmitted by the system supplier to the receiving system using a variety of protocols, normally DATEX 1 or DATEX II.

This information is processed by the recipient for its own purposes.

Operational Levels framework for systems based on data exchange in the Italian motorways introduces the following operating levels classification that are splitted in:

- Data Delivery to the information that are exchanged asynchronously between the two nodes (Leve 1 to 3 ) in one direction at a time.
- Transaction for information and messages ( Level 4 and 5 ) introduce a workflow management with bilateral data exchange flows.





Let's examine the significance of the different levels:

- 1) **Data Exchange:** Level 1 is the plain exchange of data, already operating with DATEX 1 , that exhausts its purpose with the transfer of data to the receiving node
- 2) **Processing:** Level 2 takes into account that the information exchanged have one or more application purposes and therefore can be treated (In automatic mode or in manual mode) and that on the basis of this treatment a new information is originated that may be useful, or necessary for specific application at supplier side, which sends these information to the specific purpose of treatment (e.g. to give information to the operator at the receiving organization, operational management information channels of the receiving environment, including PMV)
- 3) **VMS Messages Exchange:** as VMS are a communication media very near to drivers, the specific information that the data exchanged has generated a message that had been displayed on one or more VMS is an important feedback for the Supplier that expects a comeback for its request to expose this information via messages as regulatory measure for the traffic in the road network.
- 4) **Predefine TMP management:** a coordinated and shared decision about complex road operations, made on the basis of predefined set of combined activities implemented by several road operator. A set of information and messages are exchanged in order to establish a joint operating mode. In particular, the implementation of measures as result of a specific recognized scenario that triggers specific operating conditions of the road network based on a predefined agreement defined in a TMP (Traffic Management Plan)
- 5) **Unpredictable TMP management/ non predefined VMS Messages negotiation:** shared agreement on the basis of unplanned scenarios with requests for specific and not predefined interventions: to be used only in exceptional circumstances, more frequently it consists in a specific need to display not predefined messages on VMS based on extraordinary conditions which were not predictable and have not been planned.

Based on the principle expressed previously, starting from level 2, it becomes necessary to provide evidence of the state of information processing on the site of the receiver to the original supplier with an increasing level of type

- information received and properly entered into the system
- information processed for processing X
  - viewing by the operator (operator ack)
  - treatment for information channel X
  - treatment for VMS Message processing
  - displayed as Message on specific VMS
  - Acceptance or Rejection of proposed TMP measures or non predefined VMS messages

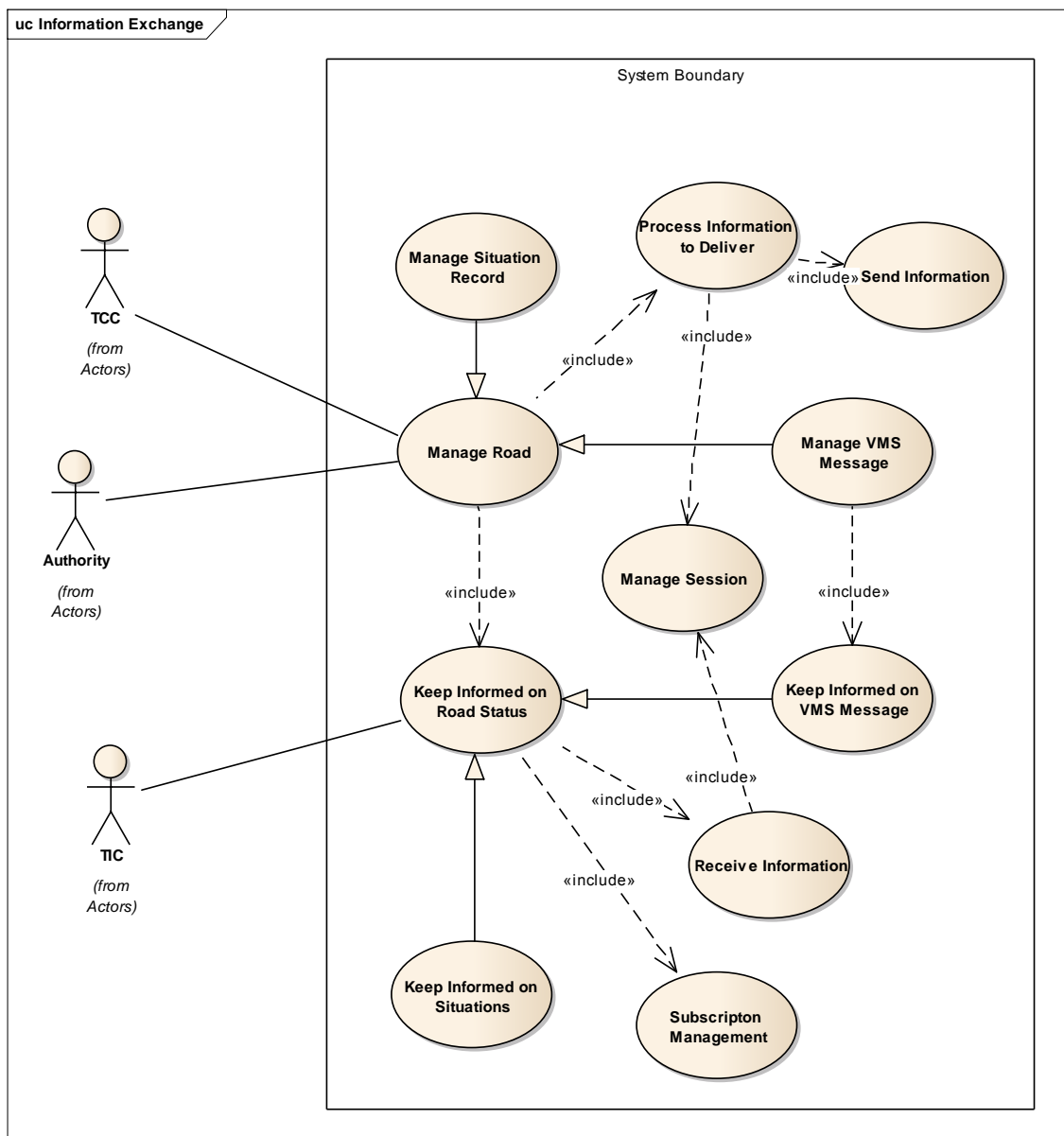


## Road Operation use case definition

Road operators works to ensure the network conditions

- Traffic Fluidity
- Safety
- Comfort

The operations set the are needed to ensure the safety and smooth operation of road management is summarized in the following Use Case diagram that represents the activities necessary to ensure these macro-requisites.





The scheme involves three kind of actors

- Traffic Operator: Manages the road
- Authority: check road management and assists in the management operations the road operator.
- Service Provider / Traffic Information Center: provide information to end users via different media/ channels

Based on role the connections the main activities of these entities are:

- Be informed about the status of the road and traffic
  - On the managed network
  - On the neighboring network that may bring consequences to your network
- Manage road that includes deliver information
  - Information channels directly available in their
    - Web / Radio / Call Center
    - TMC Channel
    - Variable Message Signs
  - or submitting information to users
    - Other road companies
    - Authority
    - Service Provider / ICT

Highlight from the description of the activities of the TCC is that the requirements to inform and be informed of the status of the network are primary features of road management, be aware of the state of the information exchange in both direction is a key requirement to evaluate the effectiveness and reliability of information in our system, i.e. our knowledge of road network situation as well as the one of the nodes that should receive this information and that in the absence of network availability may not have received it.



## Feedback Publication

It's now clear that information about data been properly exchanged and understood / treated is a must requirement in operational data exchange.

In order to implement this may not be enough so

For this purpose implementing a simple Ack on receiving a valid packet it's not enough. What is needed is the information that the single elementary information item has been correctly received, understood and treated, whether it is a given measurement or elaborated data, a VMS message or status information or a given situation or situation record.

In order to do this a Feedback Publication has been introduced to give the Supplier the status information about how the different application had processed the exchanged data / information items.

The extension provides the Feedback for road situations and individual records (and it could be easily extended for individual exchanged Elaborated Data and Measures)

The response status is either on receipt of the single data but can be extended and given for different applications or for the treatments to which the data is subjected (eg processing for an information channel or for the diffusion on the panels Variable Message)

**Status** on information processing introduced are

**Compliant:** included in schema and is understood and meaningful information

**notCompliant:** not Compliant information meaning not included in the general or profile schema and not interpreted for specific application purposes. ( e.g. mistyped )

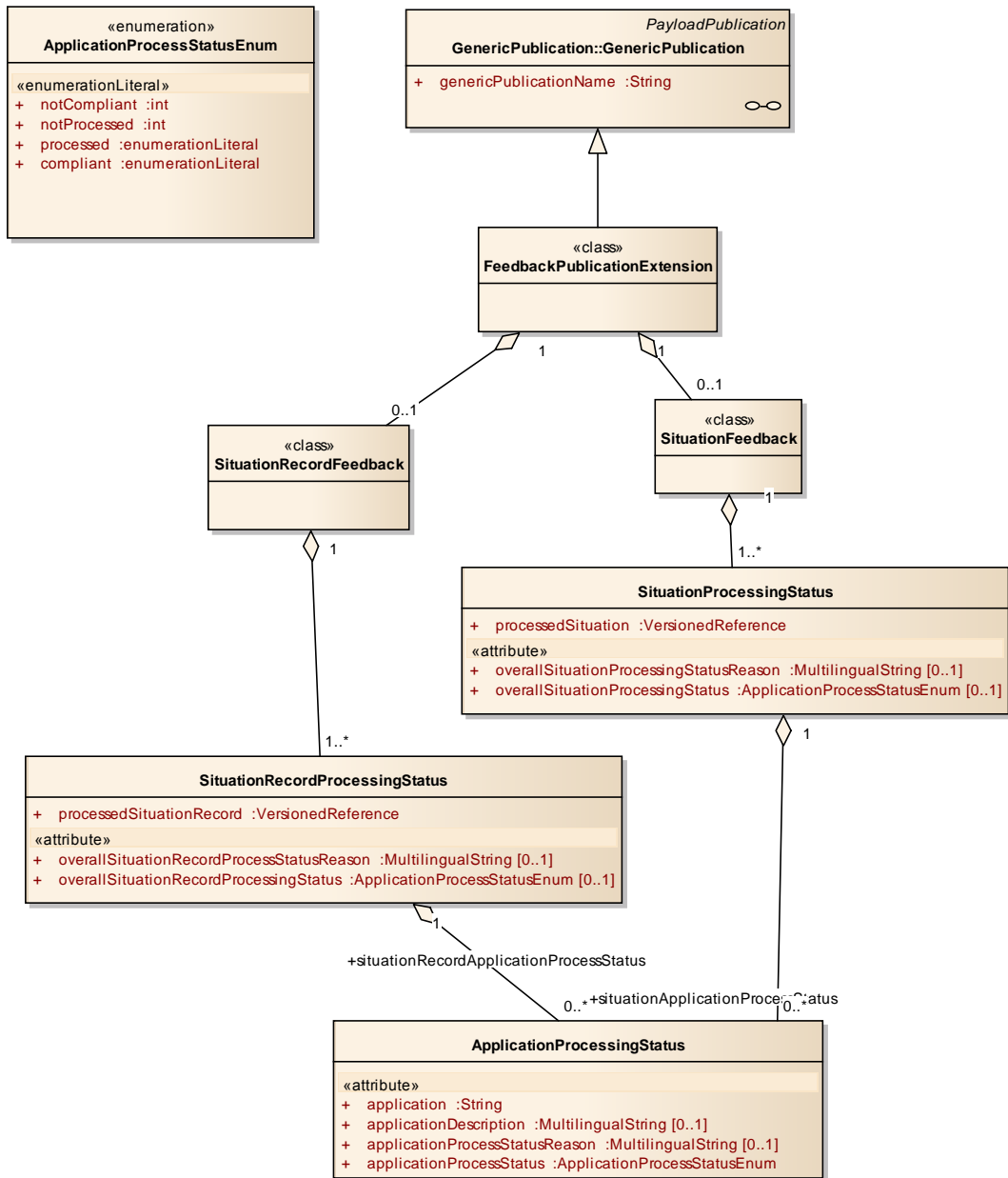
**notProcessed:** information received and understood but not ( yet ) dealt with the specific application.

**Processed:** The information was processed by the application.

In addition to the state is provided a **Reason** that describes more in detail the reason for non-compliance or retention of information processing.

While **States** are encoded, the applications are left free as they are strictly defined by the Client and Supplier for the purposes of treatment for which the data are exchanged. If the purpose is only to inform the other party of a given situation the class "ApplicationProcessingStatus" can be omitted and feedback information will be only "SituationProcessingStatus" and "SituationRecordProcessingStatus".

class FeedbackPublicationExtension



## TMP MANAGEMENT AND NEGOTIATION

TMP (Traffic Management Plan) management has been defined and has been refined over years of road operating.

We can define a TMP as the implementation of a series of predetermined activities that are necessary for the reduction or elimination of traffic disruption or bad level of service at a specific location in the road network as result of high impact incidents or conditions.

The TMP measures are predefined, built up by operators and road authorities in several stages of study and decision-making, taking into account the existing infrastructure, the availability of resources that can operate on the network, the operating devices and technology available at locations in order to implement the necessary measures.

The reference document that explains how to design and implementation of the TMP is a document of Deployment Guideline Easyway 2012 - "Traffic Management Services - TRAFFIC MANAGEMENT PLAN FOR CORRIDORS AND SERVICE NETWORKS - Deployment guideline" EW-TMS-DG07\_TrafficManagementPlan\_01-02-00. pdf available from the site Easyway to link <http://www.easyway-its.eu/deployment-guidelines/>.

But there are some differences in use and definition of the TMP that emerged from the various working groups, in particular a joint "DATEX and TMP" working groups has developed in the years 2009-2012 a model for a DATEX II exchange aimed at the implementation of TMP against road situations in the context of transactions between Spain, France and the Basque Country.

Because of these different definitions, in the following the correlation between a defined incident and the set of measures is named "scenario / strategy".

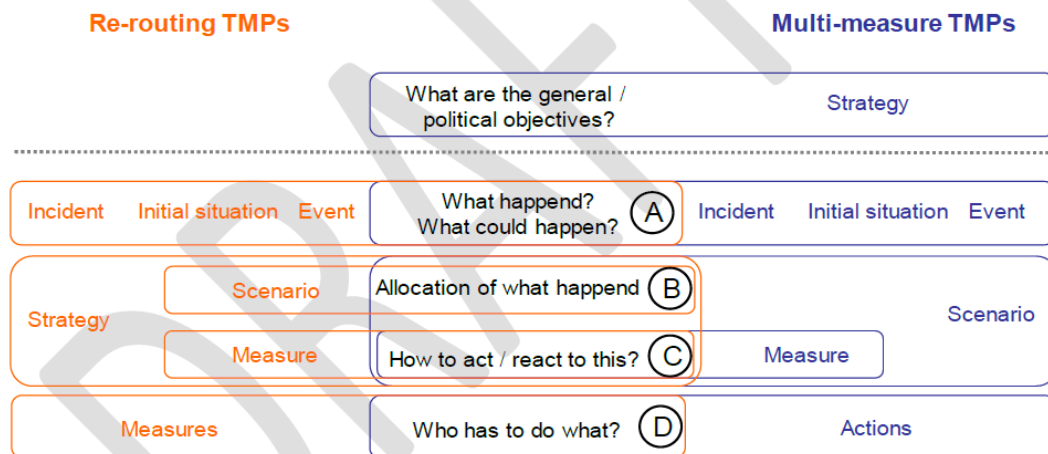


Figure 17: Wordings of TMP typology in Europe

Figura 1 - pag 34 DG TMS

As we can see in fig 1 TMP Deployment Guidelines show differing definitions of the terms Measure, Scenario, Action that are interpreted differently in ES-FR compared to the use of these terms in the Nordic countries NL, DE.

Italy for lack of funds did not attend the working group European FR-ES but has worked at the end to review the model developed and submitted some observations in the context of the Technical Group DATEX.



The present study presents an updated and amended Schema based on ES-FR proposal taking into account the Italian motorway needs, aiming to make the model more flexible to handle the same type of operating environment and scenarios ES-FR than those of Italian, but also those contemplated by the operation described in the DG for the Northern European model.

## Operational Management DATEX Extension

### A MODEL TO NEGOTIATE AND MANAGE TMP

As a matter of fact, besides known examples from the DATEX II ESG2 W15.3 proposal we extended the investigation about TMP adopted in Italian motorways companies.

In these documents "Measures" are defined as joint operations to manage high impact incidents, by closing predefined motorway sections and activating advisory or mandatory rerouting based on the severity of situations.

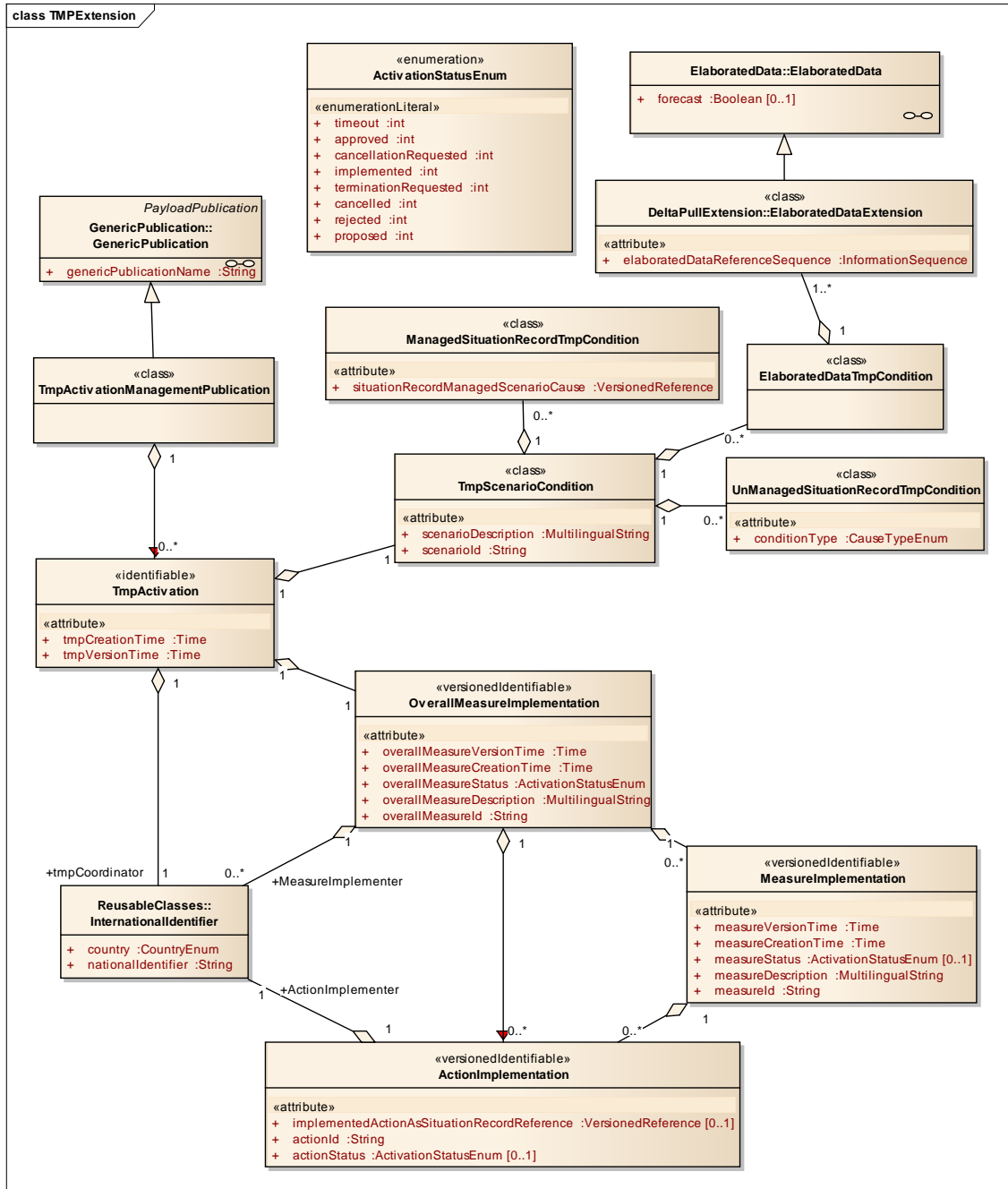
In these examples the focus of the TMP is to identify the "Measures" suitable to cope with the emergency situation which lead to serious traffic disruptions on the roads. Measures, rather than triggering emergency situations are encoded in this context.

In other cases as Winter operation management TMP (the same analyzed by the European Working Group), they primarily identify the conditions (or scenarios) i.e. predefined situations in which road operators and Authorities, activate predefined measures that are most efficient in the specific condition.

A "TMP Activation" has been introduced to consider all activities (data exchange, decision making, actions and operations) that are run when starting a shared management of the road operation between multiple centers of road operators or authorities.

The activation of the coordinated management of TMP starts when some road operators recognize a "Scenario" condition, i.e. one of the trigger conditions identified for the management of a TMP and from that it generates a specific request for Measure for which several operators / authorities have to coordinate to implement.

The UML model for the exchange of a TMP Activation and requests for Measures is as follows



## Definitions

### TMPEXTENSION:

“A TMP Activation is a set of TMP measures request, decisions, implementation and termination, due to some conditions that are active on road network”

The TmpActivation starts when the first time a triggering Scenario condition is recognized which has to be managed by TMP. Varying the conditions, implemented Measure may be terminated or switched to other Measures (eg a simple closure could become a mandatory rerouting, and then turn into advisory rerouting with the partial reopening of lanes).



#### TMPSCENARIOCONDITION:

“TMP Scenario Condition is the overall situation on the road networks that leads road operators to initiate and run a TMP”

These are the triggering condition for the first TMP Activation and request of specific Measure, as well as further conditions that could lead to end implemented Measures and eventually require for new measure to be implemented.

#### OVERALLMEASUREIMPLEMENTATION:

“An Overall Measure is an overall set of one or more operator actions which are leading to a particular network operating configuration such as closures with alternative itinerary, restriction for HGV, etc”

An Overall Measure is the abstract High Level Measure that include specific Measures implemented by each individual elementary operations.

This High level Overall Measure have been introduced to handle in one scenario, the TMP-derived ES-FR for snow in the Pyrenees and the Nordic management that seems to have no interest in the detail of Measure / Action in the exchange of specific requests.

With this first level you can agree on the Overall Size (nominally "Closing A4 between Novara and Torino") must be activated with different elementary Measures and Actions by the various organizations / operators and authorities taking part in the overall management of the measure.

In the exchange there is a reference to a Overall Measure ID which identifies the predefined Overall Measure. This ID has to be shared among the various entities, ie entities that recognize and on which they are granted.

This ID will be defined as a reference to the specific TMP document that describes the Overall Measure implementation, and the set of elementary operations / actions that implements it.

In this document the description of Overall Measure and the single Measures/ Actions , define which Centers are to be involved , whose actions are needed to implement the TMP. The TMP Publication containing the request of TMPActivation with the OverallMeasure specification to be implemented must be delivered to these Centers.

#### MEASUREIMPLEMENTATION:

“Measure is a specific set of one or more operator actions which are leading to a particular network operating configuration such as closures with alternative itinerary, restriction for HGV, etc.”

A single Measure, used by a single operator that corresponds to a set of elementary actions. Introduced for convenience for those Centers / TMPs which need to specify each single detail of the various operation. It's a predefined operation, to be identified by a specific ID, wich is defined in the TMP documents. The center which receives this ID knows exactly wich action this Measure is and which are the elementary actions to be implemented to implement this Measure.





It is still in the decision-making process of a default operation recognizable with a specific ID that is assigned when defining the TMP. Based on this who receives a request for a specific measure (part of an overall measurement) knows exactly how it is made and what are the elementary actions to be taken to implement the measure.

#### ACTIONIMPLEMENTATION:

A single operator actions which is part of a TMPMeasure/TMPOverallMeasure, such as Operator Action Situation Record, Vms Managemnt, Information Delivering

An "Action" is a minimal operation i.e. a necessary single elementary constituent of a given measure. It is uniquely identified and fixed at the time of definition of the TMP.

In case Actions are predefined it is not necessary that the individual Measures Actions are delivered to organizations/ road operators and Authorities to ask for the Overall Measure. The Overall Measure or an operation is in itself understandable and known. In other TMP modeling there is not need to specify individual actions or measures because this leaves room for options to implement measures by a number of various actions. For example: A request Measure is "to reduce the direct flow from Amsterdam to Utrecht" operations that can be implemented are "reduced lane on Amsterdam ring road " or rerouting operation out of Amsterdam with a reduction in the influx of Amsterdam ring road. This fluidity allows the operator of the center of Amsterdam, which receives the request from the Center of Utrecht, to manage the request at best depending on traffic condition and time of day, rather than indicating specific action / measures.

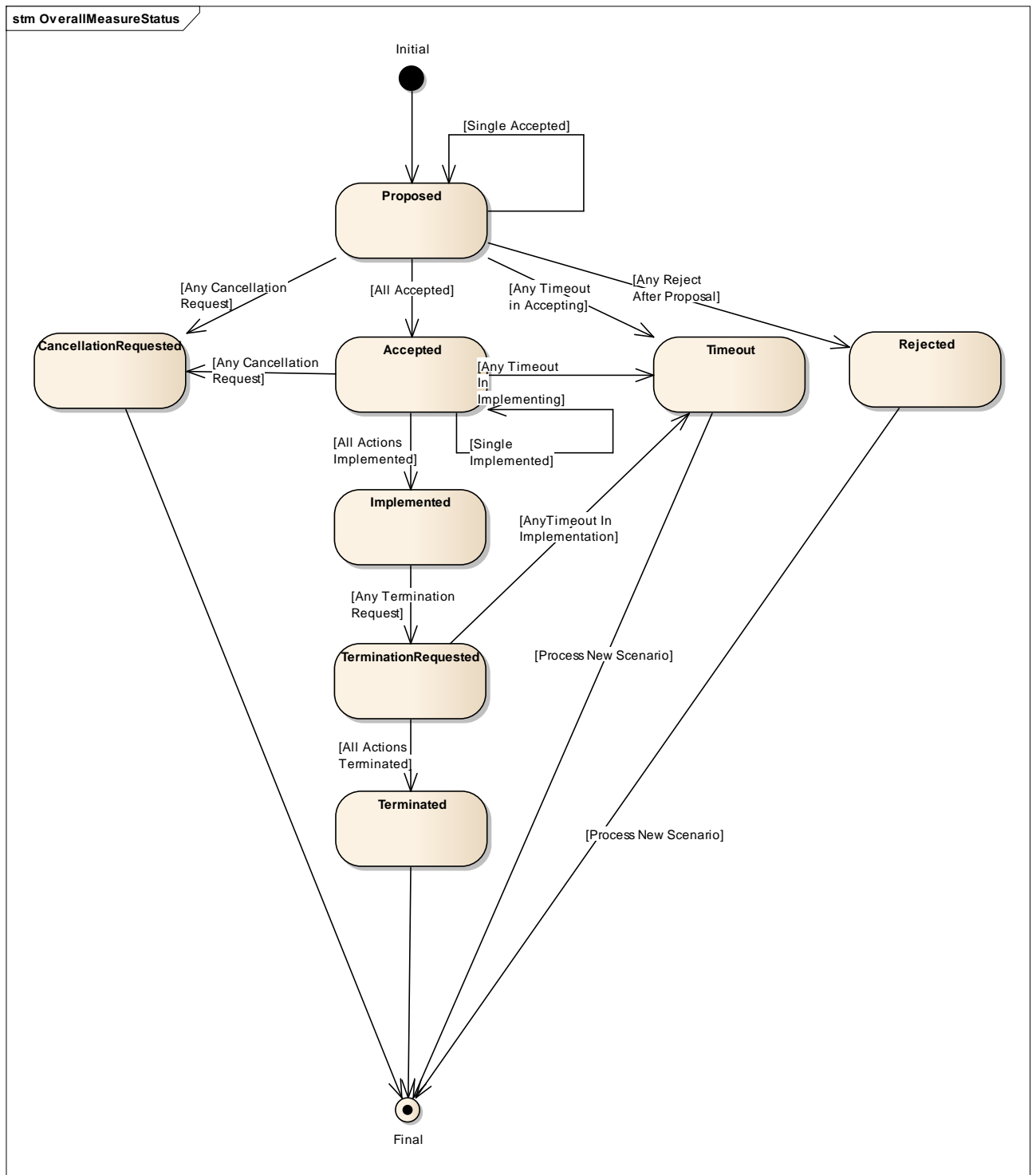
The proposed model allows then a smooth management of road conditions that may evolve from one condition to another one but also allows to ask for a single specific operation to be implemented in a measure, pausing or terminating a previous one, letting the managemnt to evolve from one measure to another one smoothly. This thus skips the rigidity of the formal model ES-FR in two ways:

- introducing a condition for the recognition of fixed scenarios as a necessary condition for the initiation of one management measures
- to move to new measures needed by new upcoming scenarios but it did not allow a smooth evolution from different scenario conditions to the implementation of new measures.

## TMP State information

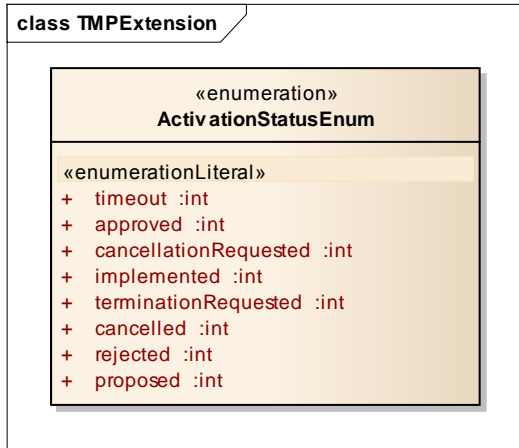
TMP publication, as explained in the previous paragraphs, allows to send the Centres which are needed to implement a TMP Overall Measure in a coordinated way, the information about this request based on condition that are on/by the road network

Overall Measure State diagram is as follows:





State definition are included in the ActivationStatusEnumeration and are



timeout	the request or implementation has not been answered or implemented within the common agreed time
approved	the proposed action or measure has been approved by (all) the operator(s) involved
cancellationRequested	the action has been proposed to be cancelled by any of the operators
Implemented	the measure or action approved has been implemented by any of the operators
terminationRequested	the action has been proposed to be terminated by any of the operators
cancelled	the proposal had been cancelled by the operator
rejected	the proposal has been rejected by the operator
proposed	the request has been received and has been proposed to the operator for approval or rejection



## FEEDBACK IN TMP MANAGEMENT

An important role in the TMP is played by Feedback. The Feedback Publication previously described is extended to manage Feedback on TMP.

Feedback Publication for TMP allows the cooperating nodes to deliver a feedback about the Overall Measures, Measures and Actions to be returned to the node that asks for the activation of these measures. The feedback processing involve the assessment and decision on the part of the Receiver Nord to recognize the Scenario and has resources to support the request for implementing the Overall Measure.

The center that recognize the need to implement a TMP is called the Coordinator node and will be responsible for publishing the proposed TMP to the interconnected nodes that must approve the proposed measures and then implement them.

It is expected the rejection of the proposal for an adequate reason.

Receiving, understanding and then accepting and rejecting of proposals are sent back by the nodes involved in the exchange to the Coordinator node, through the Feedback Publication that will contain a reference to the TMP Activation and Overall Measures ID exchanged in the Request.

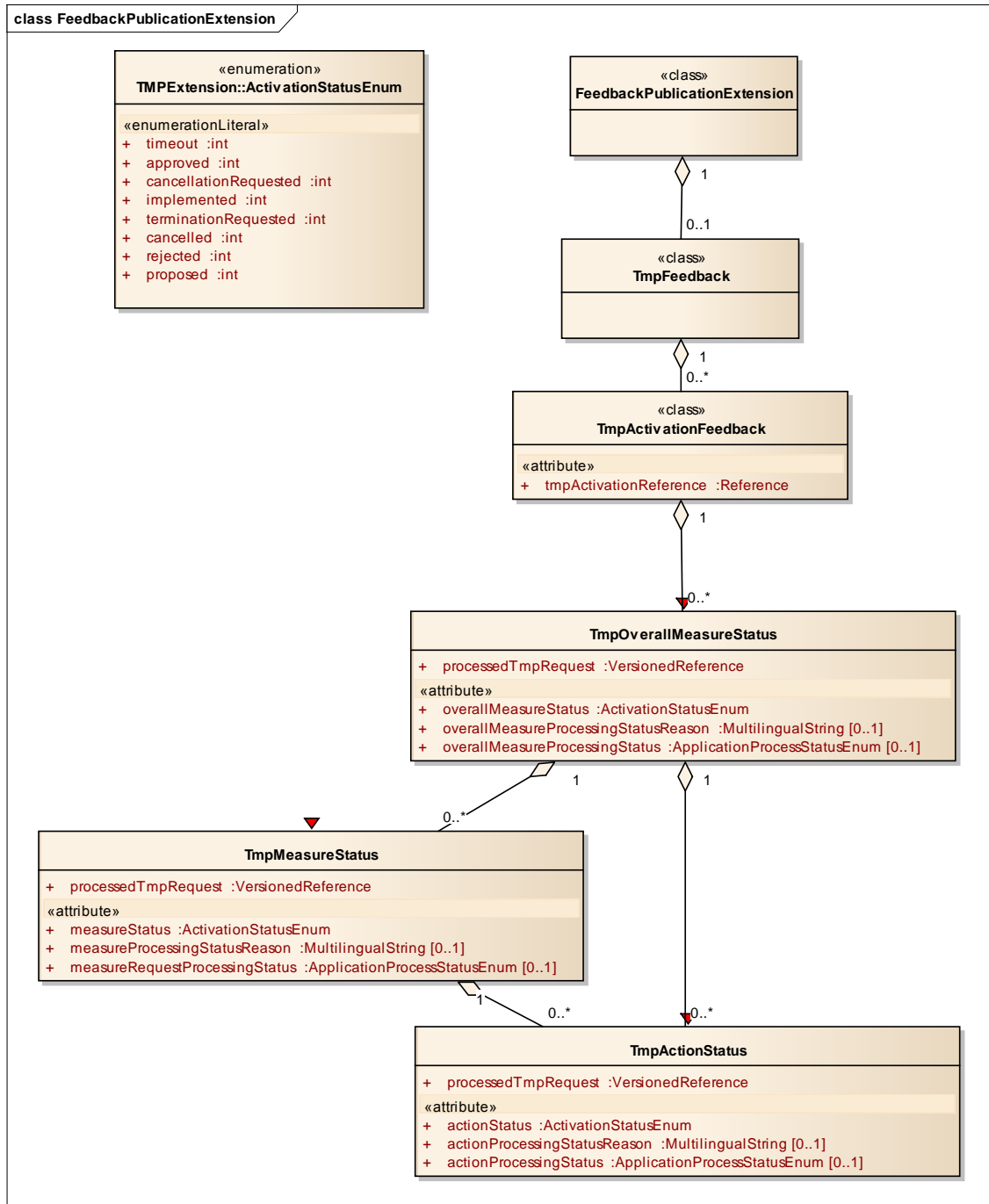
In case of refusal or failure to implement measures and actions, the control will go back to the Coordinator node which will be in charge of managing the updated scenario and operating conditions, asking for new measures or giving the control to another node.

The overall Measure will be approved if each node return positive feedback approving the proposal, it will be rejected if one of the nodes reject it.

Once the proposal have been accepted, the overall measurement is implemented when all the centers have implemented the coordinated action necessary or actions necessary to implement the measure on their side.

In case the actions are not implemented, such as after some time occurs after the proposal approval by all nodes, rise a need for further analyzing and evaluate the condition by the operator of the proposing node, in order to better understand the scenario that derives from a partial implementation of the measure. In those case there would be a need to better understand and in case to realize about a new scenario condition and for eventually new measures to be implemented.

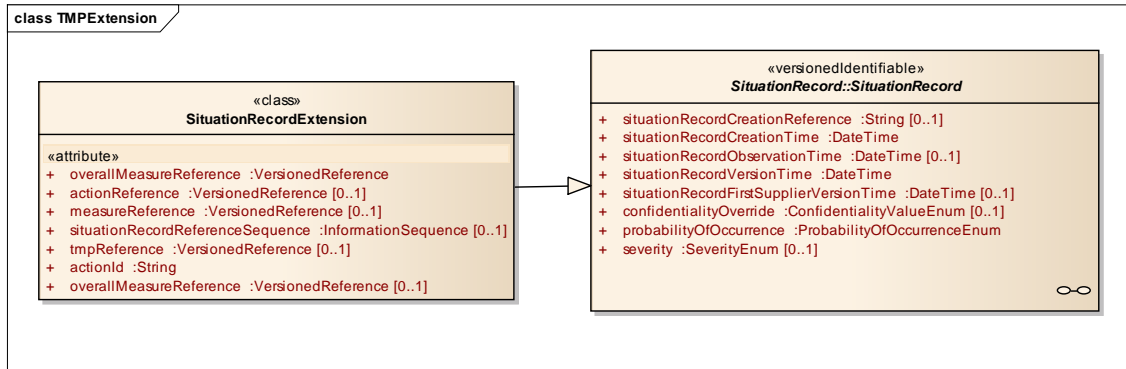
The DATEX Extension for the management of the Feedback of TMP Publication (proposal and rejection and / or requests for cancellation and termination) is shown in the following diagram.



The Feedback Publication is needed also to monitor the implementation phase, as the involved node will have to deliver the state of the OverallMeasure ( and eventually Measures/Actions) that are implemented on their side.

Furthermore Information about the implementation of Measures/Actions can be exchanged also by Situation Publication in which a Situation Record can manage a reference to TMPActivation, OverallMeasure, Measure, Action, these data are stored in SituationRecordExtended Class.

As a Situation Publication is not due to be delivered to each cooperating nodes, the implementation state by Feedback Publication shall be delivered for the correct workflow management to be managed y the Coordinator Node .



## Exchange Workflow based on Feedback

In this section the various exchanges of information and messages aimed decisions about activating TMP are explained

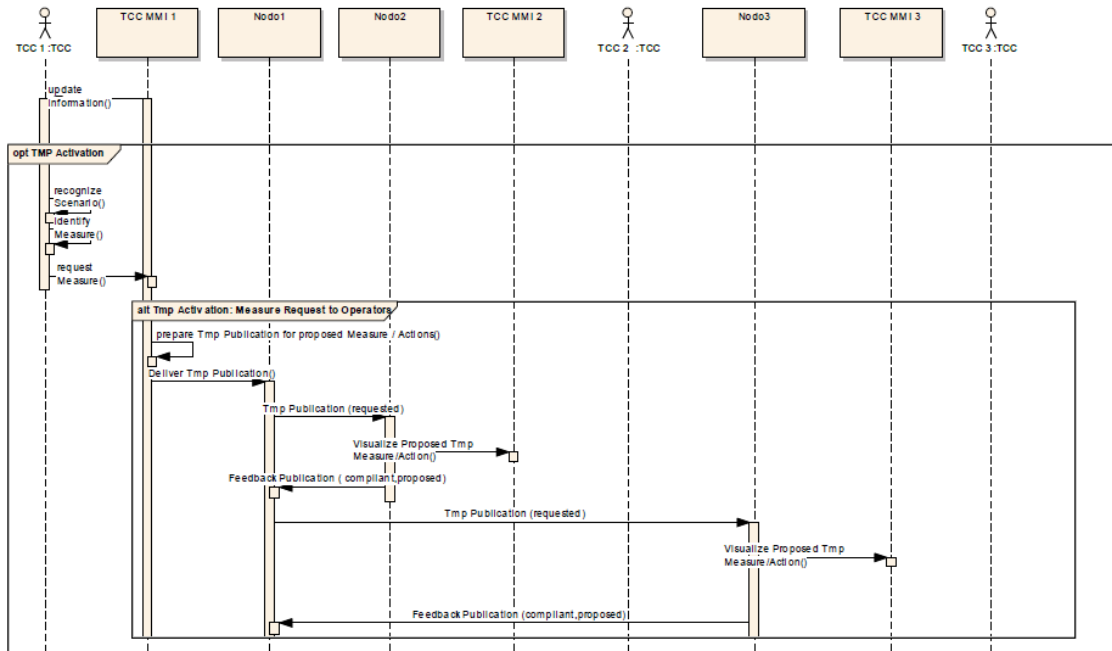
Sequence diagrams are shown based on different workflow results: acceptance, rejection, timeout. Other diagrams describes the exchange sequences for implementation and cancellation / termination of the measures.

In case of refusal or unavailability of resources to implement the control will go back to the Coordinator node which will be in charge of managing the updated scenario and operating conditions, asking for new measures or giving the control to another node.

In these sequence diagram not only the transmission systems (i.e. DATEX nodes) are relevant, but the system which operated by TCC operators and TCC operators themselves are important to identify precisely the exchange and decision workflow.

## PROPOSAL SENDING

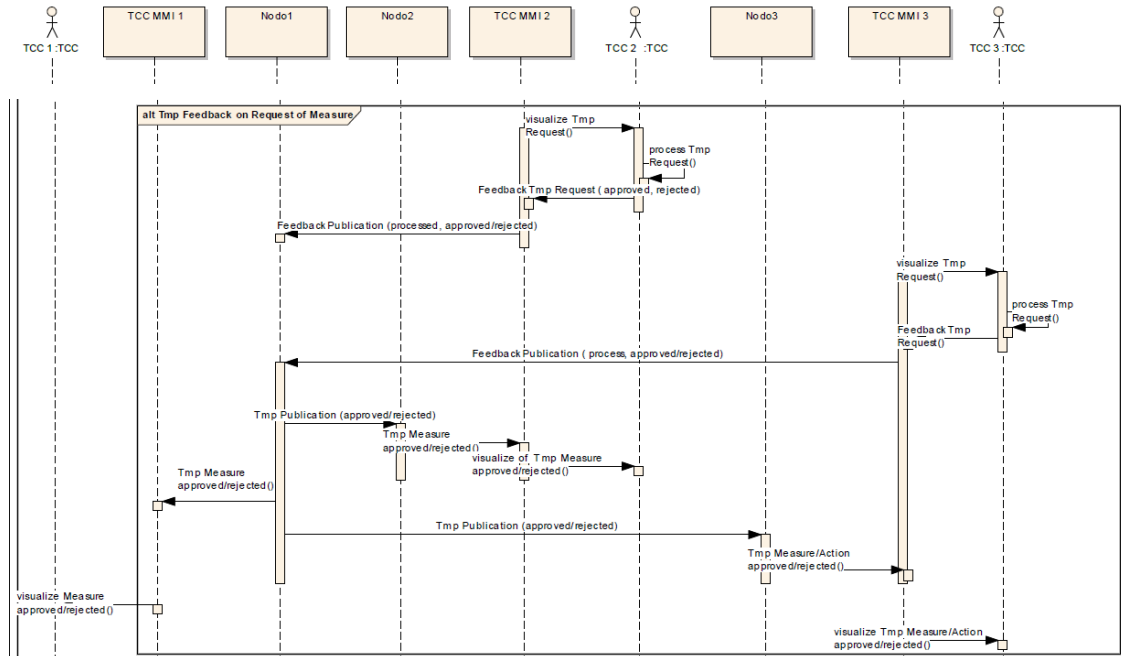
Send a TMP request for Overall Measure implementation and collection of first feedback of correct reception and understanding of the request, that has been submitted to system for Operator Evaluation



The diagram shows that the proposal is sent to all node cooperating in the TMP and from each nod a Feedback is collected notifying the proposal to be Compliant/Uncompliant to predefined TMP by the recipient systems.

## FEEDBACK COLLECTION

Furthermore a feedback on visualization and subsequent proposal evaluation are collected. These are to be delivered within a timeout that has to be agreed by all the Operators.



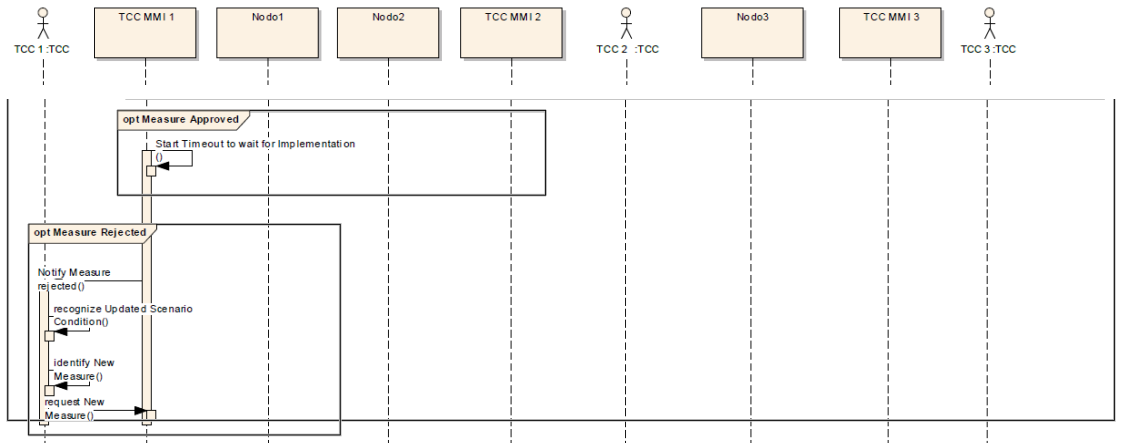
Each node is to feedback the Coordinator node about approval or rejection of TMP Proposal. The feedback is sent after the TCC operator acknowledge on the TCC system.



## APPROVAL OR REJECTION OF PROPOSAL

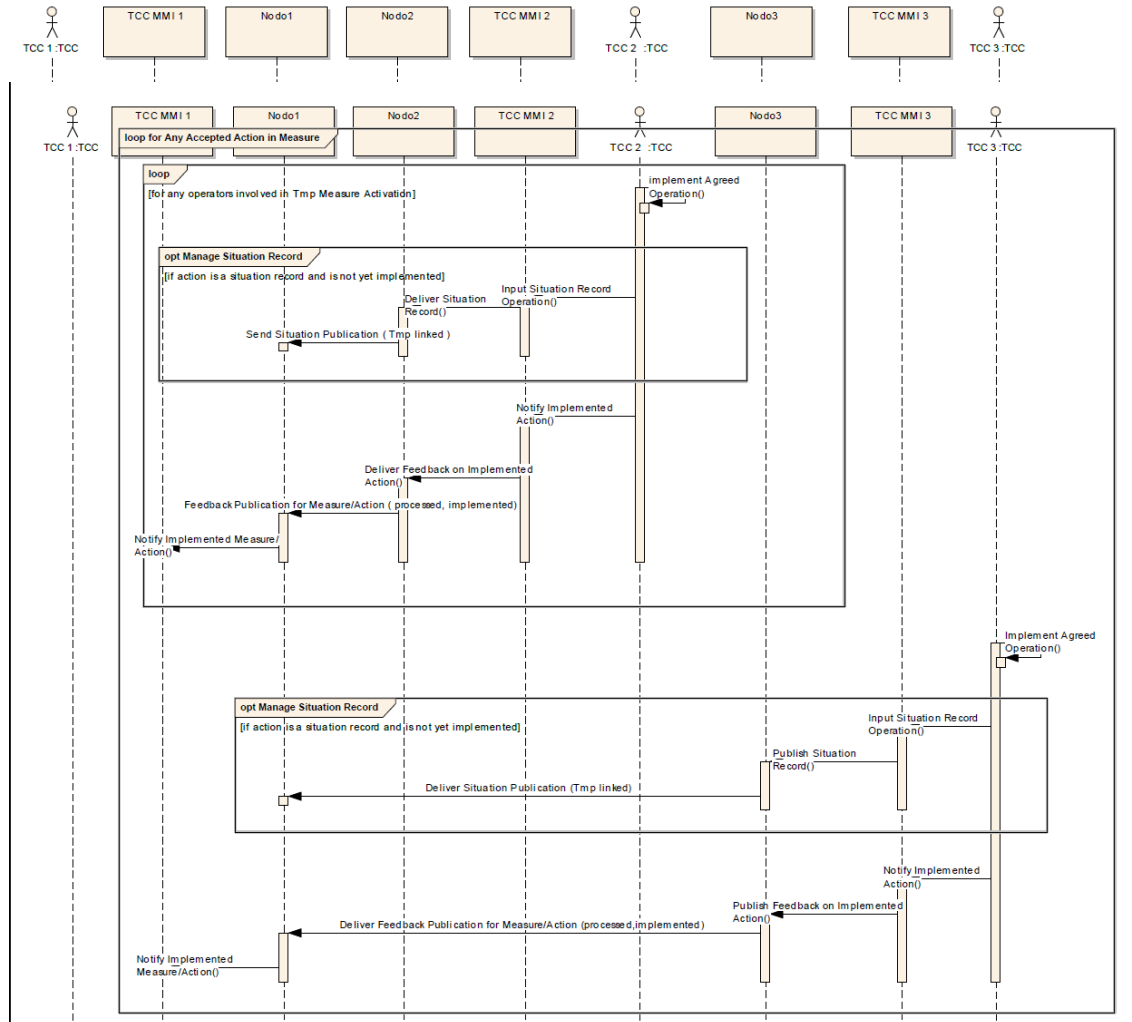
If proposed measure are approved a timeout is started to wait all action are implemented, delivery of implementation or any problem in implementing are to be notified from all cooperating nodes via a Feedback Publication

In case of Rejection of Proposal these are to be notified to the coordinator node so that an operator take this updated Scenario into account to understand how to manage or switch control to another node ( normally with higher hierarchy level )



## AGREED OVERALL MEASURES IMPLEMENTATION

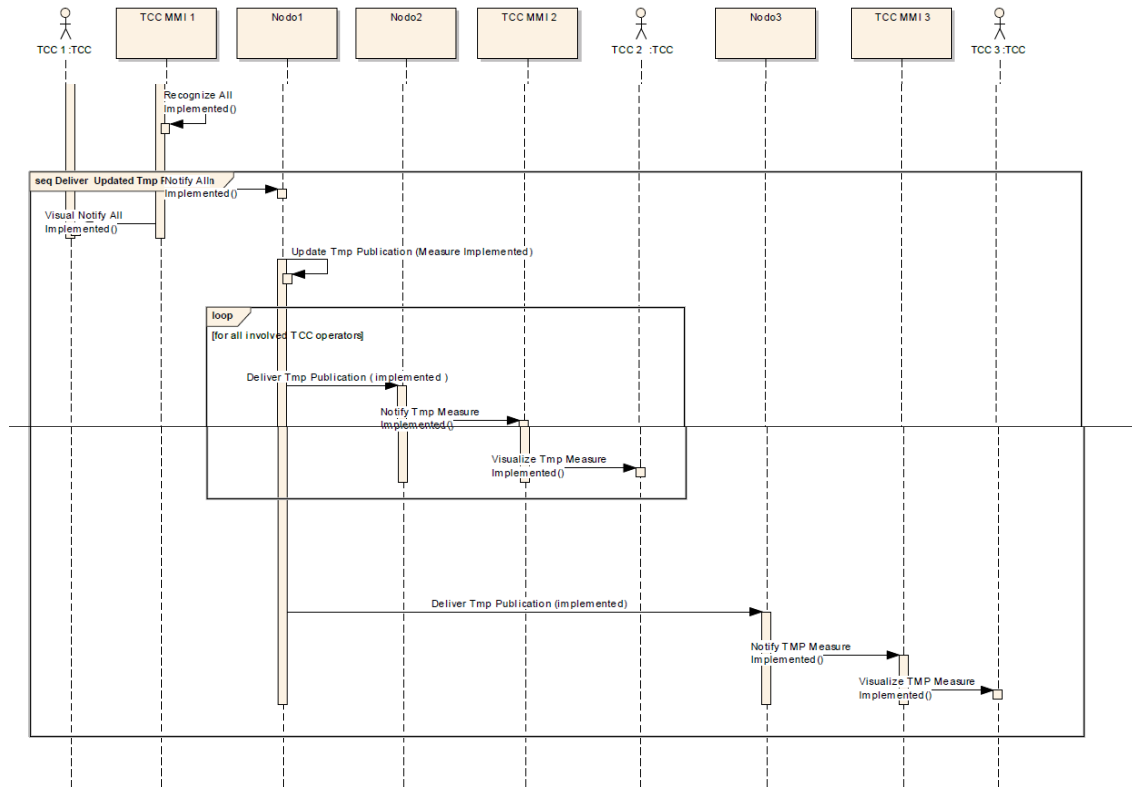
Agreed/ Approved measures have to be implemented from all cooperating centres / Road Operators and Authorities. Implementation Feedback are collected by the Coordinator Node.



### OVERALL MEASURE RUNNING

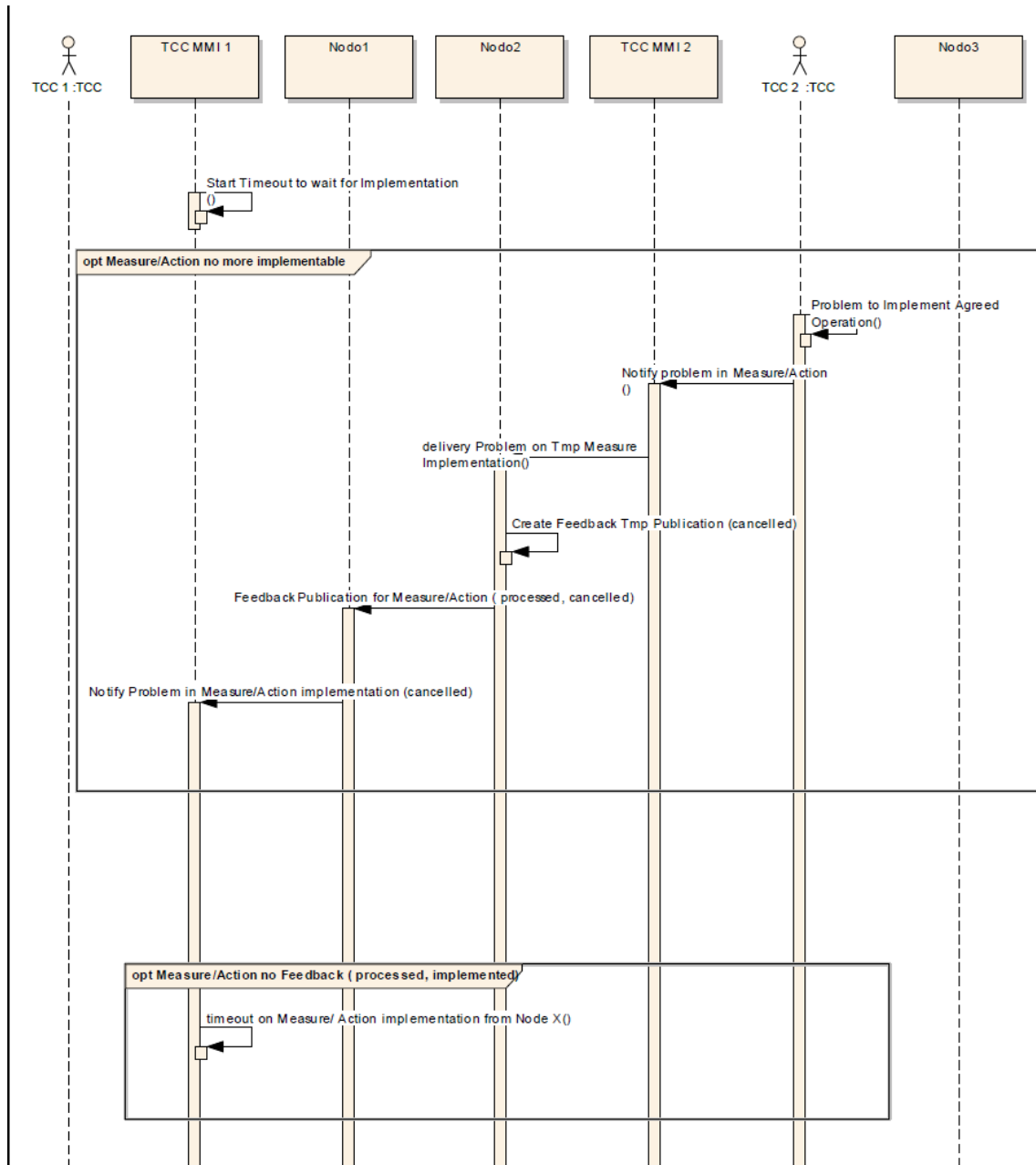
A State update is delivered after completion to all nodes via TMP Publication.

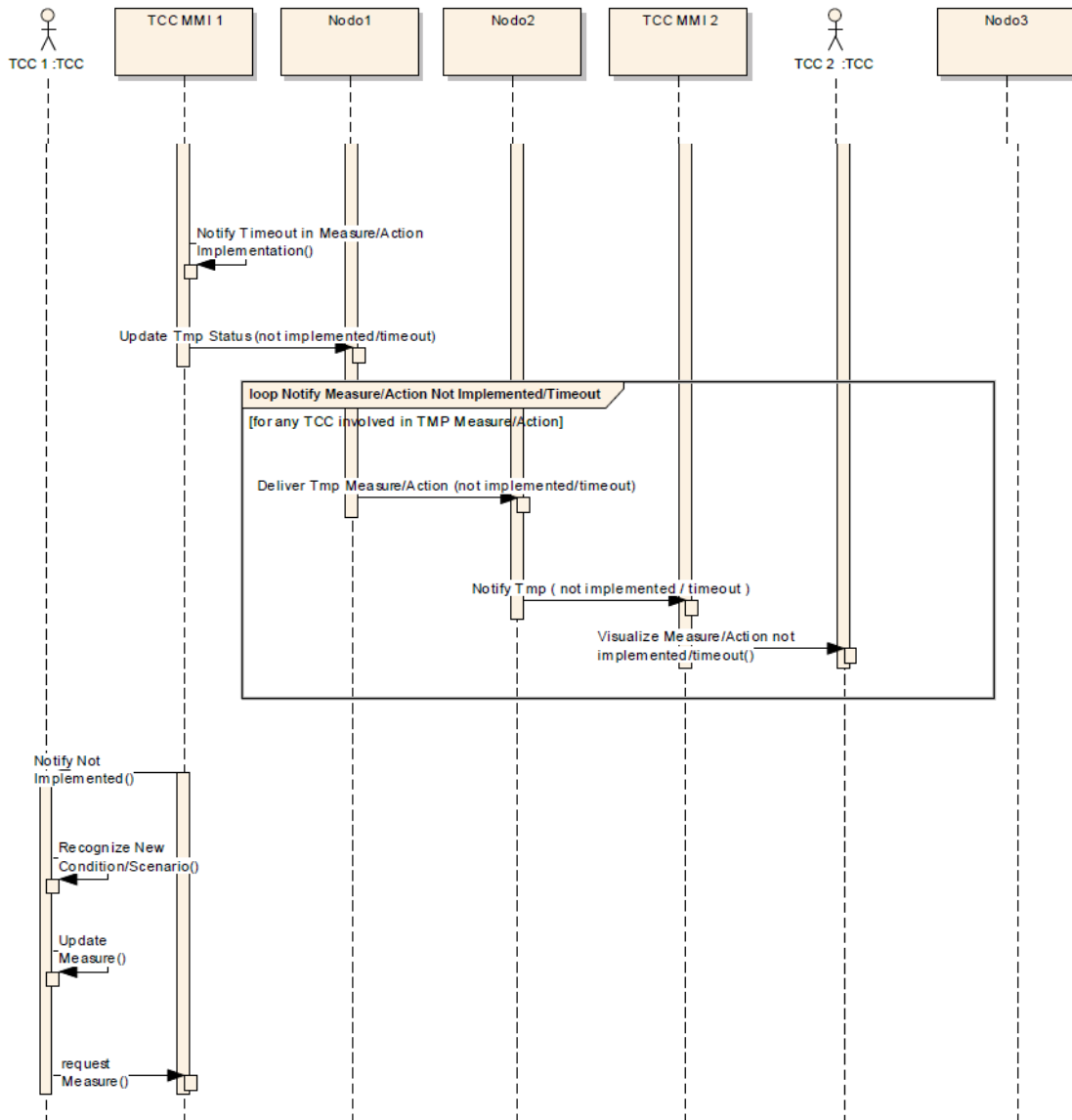
This is the last step of a TMP activation lifecycle, all operators have implemented all necessary actions and the Overall Measure is up and running.



After this step as there will be any evolution of Condition and any need for further Measure implementation arise, a new Scenario will be recognized and the consequent Overall Measure will be claimed. This Further TMP evolution can be managed by the same Coordinator which initiated the previous one, or by any other nodes in the DATEX II Network cooperating for TMP Management.

In case the Measure is not implemented as one or more nodes are not able to implement their related measures/actions this condition is notified the Coordinatore Node and there has to be managed as a new Scenario has arised or passing Control to a Higher Hierarchy node.







## 4. NOT PREDEFINED OPERATIONS

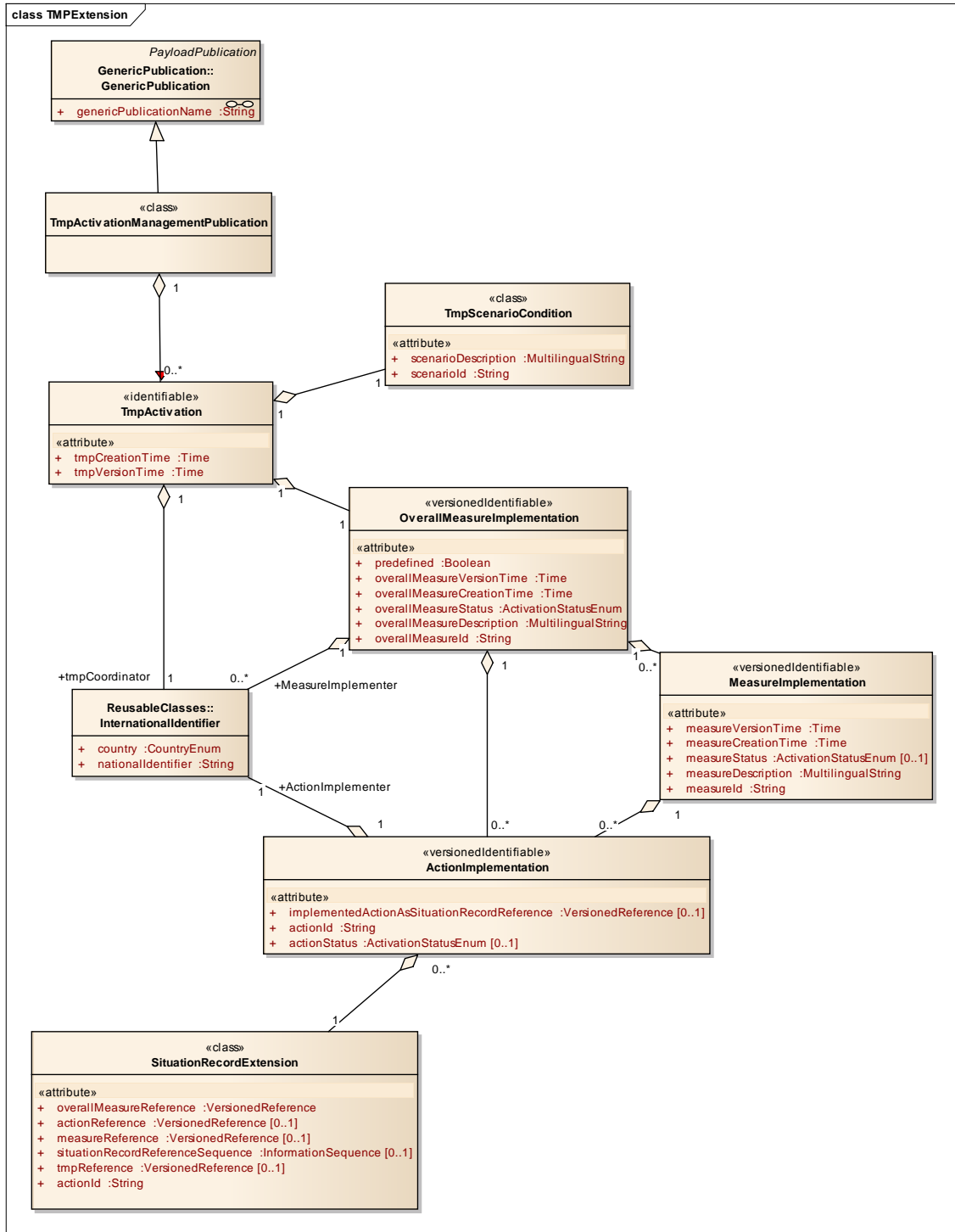
### Introduction and definitions

There could be in some organizations the need for one node to request other nodes for not Predefined Operation. Compared to Predefined TMP these are to be considered the same as Overall Measures, Measures or Actions in TMP management, only that these are not predefined.

For example a frequent requirement for this is to ask for not predefined messages to be displayed by VMS for special circumstances, such as unusual major events, urban information, etc.

This can be managed in the model by adding a boolean attribute “Predefined” to the Overall Measure and allowing the Actions to be addressed as Situation Record by association to the SituationRecordExtended class.

The user need for VMS Messages management can be implemented in the model issuing for each action a VMSSetting Situation Record information, one record for each VMS to set.



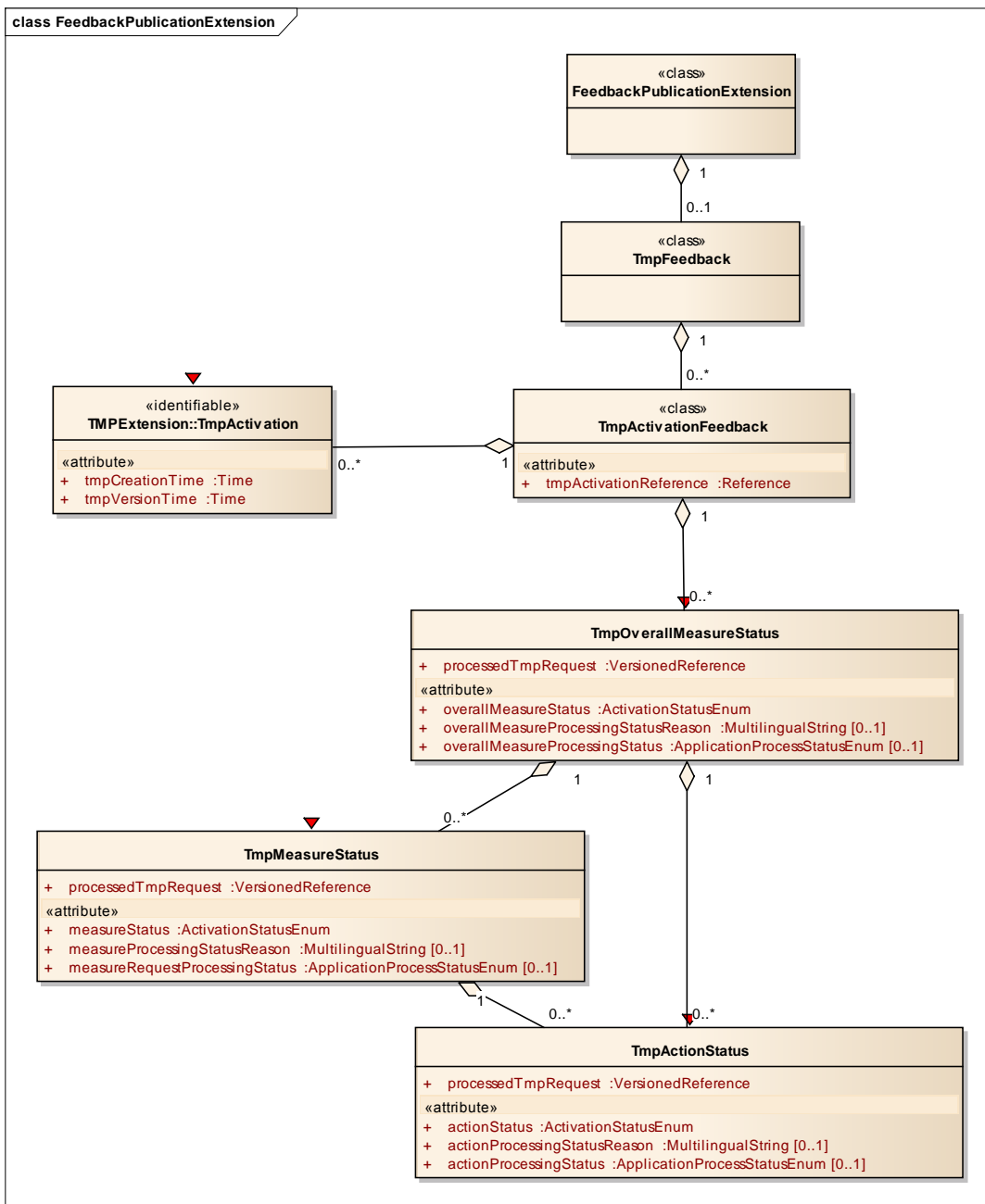
## General Workflow management

The workflow follows the same concepts as the predefined TMP management.

In case there is a rejection we can also imagine that some modification of Message may be asked/submitted from the recipient node back to the Coordinator / Proposing Node.

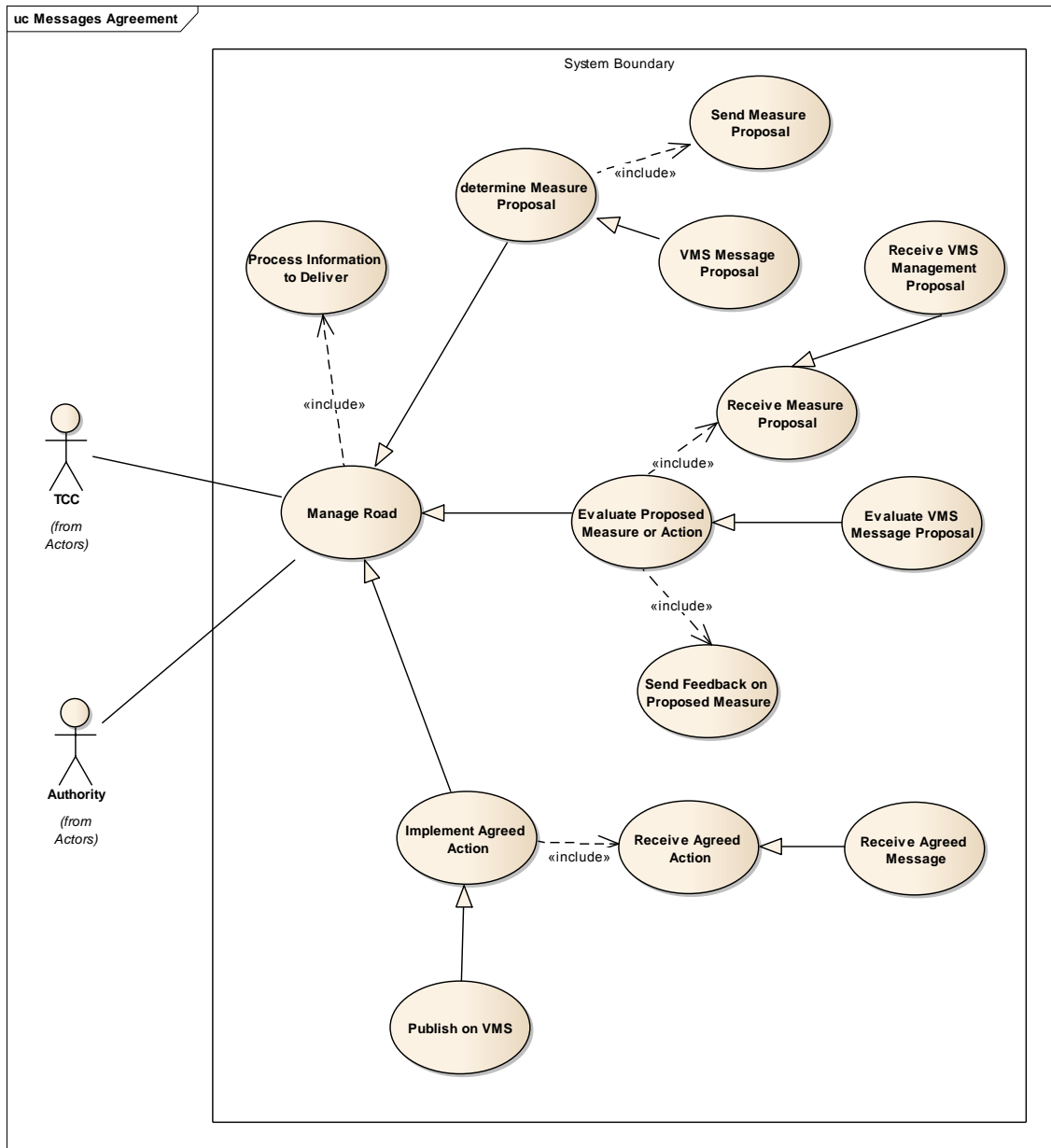
In such cases we allow in the Feedback publication to include TMPActivation information returning back to the proposing node an update of the initial request that has been de facto "Rejected" but it could be reissued following the node Feedback..

Such individual feedback from one node, as well as from each other ones involved, can be managed by the coordinator node accepting updated proposals and issuing again a new request to all nodes involved in Measure Management with the requested modification.





The reference use case that extends the General TMP Management for VMS Messages management is as follows.





## 5. REFERENCE DOCUMENTATION

1	<p>TMP Deployment Guidelines</p> <p>EW-TMS-DG07_TrafficManagementPlan_01-02-00.pdf</p> <p><a href="http://www.easyway-its.eu/deployment-guidelines/">http://www.easyway-its.eu/deployment-guidelines/</a></p>
2	<p>Italian Motorway study on “Data Exchange for TCC in Italy”</p> <p>“Prospettive dello Scambio Dati fra Centri di Controllo Traffico in Italia”</p> <p>ScambioDatiCCT-IT-V1.0.docx ( IT language only ) available on request to fpaoletti@autostrade.it</p>
3	<p>Presentation on High Impact Emergency Situation VMS Management in Italy</p> <p>“Management of VMS in Emergency Situation among Motorway operators in Italy.”</p> <p>DATEX User Forum 2012 – F. Paoletti Autostrade Tech S.p.A.</p> <p><a href="http://www.datex2.eu/user-forum/2012/duf_2012_p4_vms_management.pdf">http://www.datex2.eu/user-forum/2012/duf_2012_p4_vms_management.pdf</a></p>
4	<p>ES-FR proposal for TMP Management</p> <p>“Draft DTX2 and TMP 0.6.doc”</p> <p>( available to DATEX ESG2 TG )</p>
5	<p>VMS publication</p> <p>presentation for DATEX User Forum 2011 - F. Paoletti Autostrade per l'Italia S.p.A.</p> <p><a href="http://www.datex2.eu/user-forum/1_Paoletti_VMS.pdf">http://www.datex2.eu/user-forum/1_Paoletti_VMS.pdf</a></p>
6	<p>DATEX 2 VMS extension on DATEX 2 website and 2.* embedded VMS extension</p> <p><a href="http://www.datex2.eu/content/vms-publication-extension">http://www.datex2.eu/content/vms-publication-extension</a></p>
7	<p>DATEX 2 “VMS Operational Exchange and TMP Management” Extension</p> <p>Enterprise Architect model referring the Data Model Implementation for the current extension available at Enterprise Architect model referring this Data Model Implementation available at <a href="http://www.datex2.eu/d2-extension">http://www.datex2.eu/d2-extension</a></p>
8	<p>DATEX “VMS Operational Exchange and TMP Management” workflow model</p> <p>Enterprise Architect model referring Workflow Implementation for TMP reporting the Sequence Diagrams and Use Cases available at <a href="http://www.datex2.eu/d2-extension">http://www.datex2.eu/d2-extension</a></p>