TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

FINAL DRAFT
FprCEN/TS 15531-5

November 2010

ICS

English Version

Public transport - Service interface for real-time information relating to public transport operations - Part 5: Functional service interfaces - Situation Exchange

Service d'échanges de données temps réel pour le Transport en Commun - Partie 5: interfaces de service fonctionnel - Echanges de perturbation structurés (causes et conséquences détaillées)

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Ref. No. FprCEN/TS 15531-5:2010: E

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Foreword

This document (FprCEN/TS 15531-5:2010) has been prepared by Technical Committee CEN/TC 278 “Road transport and traffic telematics”, the secretariat of which is held by NEN.

This document is currently submitted to the Formal Vote.

This document describes the SIRI Situation Exchange service, one of a modular set of services for the exchange of Real-time information. The Situation Exchange service (SIRI-SX) is concerned with the exchange of planned events and unplanned incident data among systems, including incident capture, real-time management and dissemination systems.

The SIRI Situation Exchange service (SIRI-SX) is an additional functional service based on the European Technical Specification known as "SIRI" − Service Interface for Real-time Information. SIRI provides a framework for specifying communications and data exchange protocols for organisations wishing to exchange Real-time Information (RTI) relating to public transport operations.

The specification for the base SIRI framework on which SIRI-SX is built is presented in three parts:

a) context and framework, including background, scope and role, normative references, terms and definitions, symbols and abbreviations, business context and use cases (SIRI Part 1: CEN/TS 15531-1);

b) the mechanisms to be adopted for data exchange communications links (SIRI Part 2: CEN/TS 15531-2);

c) data structures for a series of individual application interface modules (SIRI Part 3: CEN/TS 15531-3):

    1) Production Timetable (SIRI-PT);

    2) Estimated Timetable (SIRI-ET);

    3) Stop Timetable (SIRI-ST);

    4) Stop Monitoring (SIRI-SM);

    5) Vehicle Monitoring (SIRI-VM);

    6) Connection Timetable (SIRI-CT);

    7) Connection Monitoring (SIRI-CM);

    8) General Message (SIRI-GM).

Additional documents are used for additional functional services, to date these are:

— **Facilities Management (SIRI-FM)** service is used to exchange information on the current status of facilities such as lifts, escalators or ticketing machines. It provides a short description of the facility itself, expresses any change to its operational status and specifically the accessibility status for the disabled or those with special needspeople. It provides all the current relevant information relating to all facilities fulfilling a set of selection criteria (Part 4: prCEN/TS 15531-4).

— **Situation Exchange (SIRI-SX):** this document. The SIRI Situation & Incident Exchange service is used to exchange information messages between identified participants in a standardised structured format suitable for travel information services. It enables messages to be sent and to be revoked (Part 5: FprCEN/TS 15531-5, this document).

The XML schema can be downloaded from http://www.siri.org.uk/, along with available guidance on its use, example XML files, and case studies of national and local deployments. The SIRI-SX service is included in version 1.3 of the schema onwards.

Introduction

Public transport services rely increasingly on information systems to ensure reliable, efficient operation and widely accessible, accurate passenger information.

Well-defined, open interfaces have a crucial role in improving the economic and technical viability of Public Transport Information Systems of all kinds. Using standardised interfaces, systems can be implemented as discrete pluggable modules that can be chosen from a wide variety of suppliers in a competitive market, connecting diverse systems; rather than as monolithic proprietary systems from a single supplier. Interfaces also allow the systematic automated testing of each functional module, vital for managing the complexity of increasing large and dynamic systems. Furthermore, with a well defined, version interface, individual functional modules can be replaced or evolved, without unexpected breakages of obscurely dependent function.

The SIRI framework is a European Technical Specification that provides a specification for a number of functional interfaces that allow public transport data of specific types to be exchanged readily using structured interfaces.

This further European Technical Specification specifies an additional SIRI functional service to exchange incident and event information about disruptions to public transport between servers containing real-time public transport vehicle or journey time data. These include the control centres of transport operators as well as information systems that deliver passenger travel information services.

1 Scope

The SIRI Situation Exchange service (SIRI-SX) allows the efficient exchange of data about Situations caused by planned and unplanned incidents and events and is intended to support the use cases identified in Annex C. Situations are actual or potential perturbations to normal operation of a transport network. The SIRI-SX service uses the common SIRI communication framework and services which are described in CEN/TS 15531-1 and not repeated in this document.

The Situation Exchange service has a rich Situation model, allowing a structured description of all aspects of multimodal travel Situations, including cause, scope, effect and rules for distribution to an audience. The structured values enabling computer based distribution through a wide variety of channels, and the presentation of data in different formats for different device and different audiences. The Situation Exchange Service allows the exchange of incident and event information between, amongst others:

— Control centres;

— Operations Staff;

— Public Information systems;

— Alert systems and personalised alert systems;

— UTMC systems;

— Journey planners;

— AVMS (Automatic Vehicle Management Systems).

SIR-SX uses a network model based on the CEN Transmodel conceptual model for Public Transport networks, schedules and operations, along with the CEN Identification of Fixed Objects in Public Transport (IFOPT) model for describing physical transport interchanges.

The Situation Exchange service is envisaged as a 'back office' capture and exchange service that will feed other public facing travel information dissemination systems in particular those using the TPEG format. Transport Protocol Expert Group (TPEG) is a European Broadcasting Union fostered standard for broadcasting travel data over Digital Assisted Broadcasting (DAB) radio and other channels. To this end, the SIRI-SX situation classification model has been harmonised as far as possible with that of TPEG and DATEX2 so that full interoperability can be achieved. Uses of structured elements from TPEG, for which translations already exist in most European languages, also facilitates human readability in different national languages. Maintaining and improving a harmonisation with TPEG will be a continuing objective. In addition to the TPEG exchangeable content, SIRI-SX messages contain additional structured information which allows them to be processed in additional ways.

Situation and computer systems and applications are typically *distributed*, that is information will be captured on one system and exchanged with others for dissemination and further processing. This means that a message design is needed that allows the management of the identity of distributed messages over time and across different systems, so that subsequent updates to a Situation can be reconciled by different systems over a network, and obsolete messages can be retired automatically. The SIRI-SX situation model is designed to support the distributed management of Situations.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CEN/TS 15531-1:2007, *Public transport — Service interface for real-time information relating to public transport operations — Part 1: Context and framework*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CEN/TS 15531-1:2007 and the following apply.

NOTE In accordance with Transmodel conventions, capital letters are used to indicate conceptual model entities from Transmodel, for example VEHICLE JOURNEY, STOP PLACE, etc., and also those from IFOPT and SIRI. Later in this document, the names of classes and attributes expressing these entities in the UML diagrams and the XML schema are shown in Upper Camel Case, e.g. ***VehicleJourney***. Note all conceptual entities are expressed as classes and not all concrete classes and attributes relate directly to a conceptual entity.

3.1
Access Space – IFOPT
passenger area within a STOP PLACE such as a concourse or booking hall, immigration hall or security area that is accessible by pedestrians, but without a direct access to vehicles

NOTE Direct access to a VEHICLE is always from a QUAY and/or BOARDING POSITION. An ACCESS SPACE may be a Room, Hall, Concourse, Corridor, or bounded open space within a STOP PLACE.

3.2
Accessibility – IFOPT
possibility of a user with a specific USER NEED, such as a disability or encumbrance, to access either fixed or moving Public Transport facilities

3.3
Accessibility Assessment – IFOPT
ACCESSIBILITY characteristics of an entity used by PASSENGERs such as a STOP PLACE, or a STOP PLACE COMPONENT

NOTE Described by ACCESSIBILITY LIMITATIONs, and/or a set of SUITABILITies.

3.4
Accessibility Limitation – IFOPT
categorisation of the mobility characteristics of a STOP PLACE COMPONENT such as a STOP PATH LINK or ACCESS SPACE to indicate its ACCESSIBILITY by mobility constrained users, for example those needing wheelchair access, step-free access or wanting to avoid confined spaces such as lifts

NOTE A small number of well-defined categories are used that are chosen to allow the consistent capture of data and the efficient computation of routes for different classes of user.

3.5
Affects Scope – SIRI-SX
scope of a SITUATION ELEMENT or consequence of a SITUATION ELEMENT in terms of the specific entities such as OPERATORs, NETWORKs, LINEs, SCHEDULED STOP POINTS, STOP PLACES, PLACEs, etc that are affected

3.6
Base Situation Element – SIRI-SX
original record of a particular SITUATION

NOTE This may subsequently be followed by UPDATE SITUATION ELEMENTs that record further changes.

3.7
Boarding Position – IFOPT
location within a QUAY from which passengers may directly board, or onto which passengers may directly alight from, a PT vehicle

3.8
Connection Link – Transmodel
physical (spatial) possibility for a passenger to change from one public transport vehicle to another to continue a trip

NOTE Different transfer times may be necessary to cover interchange over a given connection link, depending on the kind of passenger.

3.9
Consequence – Trident
outcome of a SITUATION

3.10
Control Action – Transmodel
action resulting from a decision taken by the controller causing an amendment of the operation planned in the PRODUCTION PLAN

NOTE For SIRI-SX, CONTROL ACTIONs may often give rise to a SITUATION, but are entirely distinct concepts.

3.11
Direction – Transmodel
classification for the general orientation of ROUTEs

NOTE In IFOPT the DIRECTION may be an important aspect of a PATH LINK that may only be traversed one way.

3.12
Easement – SIRI-SX
temporary permission to use a ticket purchased for use of a transport service on a different travel product because the original service has been disrupted

EXAMPLE To use a bus instead of the metro.

3.13
Level – IFOPT
identified storey (ground, first, basement, mezzanine, etc.) within an interchange building on which STOP PLACE COMPONENTs reside

NOTE A STOP PATH LINK may connect components on different levels.

3.14
Local Service – IFOPT
named service relating to the use of the STOP PLACE or transport services at a particular location, for example porterage, assistance for disabled users, booking offices, etc.

NOTE The service may have a VALIDITY CONDITION associated with it. A LOCAL SERVICE is treated as a form of non-material EQUIPMENT.

3.15
Location – Transmodel
position of a POINT with reference to a given LOCATING SYSTEM (e.g. coordinates)

3.16
Operator – Transmodel
organisation in charge of the operation of some or all transport services within a particular area

3.17
Passenger Accessibility Assessment – IFOPT
categorisation of the ACCESSIBILITY characteristics of a PASSENGER to indicate their requirements for ACCESSIBILITY

NOTE For example that are unable to navigate stairs, or lifts, or have visual or Auditory impairments. PASSENGER ACCESSIBILITY TYPE corresponds to one or more ACCESSIBILITY LIMITATIONs, allowing the computation of paths for passengers with constrained mobility. For example, Wheelchair, No Lifts, No Stairs.

3.18
Place – Transmodel
geographic location of any type which may be specified as the origin or destination of a trip

NOTE 1 A PLACE may be of dimension 0 (a POINT), 1 (a road section) or 2 (a ZONE).

NOTE 2 In IFOPT a PLACE may be of dimension 3 and be further associated with a LEVEL.

3.19
Plannedevent – SIRI-SX
cause of a SITUATION that is known about in advance

NOTE 1 It will have a known start and likely end time.

NOTE 2 In SIRI-SX this is recorded as an attribute of a general purpose incident description.

3.20
Publishing Action – SIRI-SX
part of SITUATION ELEMENT content that contains guidance as to how the SITUATION should be disseminated

3.21
Quay – IFOPT
place where passengers have access to PT vehicles, such as a platform, stance, or quayside

NOTE 1 A QUAY may serve one or more VEHICLE STOPPING PLACEs and be associated with one or more STOP POINTS.

NOTE 2 A QUAY is a recursive structure that may contain other sub QUAYs. A child QUAY must be physically contained within its parent QUAY.

3.22
Reason – TPEG
classification of a SITUATION ELEMENT as being of a particular type

NOTE The nature of the REASON is likely to have implications for the duration and consequence of the SITUATION.

3.23
Route – Transmodel
ordered list of located POINTs defining one single path through the road (or rail) network

NOTE 1 A ROUTE may pass through the same POINT more than once.

NOTE 2 Each JOURNEY PATTERN may be associated with a particular ROUTE.

3.24
Situation – Trident
disruption to the planned operation of services

3.25
Situation Element – Trident
record of SITUATION STATE at particular time or over a particular period

NOTE 1 A SITUATION is represented by one or more SITUATION ELEMENTs.

NOTE 2 A SIRI SITUATION ELEMENT corresponds to a DATEX2 'Situation Record'.

3.26
Situation Identifier – SIRI-SX
unique identifier of a SITUATION ELEMENT made up of several parts, the Country code, Participant Code, Situation Number and Version number

3.27
Scheduled Stop Point – IFOPT
POINT in a journey where passengers can board or alight from vehicles

NOTE SCHEDULED STOP POINT refines the primary Transmodel sense of a STOP POINT, which is that of the logical stop point within a scheduled journey, rather than a physical point in the infrastructure where boarding and alighting, may take place, for which the terms for specific STOP PLACE COMPONENTS such as QUAY or BOARDING POSITION are used. Although the same identifiers are often used for both SCHEDULED STOP POINT and STOP PLACE COMPONENT, a practice which provides significant benefits for data management, they nonetheless represent distinct concepts. A STOP POINT ASSIGNMENT is used to associate a SCHEDULED STOP POINT with a STOP PLACE COMPONENT.

3.28
Stop Place – IFOPT
place comprising one or more locations where vehicles may stop and where passengers may board or leave vehicles or prepare their trip

NOTE A STOP PLACE will usually have one or more well known names.

3.29
Stop Point – Transmodel
POINT where passengers can board or alight from vehicles

3.30
Suitability – IFOPT
whether a particular facility such as a STOP PLACE COMPONENT or VEHICLE can be used by a passenger with a particular USER NEED

3.31
Transport Mode – Transmodel
characterisation of the operation according to the means of transport (e.g. bus, tram, metro, train, ferry, ship)

3.32
Traffic Element – Datex2
type of Datex2 Situation Record (i.e. Situation Element) used to describe a road situation

3.33
Update Situation Element– SIRI-SX
record of a change to a particular SITUATION, originally established by a BASE SITUATION ELEMENT

3.34
Unplanned Incident – SIRI-SX
cause of a SITUATION that is not known about in advance

3.35
User Need – IFOPT
ACCESSIBILITY requirement of a PASSENGER

NOTE For example, that they are unable to navigate stairs, or lifts, or have visual or auditory impairments.

3.36
Validity Condition – Transmodel
condition used in order to characterise a given VERSION of a VERSION FRAME

NOTE A VALIDITY CONDITION consists of a parameter (e.g. date, triggering event, etc.) and its type of application (e.g. for, from, until, etc.).

3.37
Vehicle Journey – Transmodel
planned movement of a public transport vehicle on a DAY TYPE from the start point to the end point of a JOURNEY PATTERN on a specified ROUTE

4 Symbols and abbreviations

The common symbols and abbreviations used in the SIRI document set are presented in CEN/TS 15531-1. In addition the following terms are used:

— DATEX2 Data Exchange Version 2

— EBU European Broadcasting Union

— ICS Incident Capture System

— QoS Quality of Service

— TPEG-PTI Transport Protocol Experts Group Public Transport Information

— SIRI-SX SIRI Situation Exchange

— SIRI-FM SIRI Facilities Management

5 Situations as Software Entities

5.1 General

In a travel information system, 'Situations' are data objects describing an incident, typically an unplanned event such as a disruption, but also planned events that affect public transport or its use, such as engineering works, or major public events that will affect use of transport. They will be captured and recorded on one system and then be transmitted to other systems to convey information about the current status to travellers and to transport operator staff. Those other systems will need to transform the data to suit different delivery channel requirements. At any time, further developments may occur that need to be represented by updates to the original Situation (or as further related Situations), and a distributed situation model must allow for the propagation and reconciliation of these changes across systems.

To support distributed processing of Situations a number of basic principles need to be followed:

— use of a rich **structured Situation** representation that can be emitted in standards compliant renderings such as the European Broadcasting Union (EBU) Transport Protocol Experts Group (TPEG) specification;

— assignment of a persistent **Identity** to Situations within a global namespace; so they may pass into and out of different systems and still be matched with previous instantiations;

— use of **write-only updates** suitable for store and forward processing in a distributed environment;

— use of a **lifecycle model** with well defined edit-version-release states;

— use of well defined data reference systems. SIRI-SX uses a conceptual model for the scope of the application domain − Public Transport Situations − based on open standards (CEN Transmodel), allowing the sharing of references with other Transmodel based systems and services.

We elaborate on these below.

5.2 Structured Situations

A Situation object needs to be both machine readable and human readable (see Figure 1). To be machine readable requires a set of structured elements with precise meaning as to the nature and scope of the Situation, in particular as to its temporal and network scope (indicated by a location model) and its categorisation that can be interpreted by agents such as station displays, journey planners and alert engines. To be human readable, the Situation must be renderable on different devices in different formats as a textual and graphic representation that a human can understand. The text may be generated automatically from the structured elements, be explicitly encoded, or both.

The Situation must also include identity and cross- referencing information that can be used to track its progress across different systems.

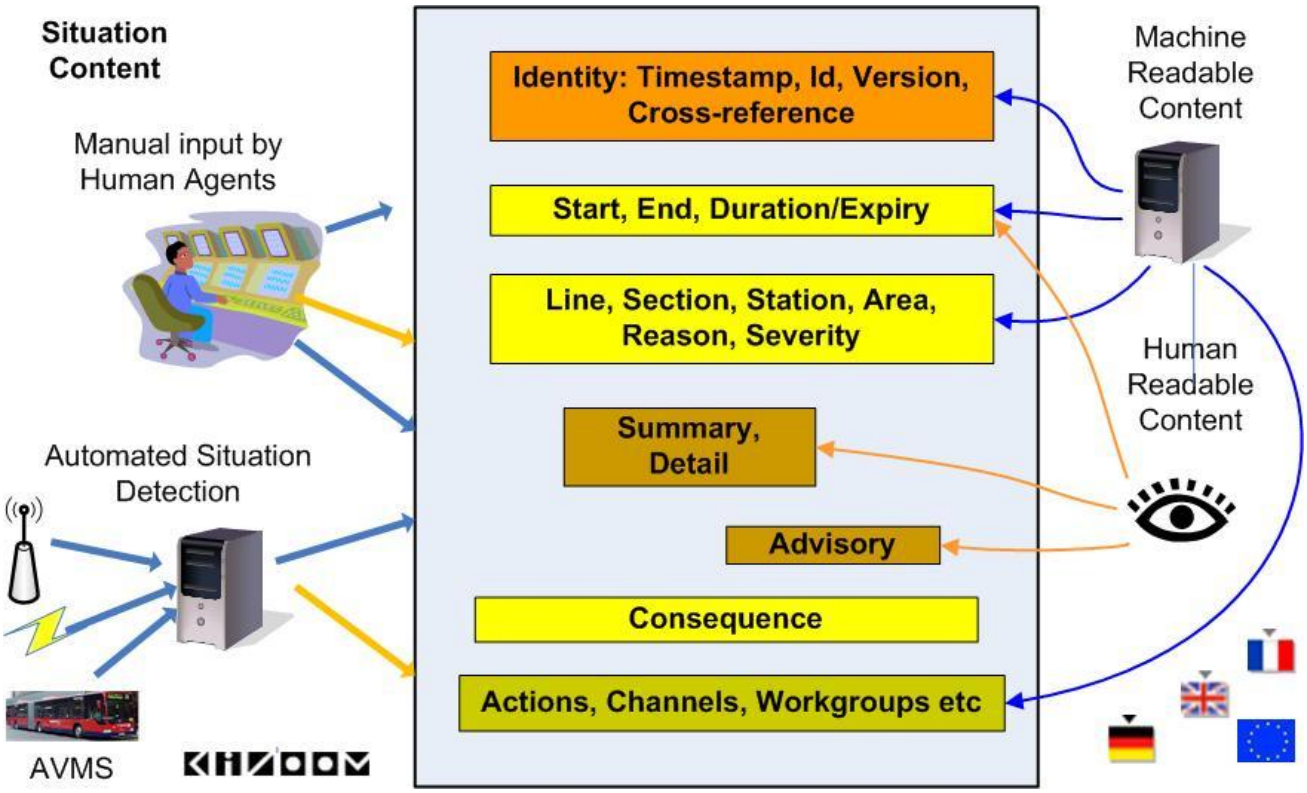

Figure 1 — Situation Structure elements

The actual structured Situation model needs to have components to describe its import, including:

— **Identity**: elements to identify and manage the situation and its components;

— **Cross-reference**: elements to relate the situation to other situations to which it is related;

— **Audit**: elements to identify the source of the situation;

— **Situation body**: elements – a set of structured details characterising the nature and processing of the situation, including its current status, **scope** of effect, **classification**, human readable **description**, consequence and suggested **distribution**.

5.3 Distributed Situation processing

5.3.1 Identity and Write-Only Updates

A distributed situation data model represents situations as information objects that may be distributed over many different systems, typically being created on one system and then displayed and sometimes augmented by others. Distributed systems raise considerations of identity and concurrency of data objects.

A particular case in point arises when the same Situation may reach a particular dissemination system via different routes; in which case the consumer needs to be able to establish that the data refers to the same event and not two different instances of a similar event. The same Situation may also return to the originating system and need to be recognized as a known Situation and not a new instance.

In order for updates to be propagated and reconciled in a distributed processing environment, a unique persistent identity must be maintained across these systems for the Situation and its updates, and there must be a means of identifying the most recent content. This makes it possible for different systems to recognize repeated references to the same Situation.

A unique identifier allows the tracking and reconciliation of updates to a given situation that has been recognised as a specific single event and is being managed as such. A more complicated question of recognition of similarity and identity reconciliation arises from the fact that a real world disruption may give rise to a number of separate Situation Objects on different systems, with different unique identifiers. These may be subsequently recognized as related and consolidated Cross-referencing mechanisms are needed to allow this to be represented in the data. Both human and computer aided processes may be used to undertake the recognition and consolidation.

A distributed processing model also raises questions of currency – how does a consumer system determine which is the latest information about a situation? What should a dissemination system do if the communication link is lost? How can one distinguish between absence of information and absence of information service? Typically both metadata and built-in mechanisms such as heartbeats are needed to address this need. Synchronisation to a universal clock is also necessary.

Figure 2 illustrates the store and forward processing typical of Situation handling whereby Situations and updates reach downstream systems via number of different routes with different intermediate steps. Each system holds its own representation of a situation model and *it is only the situation element* (i.e. an account of changes to the situation), *and not the situation itself which is exchanged.*

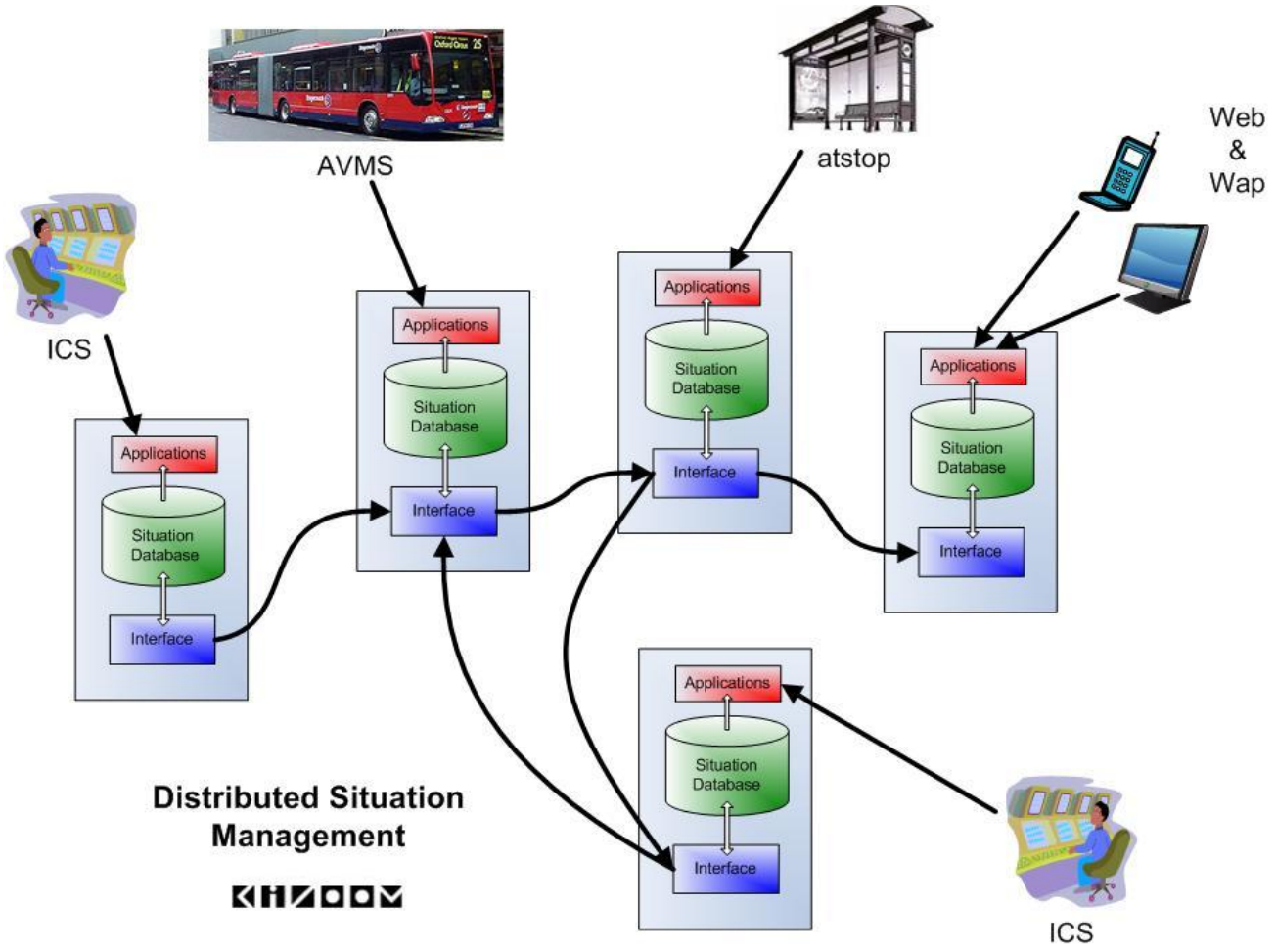

Figure 2 — Distributed Message Management

5.3.2 Currency and the Situation Life Cycle

Situations typically undergo a life cycle that will take them from initial capture as a new live situation, through additional verification and dissemination stages, followed possibly by one or more updates, and finally closure. However, as soon as a representation of a situation exists in more the one incident management system (perhaps even on the same computer), each of which might wish to make further updates to the Situation content, issues of coordination arise. How do changes get propagated and reconciled?

Furthermore, there is often also a need to maintain an exact audit trail of the information flow in incident management systems, recording when each update was entered into the system, along with data about where it came from. This can be used both to improve operational processes, and to monitor adherence to operating procedures and performance targets.

Another consideration is that the communication links are potential points of failure, so the system must allow for efficient resynchronisation after loss of connection, as well as allowing consumer systems to make suitable judgements as to the continued currency of Situations during a prolonged interruption.

Together these considerations lead to the need for a "write-only" content model which uses a formal edit-version-release process to progress an initial situation and its updates through a managed lifecycle.

This lifecycle occurs at two levels: a "macro" level progression of the overall situation, and a "micro" level of the individual updates to the situation.

5.3.3 Representational model for Situation Elements

Figure 3 shows a fundamental UML class model for representing distributed situation elements as a conceptual model. A Situation comprises one or more Situation Element instances. In effect there are two types of Situation Element object; the original **base** Situation Element, then one or more **update** Situation Element updates.

Both types of element undergo an edit-version-release process to control their use; this is marked by a versioning time: for an element in draft the time is empty. Once populated, the Situation element is considered fixed.

In SIRI-SX, as in TPEG and other incident management systems, we model the relationship between base and updates by allocating a unique **situation number** that is common to both base and update entities, and use a **version number** to distinguish each further update. Numbers are unique within participant – each of whom has a unique identifier within country. This means that we can group a base situation element and its updates simply by their common identifier parts, and can exchange an update independently of the base situation and without explicitly referencing all previously known updates.

To indicate a relationship with a completely separate situation element of a different Situation, an element may also contain one or more ***RelatedSituation*** references that link the Situation element with other Situation elements; in this case the association is explicit.

Note that the model in principle allows updates for the same situation to be created on more than one system if desired. This can give rise to branches in the update chain. It is up to a given consumer system to serialise and reconcile all the updates it has available in order to arrive at a consolidated view of a given Situation (see discussion of branching below).

The model allows for different types of **situation body** to be used to for **public transport** and for **road** related situations (which typically have different properties). SIRI-SX is primarily concerned with PT situations that affect the PT network and services described by the other SIRI services, but to support interoperability with Datex2 can also embed a Datex2 Traffic Element.

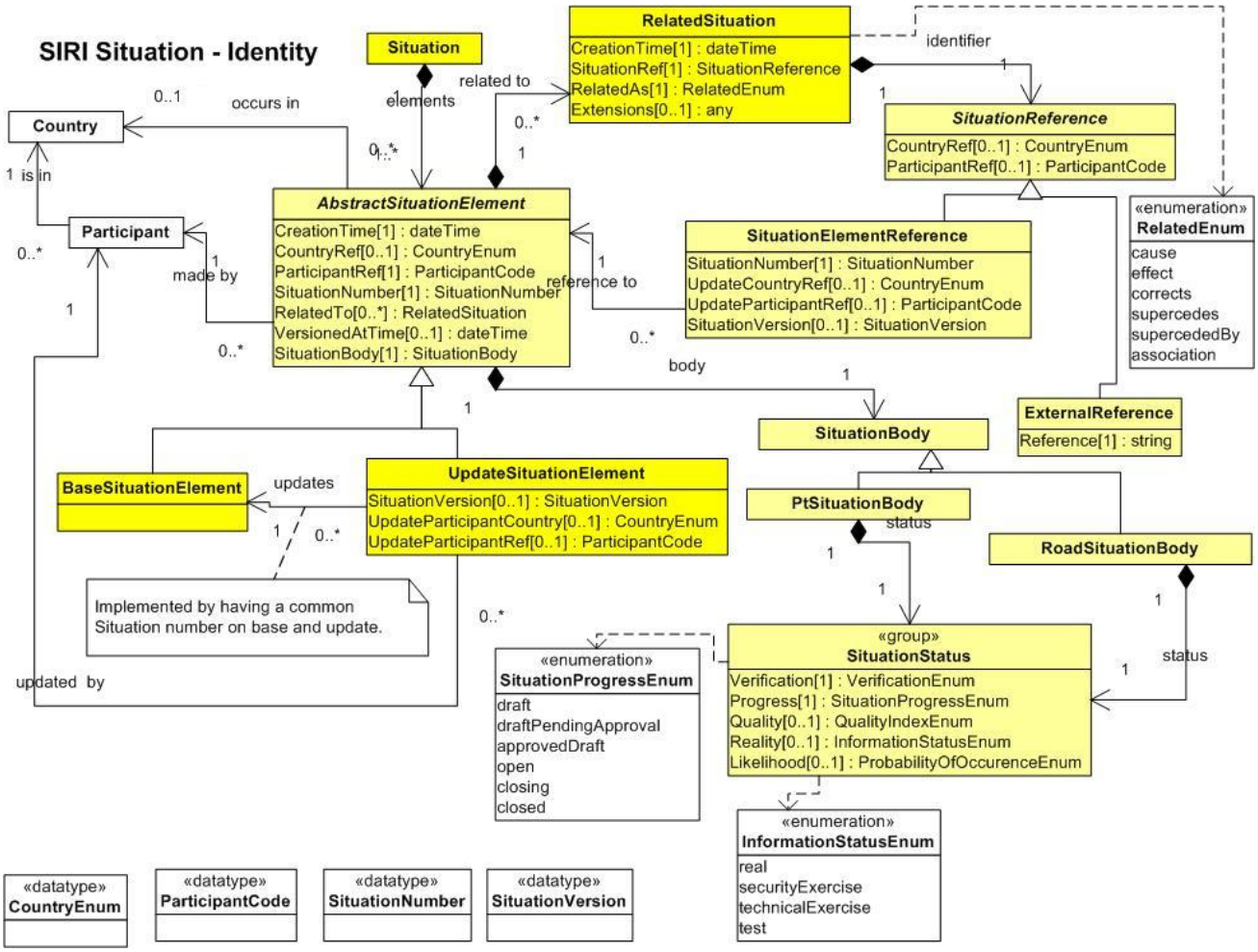

Figure 3 — UML Diagram of Situation Identity Elements

5.3.4 Update chains − Causal chains

A Situation may thus be represented as a successive chain of situation elements, possibly created on different systems. Figure 4 shows some object instances for situation headers that illustrate this. The base element *Sit00987* and update versions *Sit00987-01* and *Sit00987-02* are created by Participant system *TfL01*. The last update, *Sit00987-03* was created on a separate system by participant *LUL2,* and so has a separate ***UpdateParticipantRef***.

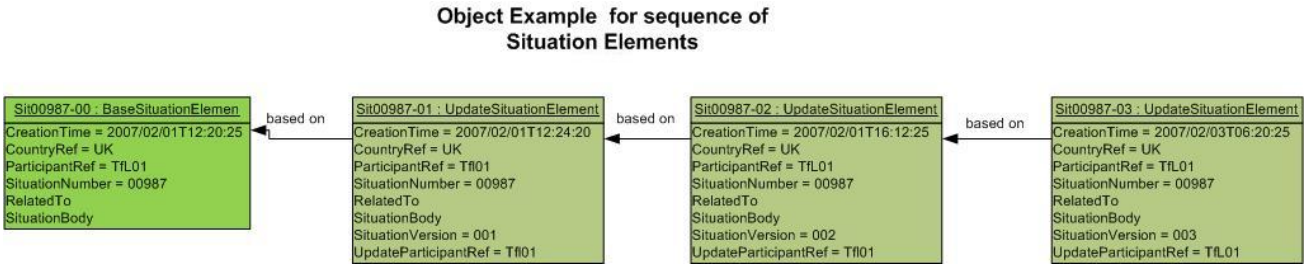

Figure 4 — Situation Instance example

Each Situation Element instance will have a Situation body associated with it (not shown). Any values specified for an attribute on an update element, e.g. a change of temporal or network scope, supersede any previous values as the current values for the Situation.

In effect, SIRI-SX exchanges the detailed history of updates to a situation. In practice, the producer and consumer systems may create additional views of the Situation representing a current consolidated view of the situation as an aggregation of the separate updates.

5.3.5 Cross-referencing Situations − Causal chains

Situation elements can include explicit references to other Situations that explain them. This allows situation threads to be merged or split into a chain of cause and effect. Adding or removing a cross reference between two different Situation element chains should follow the same edit-version-release model for other changes; i.e. to add a link between two situations requires an new Situation update element being added to the Situation that wishes to establish the reference. This allows links to be propagated to other systems.

Figure 5 shows this: an update *Sit00456-02* to situation *Sit00456* adds as one of its properties a Related to reference that associates it with *Sit00987-02* and by implication Sit00987 overall. This can be used to find earlier and later updates to *Sit00987* as well.

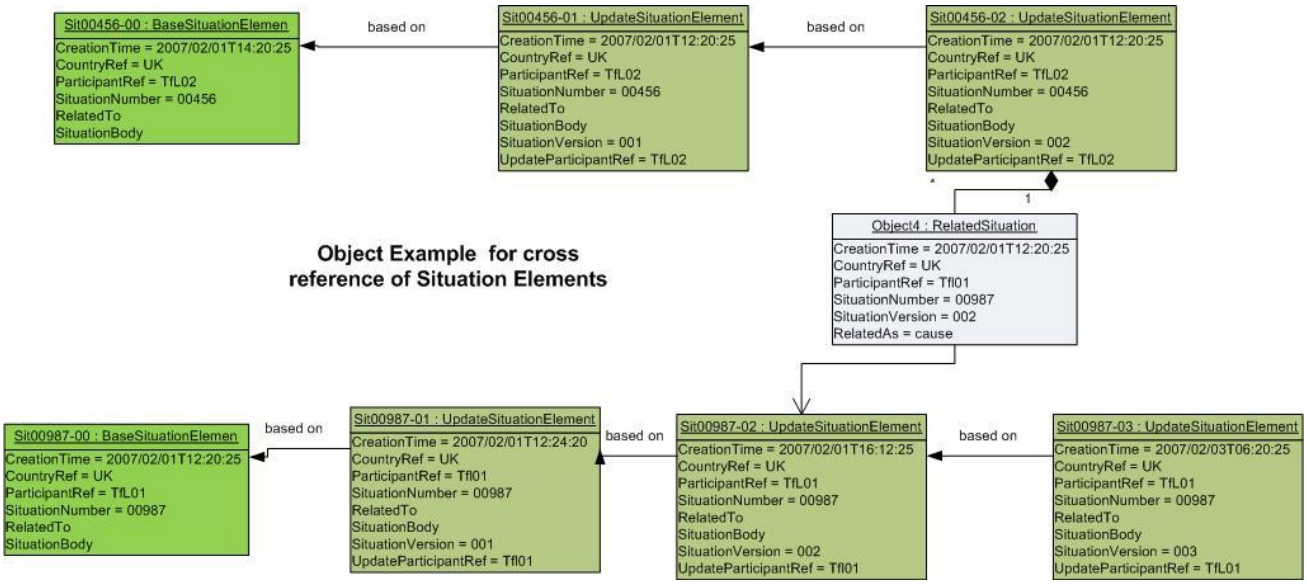

Figure 5 — Instance example − Situation cross-reference chains

5.3.6 Branching and distributed updates

5.3.6.1 General

Normally a Situation and its updates will be originated on a given computer and distributed to others. It is possible that alternative updates will be created on two different machines, giving rise to a branch in the chain of situation elements (Figure 6). In this case, if and when elements of the alternative branch are returned to the original machine (or indeed any downstream machine) it will be up to it to reconcile the two branches, either by discarding the obsolete branch, or by creating a new situation element that merges the data in to a revised update. This may be done either by a simple automated policy of using the most recent timestamp, or may be done by manual reconciliation, by an operator who chooses one or other element as more current. If there is new information unknown to the original machine then a new update will be created reconciling the branch.

It is possible as an implementation policy to constrain the creation of updates such that an update can only be created on the system on which it originated, thus avoiding branching (except by the creation of completely separate instances).

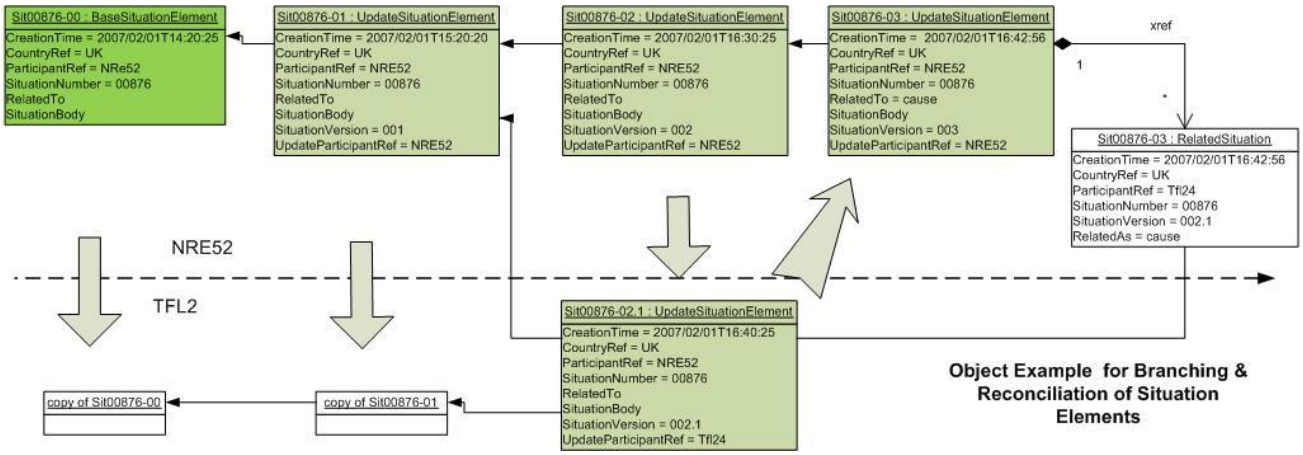

Figure 6 — Instance Example − Situation branching

5.3.6.2 Situation Element Life Cycle: Editable and Versioned States

Each Situation element starts out as an editable draft on an originating system: once capture is complete it is versioned, freezing content fields from further change, and then may be released to other systems.

Once released to other systems, if a Situation ends before its specified end time. A further update situation element may need to be distributed to rescind it.

Note that this mechanism is distinct from the version number (which may also be used to version drafts) Within a database it would be possible to save a succession of draft versions with an incrementing number, before finally saving a version with the status set to versioned.

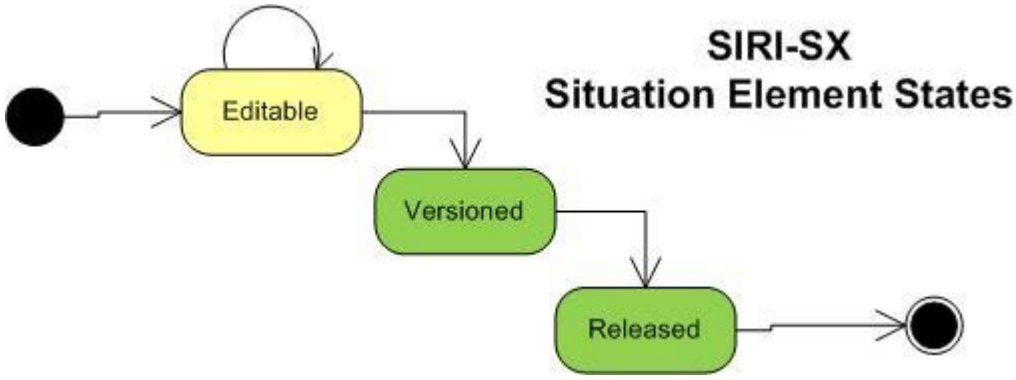

Figure 7 — Edit release cycle of an individual Situation Element

5.3.6.3 Situation Life Cycle: Situation Progress States

The overall state of a Situation progresses through a number of states (Figure 8). In a *Draft* state, the initial content of the Situation is being captured or verified. Once capture is completed, the draft may optionally be submitted to a second authority to review or approve, in which case it will pass through *PendingApproval* and *ApprovedDraft* States. Once in an *ApprovedDraft* state, the Situation is available to be picked up and published, at which point it becomes *Open*, that is, in effect or about to come into effect, during which time further situation updates may be created. Eventually the Situation will be *Closed*, that is, ready to remove from the distribution system. Closure may be immediate, or be done via an intermediate *Closing* state that indicates the Situation is resolved but a notice should be retained for a while in order that passengers see an "all clear" notice.

A given Situation element may record the current **progress state** of the Situation at the time it is versioned. To record a new state for the situation, a new situation update element is needed. Thus a *Closed* Situation may be reopened by the addition of a further update.

Note that the lifecycle states shown in Figure 8 do not necessarily correspond to a simple attribute value in the situation elements. In the SIRI-SX model, the overall status of the situation is encoded by a combination of an explicit enumerated **progress state** value in the Situation body, and the temporal scope. Thus a Situation that has passed its termination time is automatically deemed to be *Closed*.

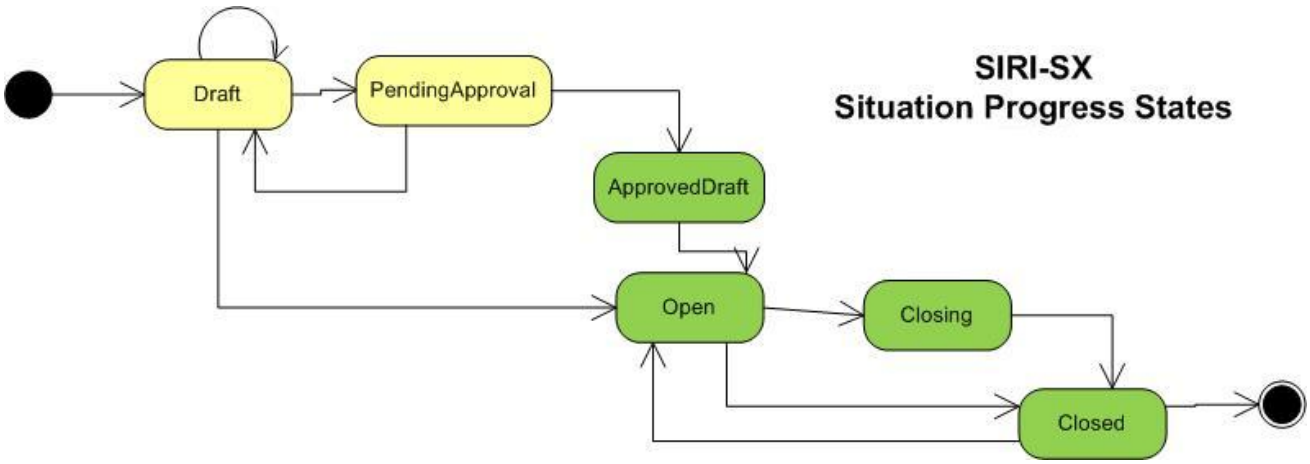

Figure 8 — Overall Life cycle Progress States of a Situation

5.3.7 Archiving

Once closed, situation elements may be maintained in a database indefinitely as documents of record. The content includes source and timestamp data suitable for audit purposes.

5.4 Summary of Situation Management

5.4.1 General

Together the above requirements dictate a particular approach to modelling Situations as software entities in SIRI-SX (and corresponding to the approach to managing message identity used in TPEG and DATEX2). The model is fundamental to using SIRI-SX messages and can be summarised as follows:

5.4.2 Situation Identity

1) Every Situation has a unique **identifier**, which is unique within all situation management systems participating in the exchange of situations.

2) A **Situation number** is allocated for the **base** situation element which creates the situation; this is unique within the issuing system, as identified by its SIRI ***Participant*** identifier.

3) Situations may have situation **update elements**, which reflect further change to the situation. Updates are also processed through clearly defined states, being first edited, then versioned and released.

4) For an update element the **Situation number** must be qualified by a **version number**. The version numbers issued are monotonically increasing. The version numbers of updates issued by systems other than the one which created the base situation element are qualified by the system identifier of that other system and must be unique within that other system.

5) Participant codes should be unique within a given country.

Thus situation elements in effect have a compound identifier:

The full logical identifier of a Base Situation element comprises:

(***CountryCode*** +) ***ParticipantCode*** + ***SituationNumber***.

The full logical identifier of an Update Situation element comprises the above with a version number added, and if the system creating the update is different from the original system, also a participant code.

(***CountryCode*** +) ***ParticipantCode*** + ***SituationNumber*** +
(***VersionCountryCode*** + ***VersionParticipantCode)*** + ***VersionNumber.***

Not all of the identifier parts necessarily need to be cited in all contexts in order to identify a given situation element. For example if the country code or participant code is common to all Situations it does not need to be cited explicitly. In implementations, the Country code may often be derived for example, to be the same as the operator, etc.

5.4.3 Situation Life Cycle

1) An edit-version-release cycle is used for situation elements. Content may only be changed when still in draft state. Once versioned, *the contents of a given version of a situation or update are never changed*. If a change is needed after release, a further update is created with modified contents.

2) Every situation element has a workflow progress status which may have at least the following states: *draft*, (i.e. in edit): *versioned, open, closed*. Some other intermediate states, for example *pendingApproval*, *approvedDraft* and *closing* may also be useful. Note that the progress status reflects the status at the time the situation element is versioned. The overall status of a situation cannot necessarily be determined just from the progress status value as if for example it has a validity set by a time window, the situation will no longer be open, even if there has been no explicit update

5.4.4 Situation Update Content

1) An update need only contain those additional content values for the situation element which have changed since previous ones. All other values will be assumed to be as in the original base situation element together with previous cumulative updates. A consumer system may create a consolidated view of the current status of a Situation by successively applying intervening update situation elements. Depending on the application, the consumer may wish to present the full history or just a consolidated view.

2) Updates may be created on more than one system, version numbers being additionally identified by the participant reference of the system that is creating the update. It is up to the consumer system to reconcile different branches. All updates contain a creation time which can be used to assess which is the most recent.

3) A situation element will have a number of content values describing its currency including a validity period and a publication date. These can be used by consumer systems to judge the staleness of a situation.

5.4.5 Example of identifier allocation

Table 1 shows and example of Situation Identifier values issued for base situation element *tfl0001:00023* and three subsequent update elements. The first two updates on the same system (*Tfl001*), the last on a different system (*rail04*).

Note that the actual choice of identifier values and numbering systems is an implementation choice. Version numbers of a given incident should preferably be monotonically increasing within each Participant system, e.g. *0001, 0002* as this provides a cross check against failures in synchronising system clocks. For update situation elements created on a different system the version number may either introduce a sub digit e.g. *0002.1, 0002.1.1,* etc, or simply increment the previous number e.g. 003, 004, etc.

Table 1 — Situation Numbering Example

	Situation Number		**Version identifier**		**Timestamp**
	Creator ParticipantRef	**SituationId**	**Update ParticipantRef**	**Update Version**	
Initial base situation element on system TfL001	Tfl001	00023	(Tfl001)	0000	2007-02-23T12:20:13Z
Update situation element 1 on system TfL001	Tfl001	00023	(Tfl001)	0001	2007-02-23T12:40:23Z
Update situation element 2 on system TfL001	Tfl001	00023	(Tfl001)	0002	2007-02-23T16:30:57Z
Update situation element 3 on System Rail 04	Tfl001	00023	Rail04	0002.1	2007-02-23T16:30:57Z

5.4.6 Date time stamps as identifiers

All situation elements and updates are also time stamped. Assuming all participant systems use synchronised time, this provides an additional alternative way to identify and sequence updates.

5.5 Interoperability of Situation management systems

5.5.1 General

In a complex transport network, systems will wish to integrate both public and private transport data, and will need to exchange data with many different systems in many different formats. SIRI-SX attempts to use a general situation model that will allow the round-trip exchange of Situations with the other main Situation models, notably Datex2 and TPEG.

Some types of road situation affect certain PT networks that make use of the road network, such as bus and coach. Although certain generic aspects of Situations, such as identifiers, temporal validity, severity, etc are common to both Road and PT Situation models, there are very significant differences in the detailed models needed to describe Road Situations from those needed to describe PT Situations, and in particular each requires quite distinct representations for key aspects such as nature of situation, network and location scope, advice, etc. It would indeed be very undesirable for SIRI-SX to introduce its own separate model for road Situations. Instead SIRI-SX attempts to achieve interoperability with Datex2 and TPEG by establishing an explicit correspondence between the situation models (See Annex). This allows the exchange of messages between different systems to describe situations with content that is sufficiently uniform to achieve a useful level of computation and to support cross modal inferences.

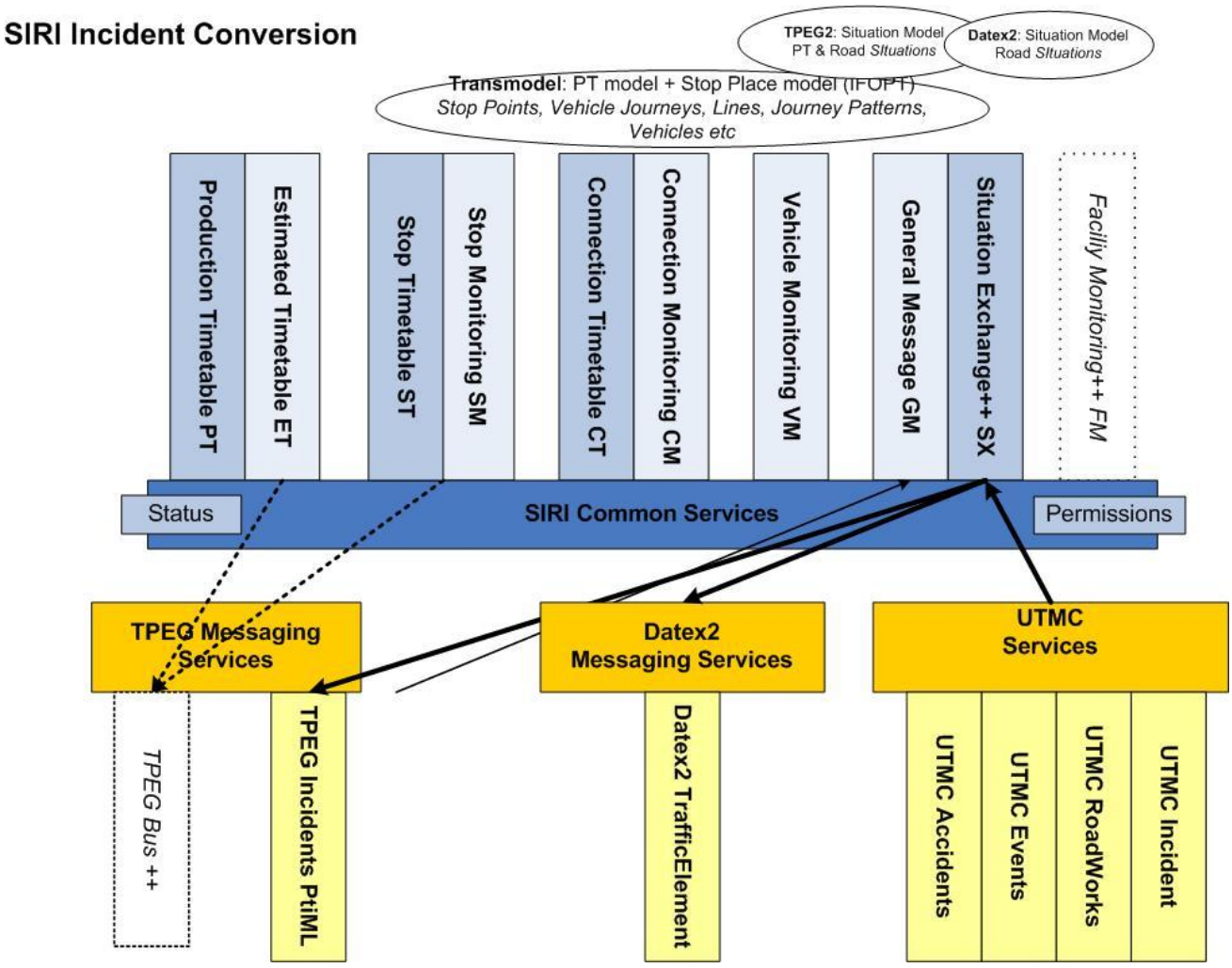

Figure 9 — Interoperability of message services

In principle the adoption of interoperable models should make it possible to use SIRI to DATEX2 situation records and vice versa. It should also facilitate the creation of adaptors to transform situation content. For example, one might want certain types of datex2 road network situation to create an equivalent situation that affects certain routes of the bus network.

5.5.2 Datex2 Interoperability

To support interoperability with Datex2, SIRI-SX includes the following mechanisms:

1. A formal correspondence between most generic SIRI-SX and Datex2 Situation elements (see Annex B), allowing a uniform approach to managing both road and PT situations. The SIRI-SX schema has equivalent elements (and in some cases reuses actual Datex2 elements), so that the creation of adaptors to exchange Situations is simplified, and it is possible to establish uniform business rules for processing situations.

2. Allowing the reuse of a Datex2 ***TrafficElement*** to describe a road situation that can be exchanged as a SIRI situation, or linked with a PT situation in a causal chain.

3. Allowing the annotation of SIRI-SX PT situations with Datex2 Locations.

5.5.3 TPEG Interoperability

To support interoperability with Datex2, SIRI-SX includes the following mechanisms:

1. A correspondence can be seen between a subset of generic SIRI-SX and TPEG message elements, allowing a uniform approach to managing both TPEG pti messages and PT situations, and making the construction of adaptors straightforward.

2. TPEG reason codes are used to categorise SIRI-SX messages. See 7.8.5.5.6.

5.5.4 Communications Bandwidth

As with other SIRI functional services, the SIRI-SX service is intended primarily for server to server communication over broadband IP between back end control systems and distribution hubs. It uses a XML structure that is relatively verbose and includes both a rich structured content and textual descriptions. It is not optimised for over the air communication with vehicles using communication over constrained bandwidth. It should however be straightforward to make a one-way transform of SIRI-SX messages (or a subset of their content) into a more concise format suitable for such transmission if required.

6 The Situation Model

6.1 General

SIRI-SX includes a structured model of Situations. A Situation describes a disruption to services, using data elements whose identifiers relate directly to the entities of other information services. Situations can thus be directly linked to stops, lines, journeys, pathways: as the cause of disruption or as the result of service problems. This tagging makes it possible to process situations automatically, for example to support journey planners or alert services.

The SIRI-SX Situation model is described with UML class diagrams in this section.

— Summary of Situation Model.

— Situation Body.

— Situation Body Details.

— Situation Reason (TPEG).

— Situation Consequence.

— Situation Affects Scope.

  — Overview of Affects Scope.

  — Affects Scope for Scheduled Services.

  — Affects Scope for Stop Place.

  — Common Accessibility Elements.

— Publishing Actions.

— Data Types.

There are separate descriptions of the PT Situation body and the Road Situation Body.

The UML class diagrams in this document follow presentation conventions intended to make clear the mapping of elements to a concrete XML schema. See Annex A for a full discussion. The attributes used to implement associates are shown explicitly. In most cases, each UML Class is implemented as an explicit XML element of the same name. In some cases the XML schema simplifies, in particular a <<group>> stereotype is used to indicate that a class is implemented as a reusable XML group embedded within another element, rather than as a first-class element.

6.2 Representing a PT Situation in SIRI-SX

6.2.1 Summary of PT Situation model

Figure 10 introduces the SIRI-SX Situation model for Public Transport Situations as a UML diagram. The Situation model has four main concepts: ***PtSituationBody***, ***AffectsScope***, ***Consequence*** and ***Actions***.

— The ***PtSituationBody*** brings together the information about a Public Transport Situation and is made up of a number of structured parts, including the temporal scope; a systematic classification (based on TPEG); and set of text descriptions.

— The ***AffectsScope*** element specifies the scope of the Situation – the location model in TPEG terms. This can be stated in terms of the network, and/or particular lines, stations or vehicle journeys or points in line with a Transmodel representation.

— A ***Consequences*** element describes the effect of the Situation on services.

— A ***PublishingActions*** element suggests processing options for the situation for use by downstream systems, for example whether it should appear on the web or not. This allows the situation provider to tag the situation with information guiding the business rules for different workflow steps in the subsequent use of the situation.

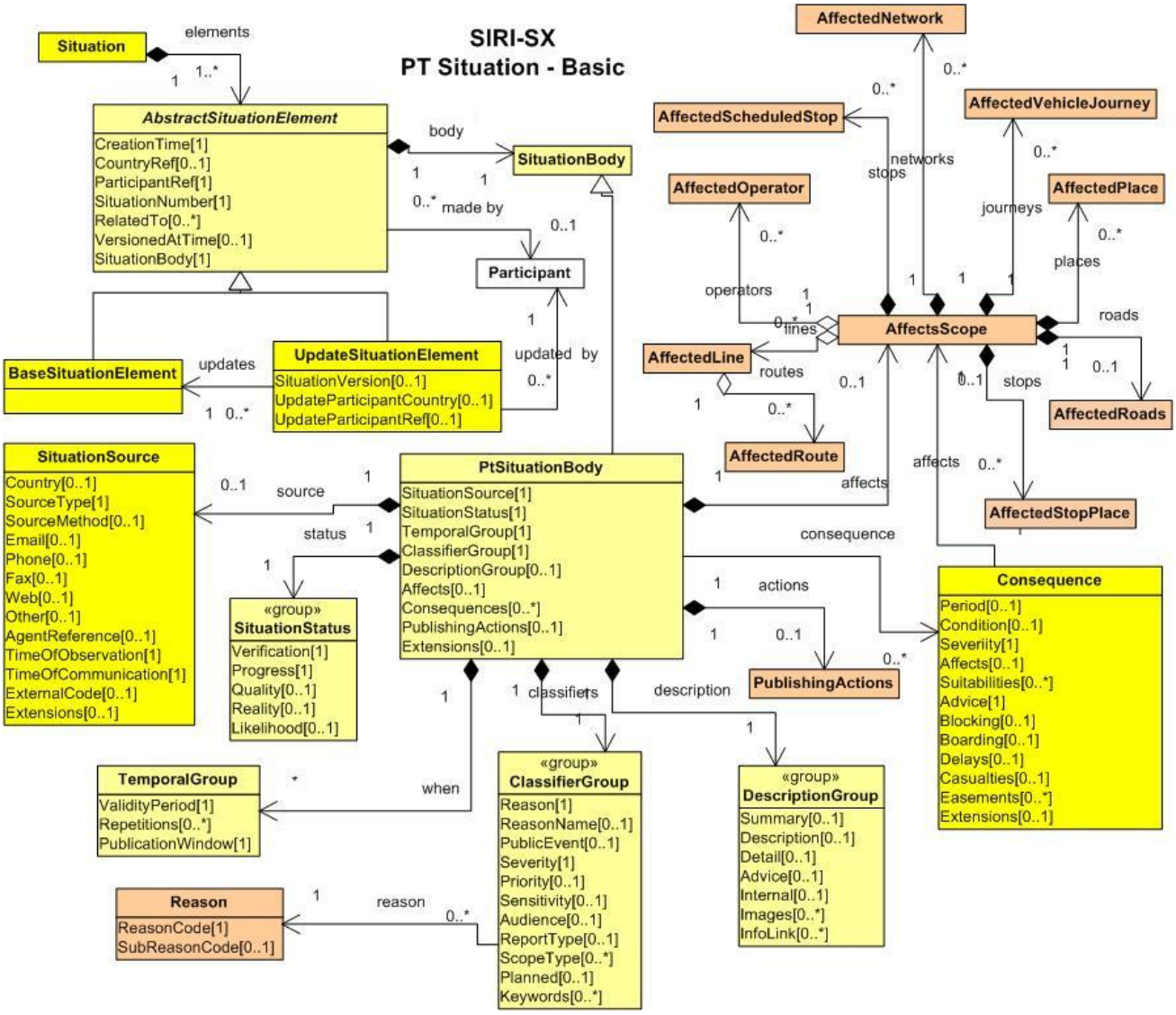

Figure 10 — UML Diagram of Overview of SIRI-SX Model for PT Situations

6.2.2 PT Situation Element Body

Figure 11 elaborates Figure 10 to add in basic information about the properties of a PT Situation.

— The ***PtSituationBody*** groups the descriptive properties of situations that are common to both Base Situations and Updates

  — ***SituationStatus*** describes the current status of the situation, including ***Verification***, ***Progress.*** ***Reality*** and ***QualityIndex.***

  — ***SituationSource*** describes the information source from which the Situation was obtained.

  — A Group of Temporal elements describes the Temporal scope of the Situation, including ***ValidityPeriod***, (when the Situation occurs) ***Repetitions*** (if it recurs at a regular periodicity) and ***PublicationWindow.*** (If the period for informing customers is different from the validity period).

  — A Group of Classifier elements describes the Classification of the situation by ***Reason***, ***Severity***, ***Priority***, ***Audience***.

— A Group of Descriptor elements provides a set of textual descriptions of the situation. This can contain different components, for example ***Summary***, ***Description***, ***Details***, ***Advice***, ***Internal*** as well as ***Image*** and ***InfoLinks.***

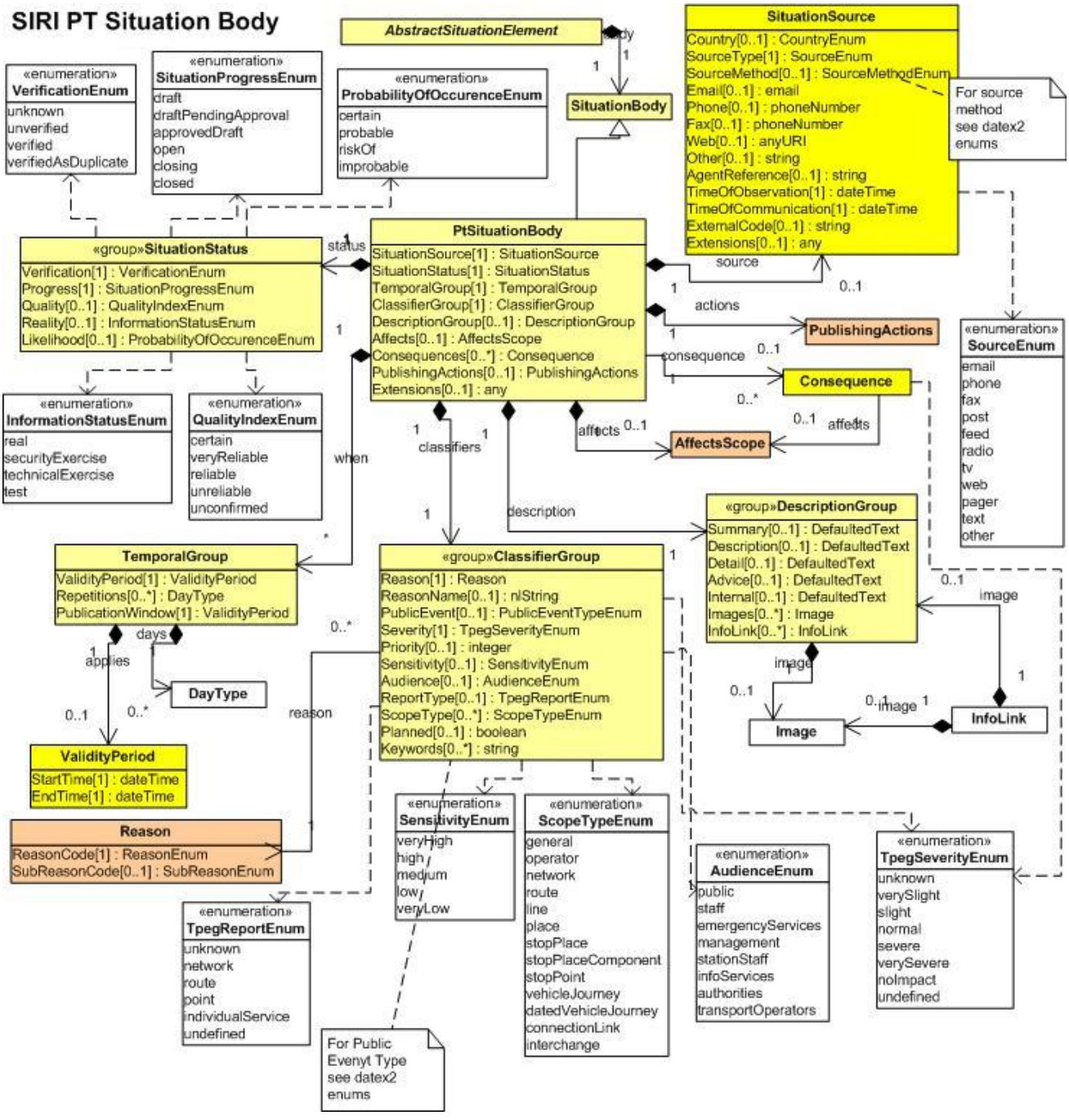

Figure 11 — UML Diagram of PT Situation Body Summary

6.2.3 PT Situation Body Details

Figure 12 elaborates Figure 11 with further details about the types and allowed values for them. These are also described in tabular form later in 7.8.5 below.

The diagram introduces the subcomponents of the ***AffectsScope*** element which can be used to specify the scope of a Situation as a collection of annotated references to network and service elements.

Consequences*:** Describes specific effects of the Situation, including additional ***AffectsScope specific to the consequence. May have a separate ***ValidityPeriod***, ***Severity***, ***Advice*** as well as additional structured information such as ***Delay***, ***Casualties***, and specific effects on accessibility – ***Suitability, Boarding*** possibilities**, *Easements.***

Some components, such as *Reason*, *AffectsScope*, *Consequence* **and** *PublishingActions***, are further elaborated in additional diagrams (See Figure 13, Figure 14, Figure 15, Figure 16, Figure 20).**

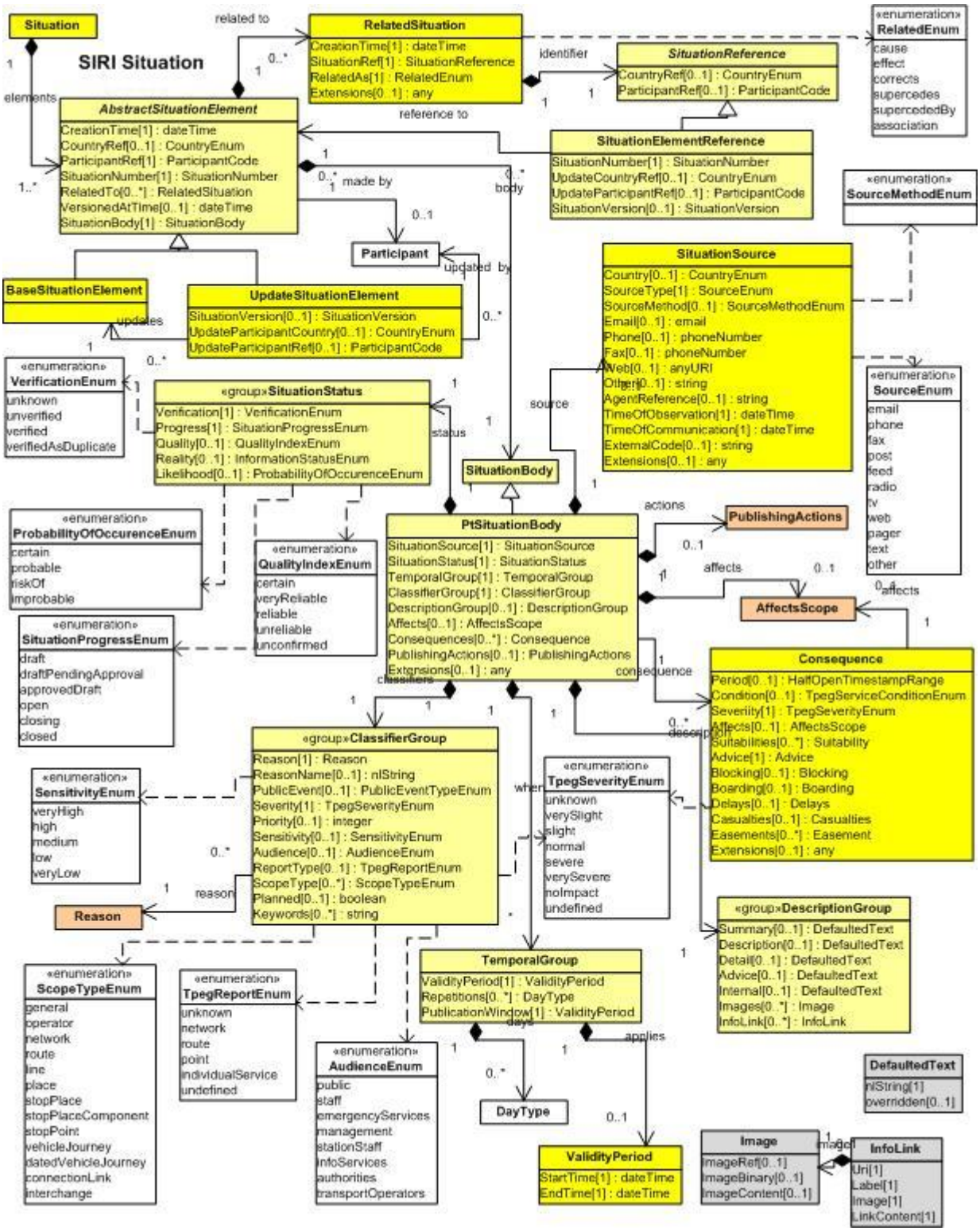

Figure 12 — UML Diagram of SIRI-SX Situation Body

6.2.4 PT Situation Reason

A situation ***Reason*** is part of the situation classifier content and provides taxonomic information about the cause of the situation. Each situation is assigned a Reason type.

In the SIRI-SX Situation model, for Pt Situations a two level classification system is used, corresponding to the TPEG PTI ontology. Each main reason type (***PersonnelReason***, ***EquipmentReason***, ***EnvironmentReason*** etc) contains a set of subtypes that explain the reason in more detail; for example for ***EnvironmentReason*** , includes *heavySnow, rain, fog, flooding,* etc.

Note that TPEG in fact has two sets of Reason codes; one in TPEG-Loc and one in TPEG–PTI There are some minor differences but not conflicts. SIRI-SX uses a union of both sets.

SIRI-SX makes some additional distinctions to identify a number of additional situation reasons not currently recognised by TPEG – each of these additional reasons is mapped to an existing TPEG category so that an SIRI-SX schema is fully compatible for export to TPEG. For example SIRI-SX distinguishes between ‘Fire on Track’ and a plain ‘Fire’.

Figure 13 summarises the SIRI-SX Reason codes. The codes are listed in tabular form in 7.8.5.5.6.

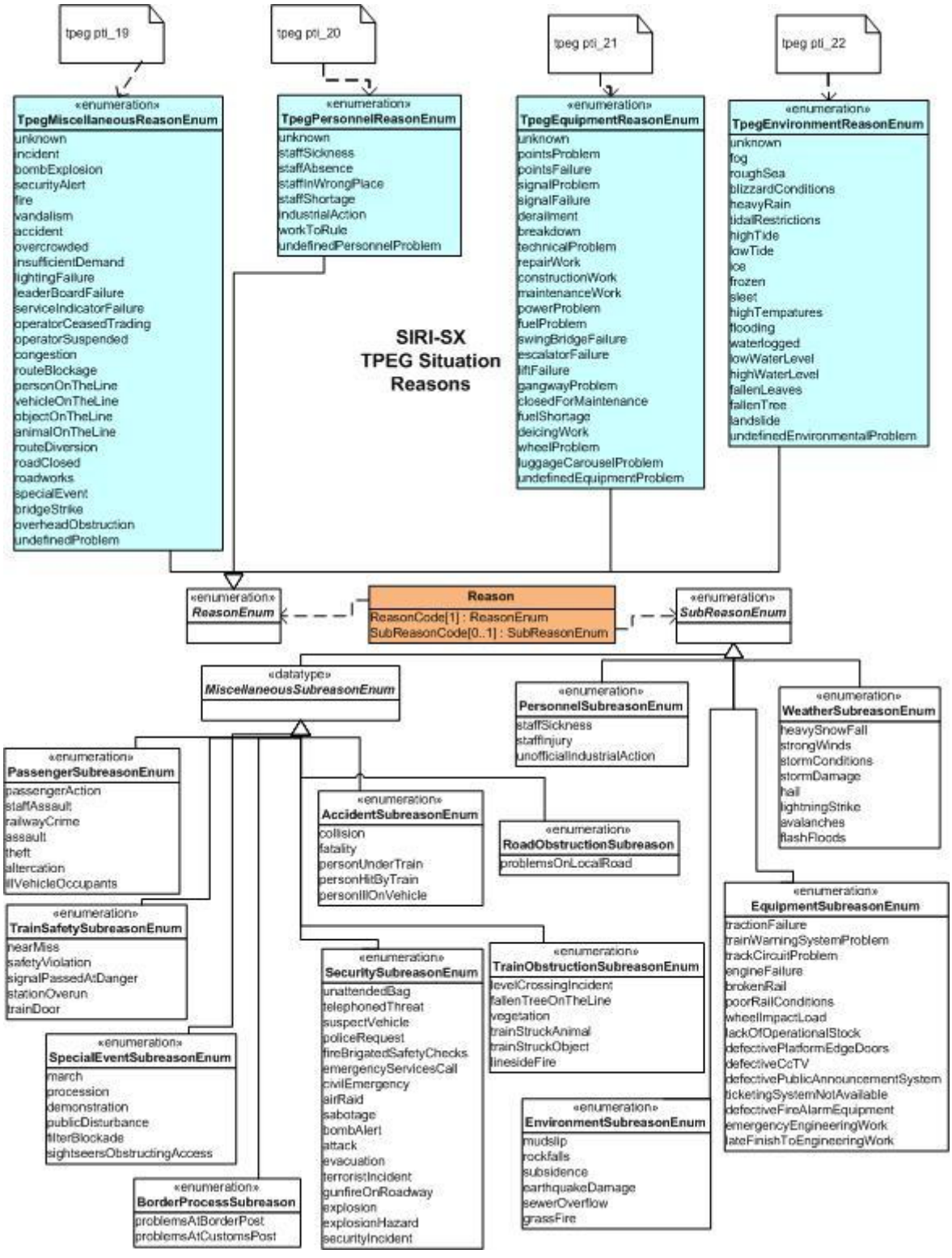

Figure 13 — UML Diagram of TPEG Situation Reason Values

6.2.5 Situation Consequence

The Situation ***Consequence*** element represents the likely effect or effects of a Situation on transport services. A Situation may have multiple consequences, each of which may have a different scope.

Figure 14 elaborates just the Consequence part of the previous UML diagrams. See 7.8.5.7 for a tabular representation. ***Consequence*** is made up of an ***AffectsScope*** and other properties:

— ***Suitability:*** describes the consequence for accessibility.

— ***Blocking*** describes whether the routes and services described in the ***AffectsScope*** element should be blocked, i.e. shown as unavailable in Journey Planner and real-time departure systems.

— ***Boarding*** describes the consequence for alighting and boarding at the Affected Stops

— ***Advice***: Additional guidance to passengers

— ***Casualties***: the number of

— **AffectsScope**: Identifies which parts of the network and which services are affected by the consequence. (See 6.2.6 below)

— **Easements**: Describes fare exceptions allowed because of the disruption.

The ***Consequence*** elements are described in tabular form in 7.8.5.7.

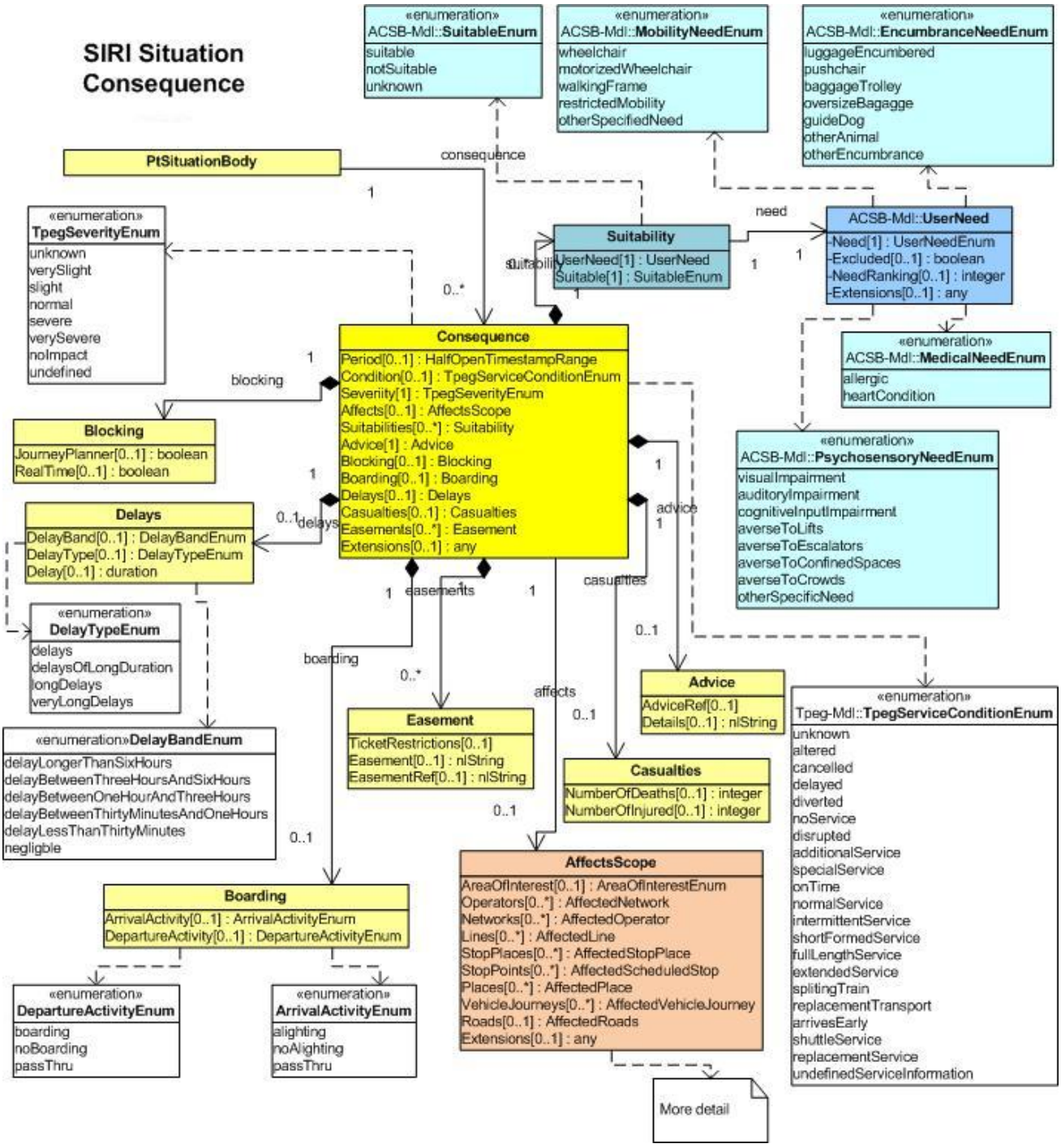

Figure 14 — UML Diagram of SIRI-SX Situation Consequence

6.2.6 The PT AffectsScope

6.2.6.1 Overview of AffectsScope

The ***AffectsScope*** element describes the scope of a Situation or scope of the ***Consequence*** of a PT Situation. It allows the use of tagged references to the identifiers of Transmodel entities. The same references to data elements can be shared with other SIRI services, allowing the efficient exchange of information.

It can also be used to associate IFOPT Stop Place entities with a Situation in order to describe the precise scope of a situation within a physical interchange.

Figure 15 introduces the ***AffectsScope*** model. The scope can be specified at different levels – e.g. the whole network, part of network, a station, etc. Annotations such as the name, direction etc that are useful for Situation processing and presentation can be included along with the basic entity references.

The scope of effect on the network and on scheduled services is made using ***AffectedNetwork***, ***AffectedOperator***, ***AffectedLine***, ***AffectedRoute***, ***AffectedVehicleJourney***, ***AffectedScheduledStop***, and ***AffectedCall*** elements, each of which may reference specific Transmodel entities. This is elaborated in Figure 16.

The scope of effect on PLACE and STOP PLACE usage is made using ***AffectedPlace***, ***AffectedStopPlace,*** and ***AffectedStopPlaceComponent***. This is elaborated in Figure 17.

For a discussion of the distinction between a ***ScheduledStopPoint***, a ***StopPlace*** and a ***StopPlaceComponent***, see the IFOPT documentation.

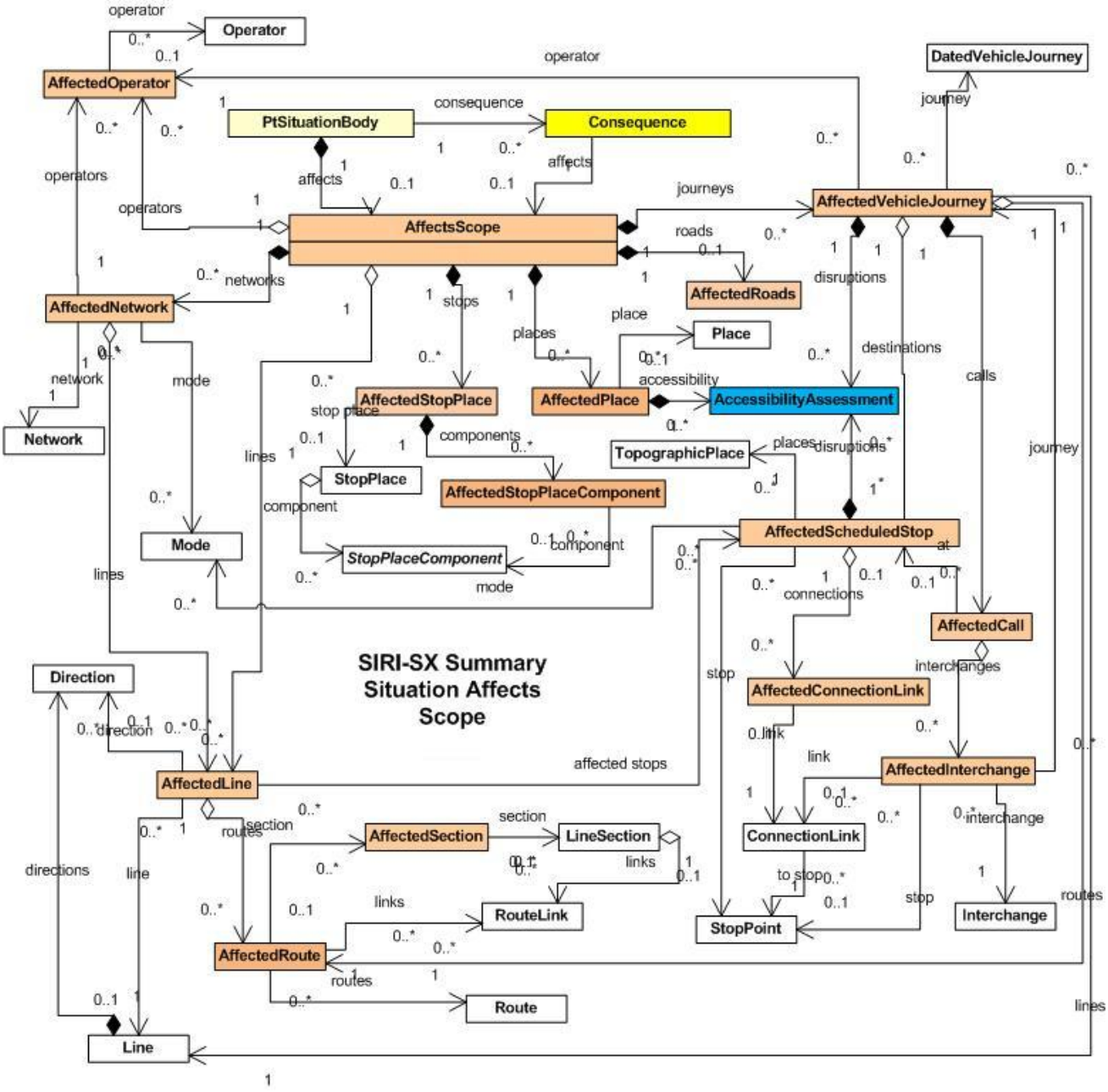

Figure 15 — UML Diagram of AffectsScope Summary

6.2.6.2 AffectsScope for Scheduled Services

Figure 16 shows that part of the ***AffectsScopeAffectsScope***that pertains to scheduled service elements. The AffectsScope may contain multiple instances of any of the following (some of which provide a context for other child elements):

— ***AffectedNetwork*** describes a network level scope, such as might apply to weather conditions or a special holiday.

— ***AffectedOperator*** describes an OPERATOR wide scope, such as a strike.

— ***AffectedLine*** describes a LINE or line section scope for situations affecting part of a Network, such as a line undergoing delays because of signalling problems. A line section is an arbitrary list of identifiers of ***RouteLink*** instances or other parts of a line.

— ***AffectedRoute***, describes a ROUTE or line section scope for situations affecting all or part of a route of network (and hence all journeys that use that route), such as a section undergoing delays because of road works.

— ***AffectedVehicleJourney*** describes a scope of a specific VEHICLE JOURNEY, such as a delayed or cancelled service. The vehicle journey may be a DATED VEHICLE JOURNEY – i.e. one particular instance on a particular calendar day, or undated, it which case it specifies a particular journey in the timetable.

— ***AffectedCall*** describes a scope of a call at a SCHEDULED STOP POINT within a VEHICLE JOURNEY, such as a cancelled call at stop.

— ***AffectedInterchange*** describes a scope of an INTERCHANGE between two VEHICLE JOURNEYs at a SCHEDULED STOP POINT, such as a cancelled connection.

— ***AffectedScheduledStop*** describes a scope of an individual SCHEDULED STOP POINT, such as for a closed station. Note that this is a timetable reference and does not necessarily distinguish between the whole STOP PLACE or a specific QUAY – this can be done using the ***AffectedStopPlace*** elements – see Figure 17.

— ***AffectedConnectionLink*** describes a scope of an individual a CONNECTION LINK between two SCHEDULED STOP POINTs, such as the possibility of transfer between rail and metro at a station.

— ***AccessibilityAssessment*** describes the specific effects on ACCESSIBILITY at a point in the network or on use of a VEHICLE JOURNEY. See later below.

— ***AffectedRoads*** describes those parts of the road network affected using a Datex2 ***GroupOfLocations***. See Datex2 for further details. The ***AffectedRoads*** can be used to describe a road scope for PT Situations – for ***RoadSituationBody*** it would typically be specified on a ***TrafficElement*** of.

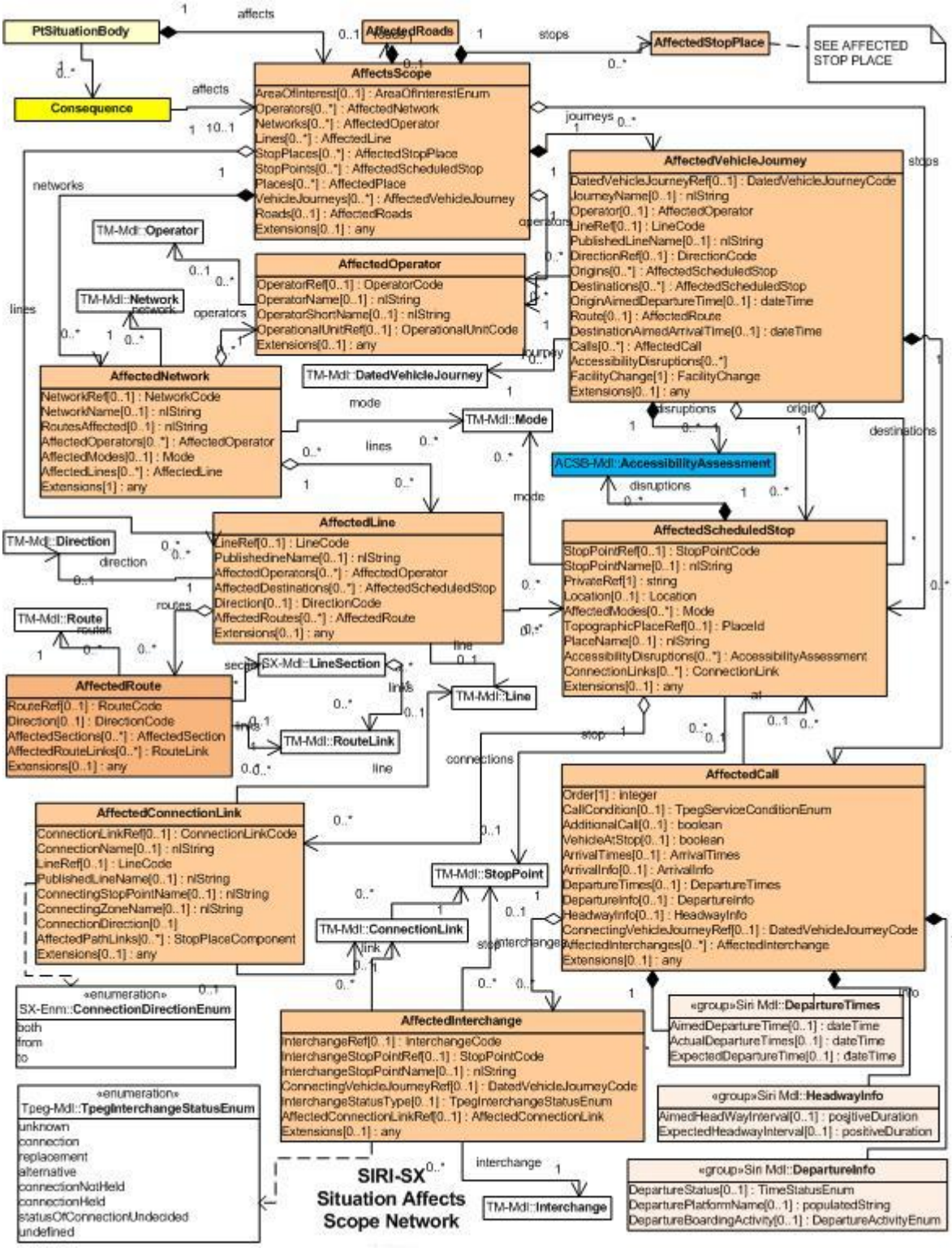

Figure 16 — UML Diagram of Situation AffectsScope: Scheduled Timetable Elements

6.2.6.3 AffectsScope for Stop Place

Figure 17 shows that part of the ***AffectsScope*** model that pertains to the STOP PLACE elements. It can be used to indicate that the scope of an situation is all of STOP PLACE, or a specified part of it, such as a particular QUAY, ACCESS AREA, BOARDING POSITION, ENTRANCE or EQUIPMENT PLACE, or PATH LINK between them. For further details see the IFOPT technical specification.

— ***AffectedStopPlace*** describes a station or interchange level scope, such as might apply to Situations caused by a security alert at a station.

— ***AffectedStopPlaceComponent*** describes a scope of an element within a STOP PLACE, such as a QUAY, an ENTRANCE or an ACCESS SPACE.

— ***AffectedPlace*** describes a scope for situations affecting other PLACEs (i.e. other than STOP PLACEs) such as POINTs OF INTEREST. This can also be used to speciof an arbitrary point location

— ***AccessibilityAssessment:*** specifies an effect in terms of change to a SUITABILITY or LIMITATION, such as lack of use of a lift. This might arise from the SIRI-FM service.

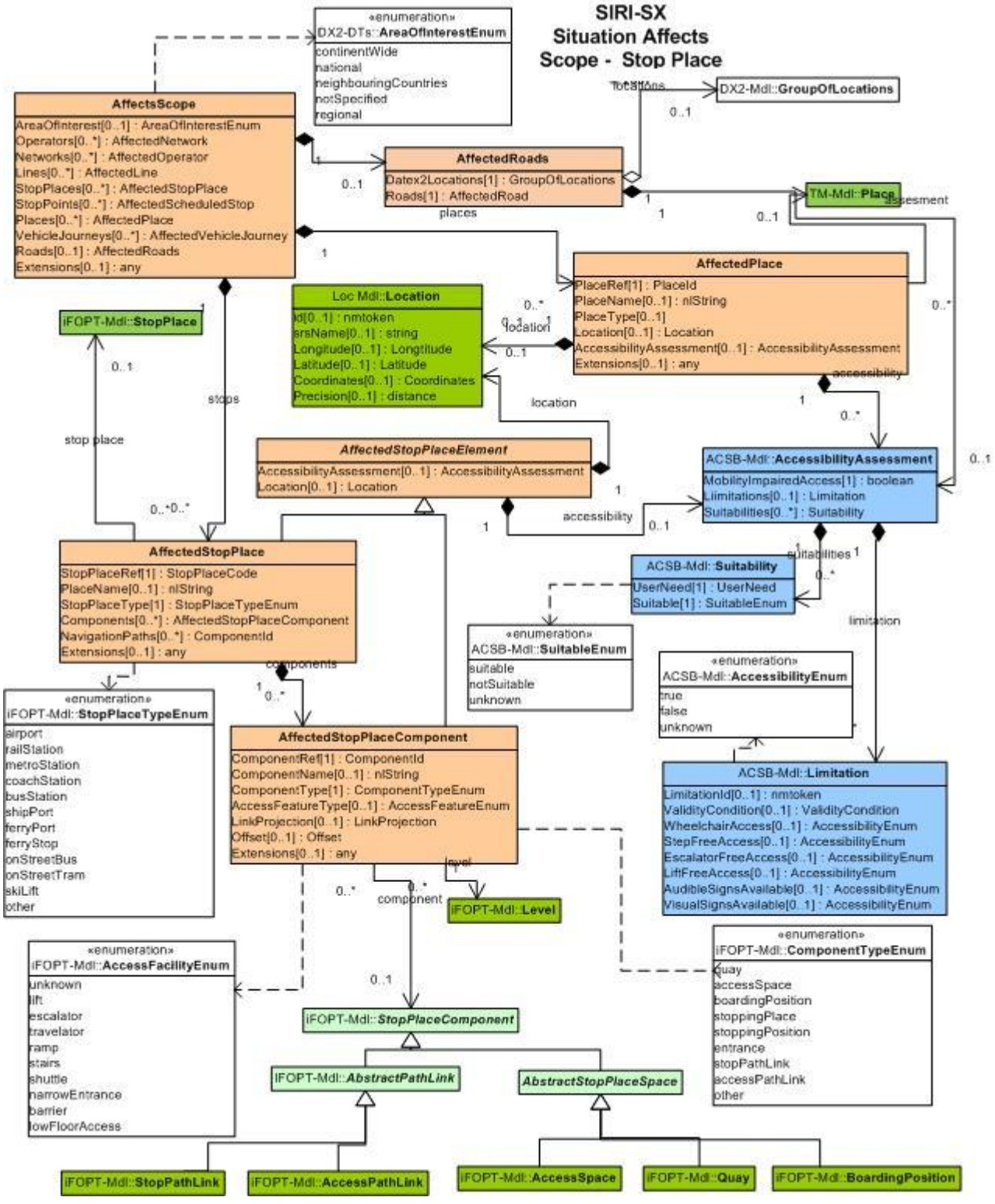

Figure 17 — UML Diagram of Situation AffectsScope: Stop Place & Suitability Elements

6.3 Representing a Road Situation in SIRI-SX

6.3.1 Summary of Road Situation model

Figure 18 introduces the SIRI-SX Situation model for Road Situations as a UML diagram. The Situation model has four main concepts: ***RoadSituationBody***, ***AffectsScope***, ***TrafficElement*** and ***Actions***. It is intended primarily to indicate how interoperability with Datex2 to describe road situations can be achieved.

— The ***RoadSituationBody*** brings together the information about a Public Transport Situation and is made up of a number of structured parts, including the temporal scope; a systematic classification (based on TPEG); and set of text descriptions. Most of the elements are the same as described earlier under ***PtSituationBody***

— The ***AffectsScope*** element specifies the scope of the Situation – the location model in TPEG terms. This can be stated in terms of the network, and/or particular lines, stations or vehicle journeys or points in line with a Transmodel representation. See earlier.

— A ***TrafficElement*** element describes the effect of the Situation on services. It embeds a Datex2 Traffic Element. Note that a number of the generic Situation elements such as severity, status, probability, etc can be specified using either the Traffic Element, or in the SIRI-SX elements or both.

— A ***PublishingActions*** element suggests processing options for the situation for use by downstream systems, for example whether it should appear on the web or not. This allows the situation provider to tag the situation with information guiding the business rules for different workflow steps in the subsequent use of the situation.

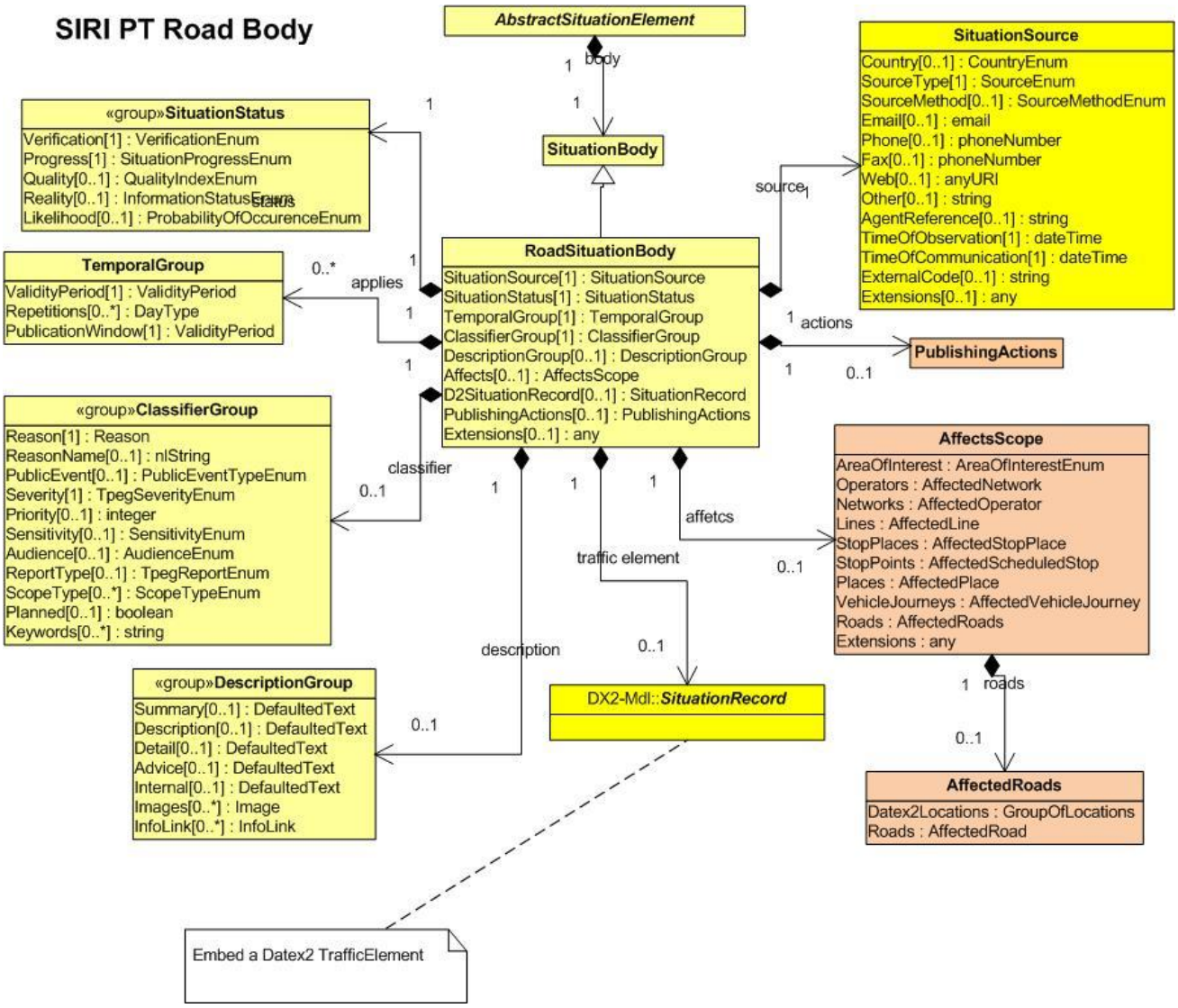

Figure 18 — UML Diagram of Overview of SIRI-SX Model for Roads

6.3.2 Road Situation Element Body

The ***RoadSituationBody*** groups the descriptive properties of Road Situations. It has many common properties with ***PtSituationBody.***

— *SituationStatus* describes the current status of the situation, including *Verification*, *Progress. Reality* and *QualityIndex.*

— *SituationSource* describes the information source from which the Situation was obtained. Some aspects of the source may additionally be specified using the *TrafficElement*.

— A Group of Temporal elements describes the Temporal scope of the Situation, including *ValidityPeriod*, (when the Situation occurs) *Repetitions* (if it recurs at a regular periodicity) and *PublicationWindow.* (If the period for informing customers is different from the validity period). Some aspects of the temporal scope may alternatively or as well be specified using the *TrafficElement*.

— A Group of Classifier elements describes the Classification of the situation by *Reason*, *Severity*, *Priority*, *Audience*. Some aspects of the Classification may alternatively or as well be specified using the *TrafficElement*.

— A Group of Descriptor elements provides a set of textual descriptions of the situation. This can contain different components, for example *Summary*, *Description*, *Details*, *Advice*, *Internal* as well as *Image* and *InfoLinks.*

— An embedded DATEX2 *TrafficElement* specifies the road location model, and other DATEX2 elements.

— An *AffectsScope* allows the additional impact on PT network journeys to be stated.

6.3.3 Common Accessibility

The ***AccessibilityAssessment*** element describes the effect of a Situation on Accessibility. The effect may be stated either as a change to a ***Limitation***, or as a change to a ***Suitability*** to a specific ***UserNeed***.

A Limitation describes the accessibility attributes of an element of the infrastructure (fixed or moving) in terms of a number of standard properties.

A ***Suitability*** explicitly defines whether an element of the infrastructure is suitable for use by someone with a specific ***UserNeed.***

Limitations may imply specific suitabilities – it is up to applications to decide the correspondence.

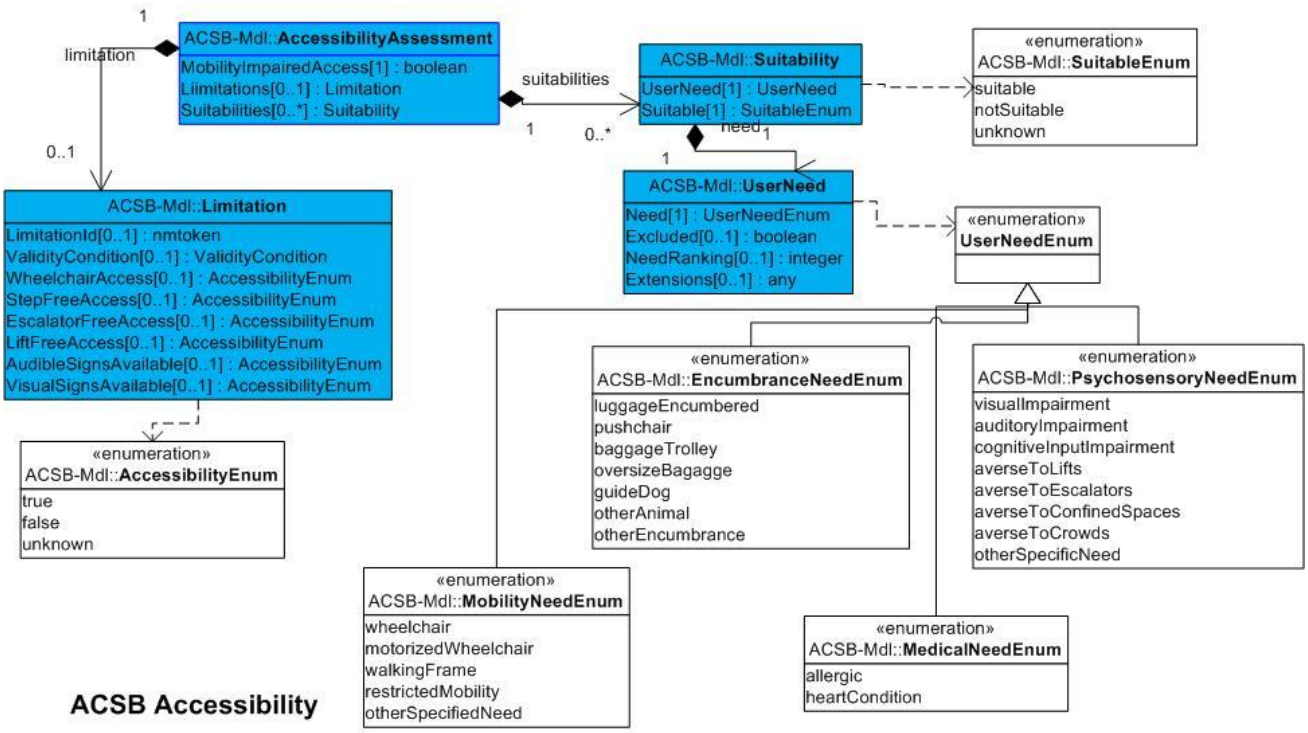

Figure 19 — UML Diagram of Common Accessibility Types

6.3.4 Publishing Actions

The ***PublishingActions*** (Figure 20) annotate the situation with information to direct its distribution by dissemination systems. Each action type specifies use in a particular channel. The values are intended as guidance to filtering and consumer systems to drive automated rule driven processing of Situations for electronic dissemination.

The actions are grouped into two categories: demand channels, indicating that the data should be made available through the channels on demand:

— ***PublishToWebAction*** indicates that the Situation should be published on the web (other elements such the ***Audience*** and ***Sensitivity*** can be used to decide whether the Situation should be on private intranets only or on the public internet).

— ***PublishToMobileAction*** indicates that the Situation should be published on mobile delivery channels (other elements such the ***Audience*** and sensitivity can be used to decide whether the Situation should be on private mobile intranets only or the public mobile internet.

— ***PublishToTvAction*** indicates that the Situation should be published to broadcasting dissemination channels such asTeletext.

— ***PublishToDisplayAction*** indicates that the Situation should be published to in station and onboard displays channels.

— ***OtherPublishAction*** can be used for arbitrary dissemination channels.

The second group constitutes the push channels. For Situations that are published with push systems, additional information on the scheduling of messages to handle and clear the Situation can be specified. Thus for example, for a planned engineering works, a Situation could be tagged with a publication schedule that states that reminders should be sent at say three week, one week, one day intervals before the works start, and at the end of the of the works.

Situations can also be tagged with information for individually targeted distribution. Each different type of channel may be tagged with different attributes.

— ***PublishToAlertsAction*** indicates that the Situation should be published on generic alert channels.

— ***NotifyByEmailAction*** indicates that the Situation should be published as an Email to a specific named user.

— ***NotifyBySmsAction*** indicates that the Situation should be published as an SMS to a specific named user.

— ***NotifyByPagerAction*** indicates that the Situation should be published as Pager message to a specific named user.

— ***NotifyUserAction*** indicates that the Situation should be published by some other means to a specific named user.

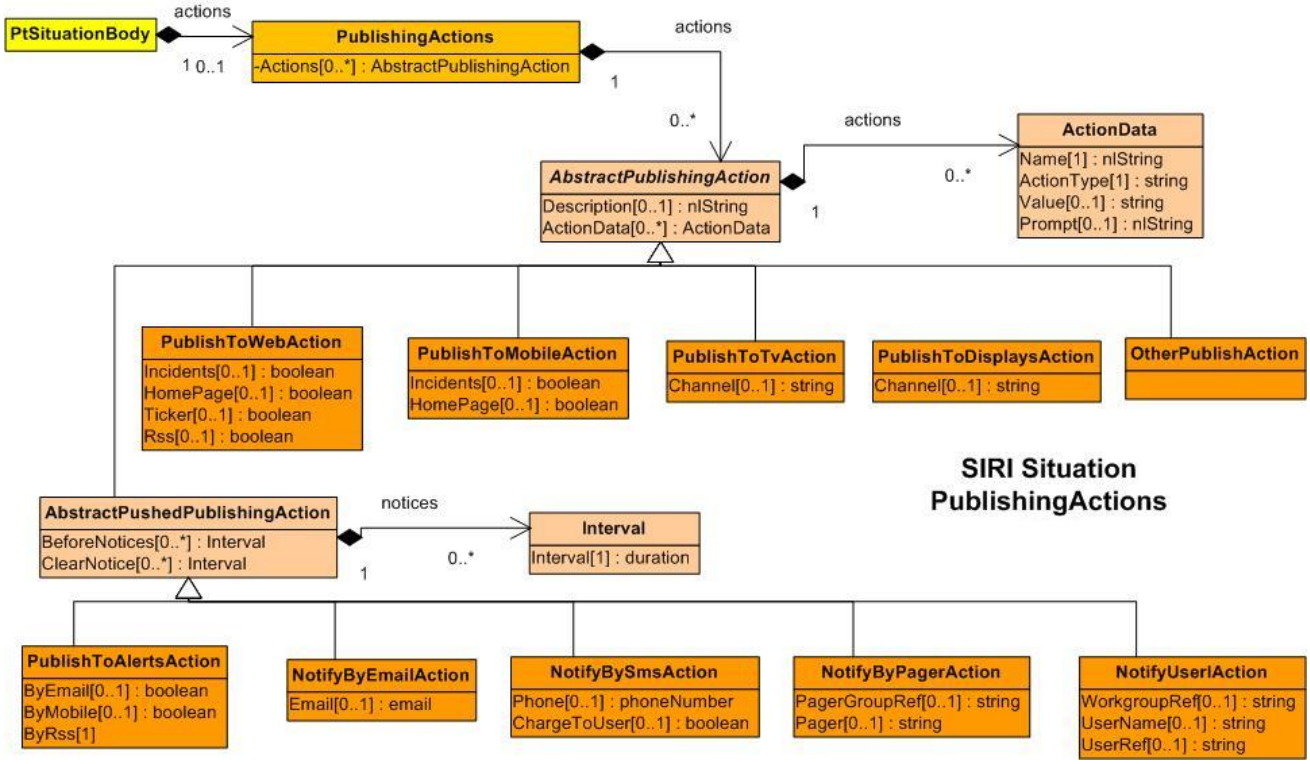

Figure 20 — UML Diagram of SIRI-SX Publishing Actions

6.3.5 Common Types

6.3.5.1 Common SIRI Data Types

The SIRI-SX services use a number of common SIRI data types. The common SIRI data types are listed in Figure 21.

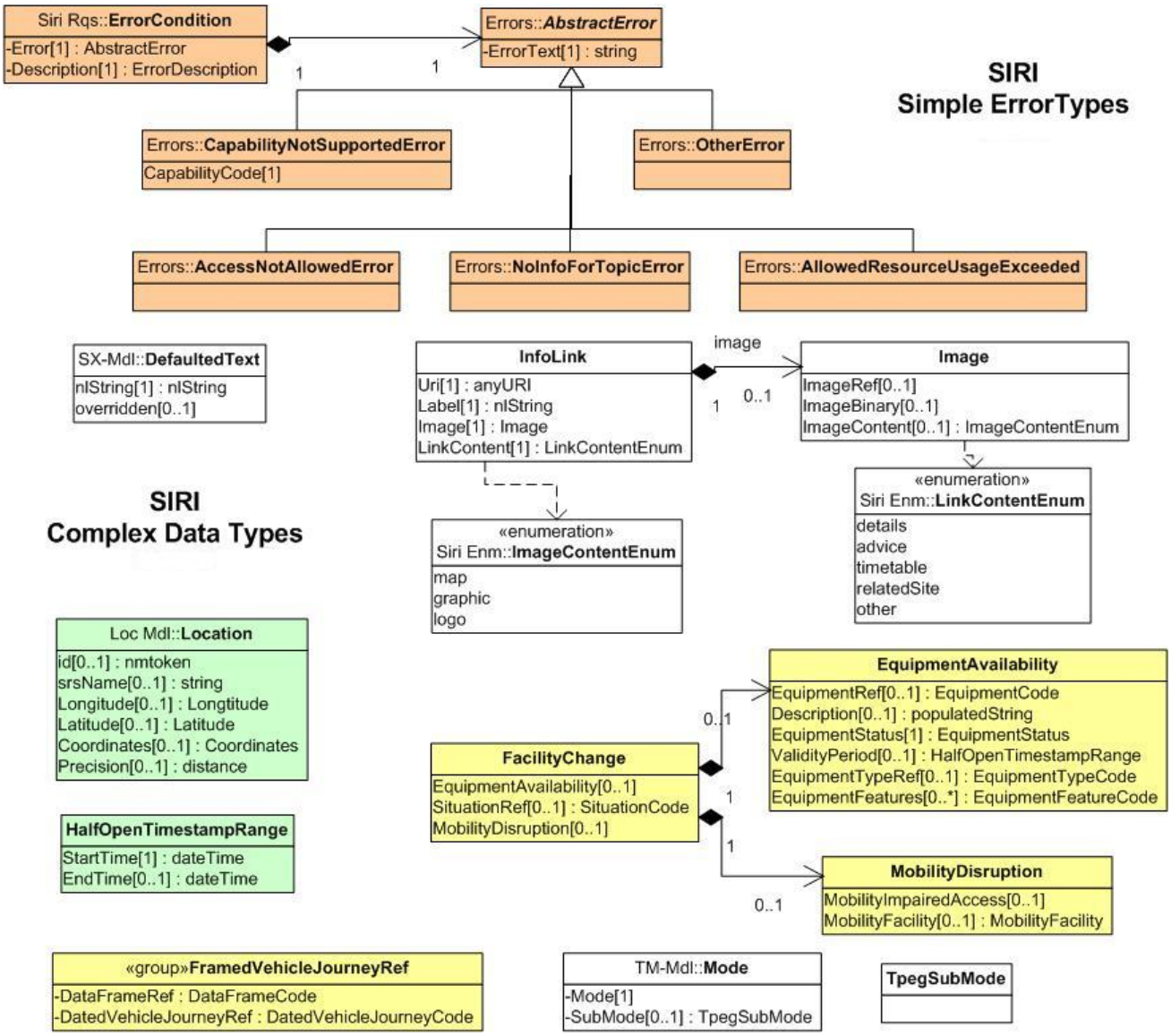

Figure 21 — UML Diagram of Common SIRI Data Types

6.3.5.2 Common General SIRI Enumerations

The SIRI-SX services use a number of common SIRI enumerations. The common SIRI enumerations are listed in Figure 22.

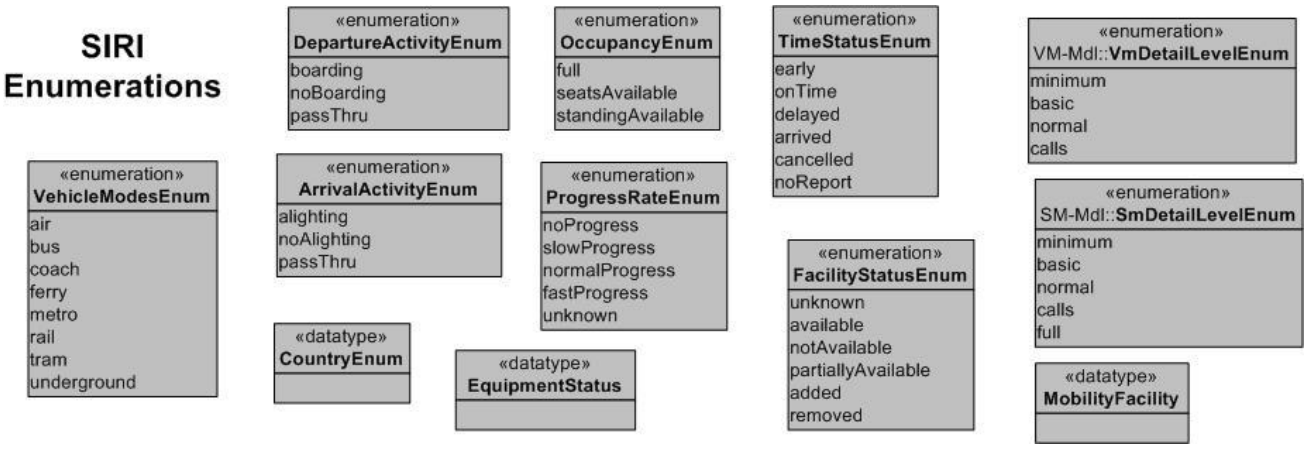

Figure 22 — UML Diagram of SIRI enumerations

6.3.5.3 SIRI-SX Enumerations

Figure 23 summaries the enumerations that are specific to SIRI-SX. These also appear in context on individual diagrams.

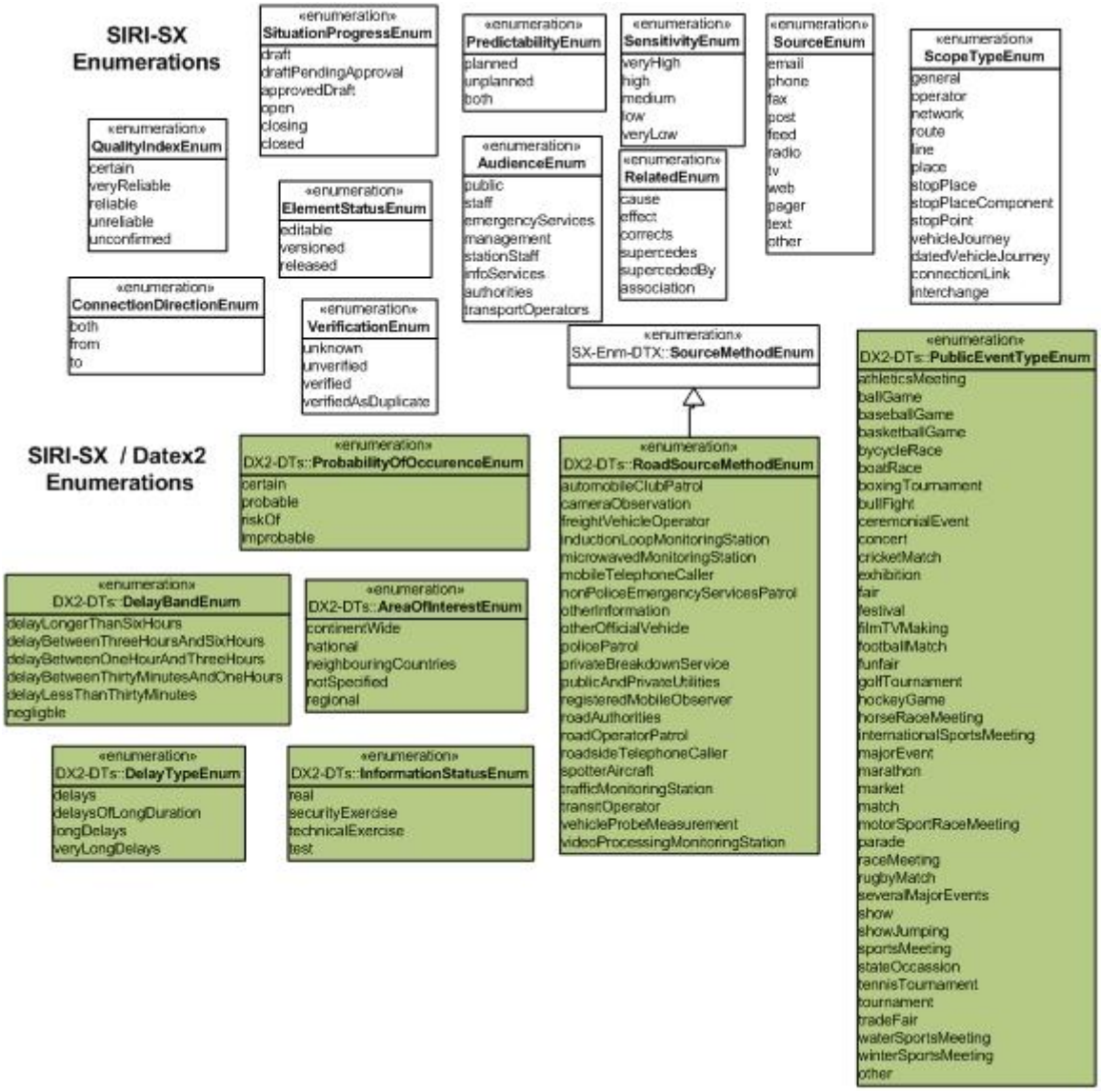

Figure 23 — UML Diagram of SIRI-SX Enumerations

6.3.5.4 IFOPT Enumerations

Figure 24 summarises the IFOPT STOP PLACE enumerations that are used in SIRI-SX. These mostly also appear in context on individual UML diagrams.

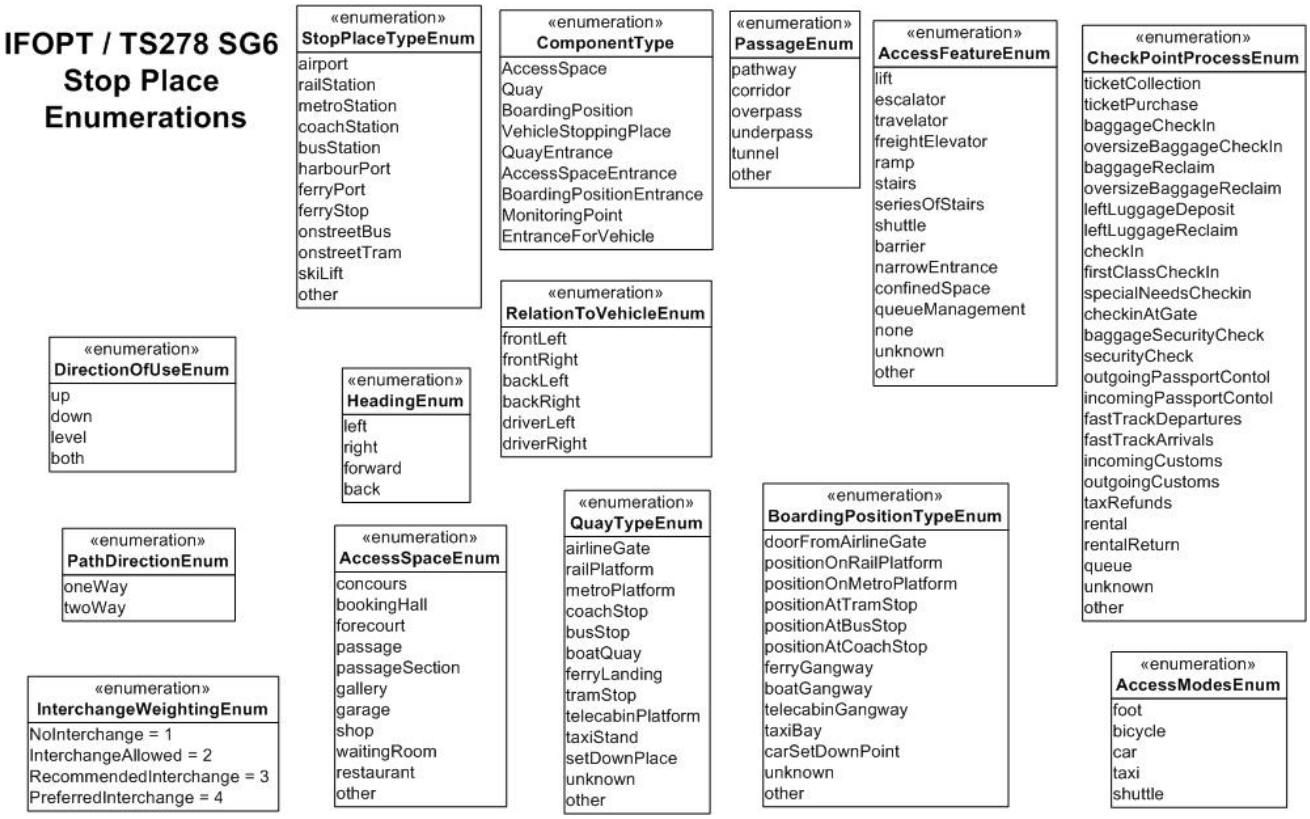

Figure 24 — UML Diagram of IFOPT Stop Place Enumerations

6.3.5.5 TPEG Miscellaneous Enumerations

Figure 25 summarises the miscellaneous TPEG enumerations that are used in SIRI-SX. These mostly also appear in context on individual UML diagrams.

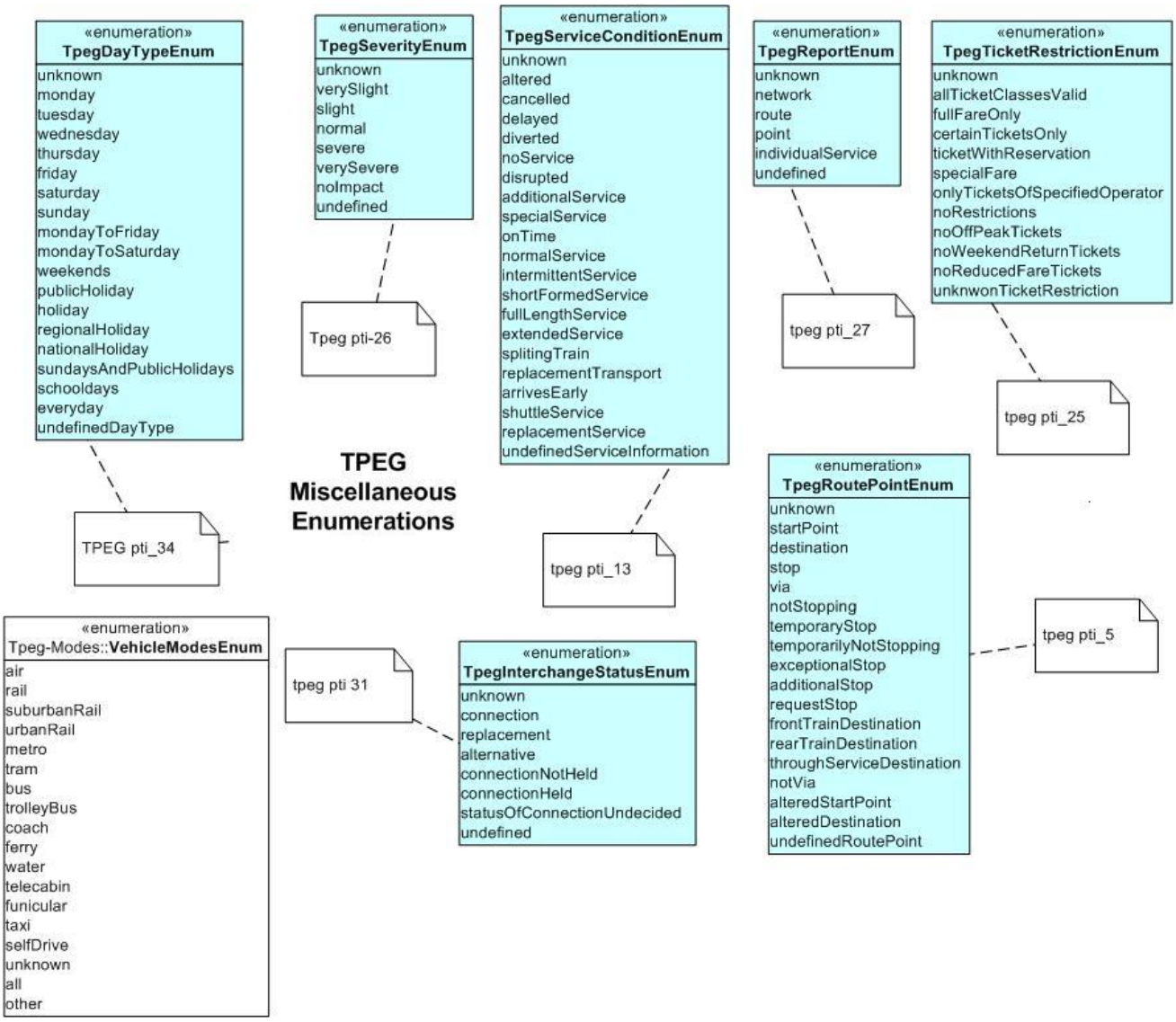

Figure 25 — UML Diagram of TPEG Enumerations

6.3.5.6 TPEG Mode Enumerations

Figure 26 summarises the TPEG mode enumerations that are used in SIRI-SX. These mostly also appear in context on individual UML diagrams.

Figure 26 — UML Diagram of Tpeg submodes

7 Situation Exchange Service [SX]

7.1 Purpose

The SIRI-SX Service is for exchanging Situation content in real-time. It uses a structured Situation model for describing disruptions to services that includes element references that relate directly to the Public Transport model entities used by other SIRI services. Situations can thus be directly linked to stops, lines, journeys, pathways, etc: and provide an explanation of the disruption. As a corollary, the entities of other information services may be referenced to provide further details about a Situation.

7.2 Description

The Situation Exchange Service comprises the ***SituationExchangeRequest*** message used to specify the contents of request or subscription messages, and the ***SituationExchangeDelivery*** message, used to deliver the response. The ***SituationExchangeSubscription*** message allows a subscriber to request asynchronous updates for the service: it contains an embedded ***SituationExchangeRequest,*** along with further parameters controlling the asynchronous delivery.

SituationExchangeRequest has *topic* parameters to filter the information by Operator, Network, Vehicle, Line, and StopPoint, etc, and *policy* parameters to control the amount of data returned.

The ***SituationExchangeDelivery*** returns information about one or more situations and their associated status as one or more ***SituationElements***. Each ***SituationElement*** is made up of a number for structured parts including the source, temporal scope, a systematic classification, a layered text description, etc. See Clause 6. It also includes:

— The ***AffectsScope*** element provides a location model of the scope of the situation. This can be stated in terms of the network, and / or particular lines, stations or vehicle journeys or points, this location is provided as a reference to a Transmodel object (Stop Point, Line, Vehicle, etc.) or to an IFOPT object.

— One or more ***Consequences***, describing the effect the situation will have.

— The ***PublishingActions*** describe a suggest processing of the Situation, for example whether it should appear on the web or not. This allows the situation provider to tag the situation with information guiding the business rules for different workflow steps in the subsequent use of the situation.

7.3 Reference Data

The ***SituationExchangeRequest*** requires the participants to have agreed data reference models for any Affect scope references that are used: Lines, Stop Points, Vehicle Journeys, Connection Links, Interchanges and Vehicles, Stop Places, Stop Place components, etc. Not all elements need to be used.

7.4 Capability and Permission Matrices

7.4.1 Capability Matrix

The following set of required and optional capabilities is defined for the Situation Exchange service. If the service supports Capability Discovery the ***SituationExchangeCapabilitiesRequest*** / ***SituationExchange-CapabilitiesResponse*** message pair can be used to determine the implementation's capabilities.

Table 2 — SituationExchangeCapabilities Matrix

SituationExchangeCapabilities			*+Structure*	Capabilities describing implementation of Situation Exchange service.
inherit	***:::***	*0:1*	*See xxx-Capability-Response*	See SIRI Part 2-12.4 for Common Capability attributes.
Topic	***TopicFiltering***	0:1	*+Structure*	Which optional filtering features are supported.
	FilterByKeyword	0:1	*xsd:boolean*	Whether results can be filtered by keyword. Default is false
	FilterByNetworkRef	0:1	*xsd:boolean*	Whether results can be filtered by network. Default is true
	FilterByStopPlaceRef	0:1	*xsd:boolean*	Whether results can be filtered by StopPlace. Default is true
	FilterByJourneyRef	0:1	*xsd:boolean*	Whether results can be filtered by VehicleJourney. Default is false.
	FilterByMode	0:1	*xsd:boolean*	Whether results can be filtered by Mode. Default is true.
	FilterByAccessibility-Needs	0:1	*xsd:boolean*	Whether results can be filtered by Accessibility Needs. Default is true
Request Policy	***RequestPolicy***	0:1	*+Structure*	Which features of ***RequestPolicy*** are supported by service?
	Language	**1:***	*xsd:language*	National languages used by service.
	HasPreviewInterval	0:1	*xsd:boolean*	Whether service supports a Preview Interval.
	MaximumNumberOf-Situations	0:1	*xsd:boolean*	Maximum number of Situations to return
Subscription-Policy	***SubscriptionPolicy***	0:1	*+Structure*	Which features of ***SubscriptionPolicy*** are supported by service?
	HasIncremental-Updates	0:1	*xsd:boolean*	Whether incremental updates can be specified for updates Default is *true*.
	HasChangeSensitivity	0:1	*xsd:boolean*	Whether change threshold can be specified for updates. Default is *true*.
Access Control	***AccessControl***	0:1	*+Structure*	Which optional Access Control features are supported by service?
	RequestChecking	**1:1**	*xsd:boolean*	Whether access control of requests is supported. Default is *false*.
	CheckOperatorRef	0:1	*xsd:boolean*	If access control is supported, whether access control by Operator is supported. Default is *true*.
	CheckLineRef	0:1	*xsd:boolean*	If access control is supported, whether access control by Line is supported. Default is true.
Response	***ResponseFeatures***	0:1	*+Structure*	Which features of Response data are supported by service?
any	***Extensions***	0:1	*any*	Placeholder for user extensions.

7.4.2 Permission Matrix

If the implementation supports both Capability Discovery and Access Controls, then the ***SituationExchange-CapabilitiesResponse*** response can include the access permissions for the requestor participant to access data.

Table 3 — SituationExchange Service Permissions

SituationExchangePermission			*+Structure*	Permissions to use implementation of Situation Exchange service.
Inherit	***:::***	**1:1**	*xxxService-Permissions*	See SIRI Part 2-12.5 for Common Permission elements.
Topic	***OperatorPermissions***	0:1	*+Structure*	Operator permissions for participant. See Part 2.
	LinePermissions	0:1	*+Structure*	Line permissions for participant. See Part 2.

7.5 UML Diagrammatic Representation

7.5.1 General

The ***SituationExchangeRequest***, ***SituationExchangeSubscription*** and the ***SituationExchangeDelivery*** elements are summarised in the following three of diagrams.

UML Summary Diagram of SituationExchangeRequest

Figure 27 shows a summary diagram of ***SituationExchangeRequest.*** The request Topic specifies a number of Filters which control the values to be returned.

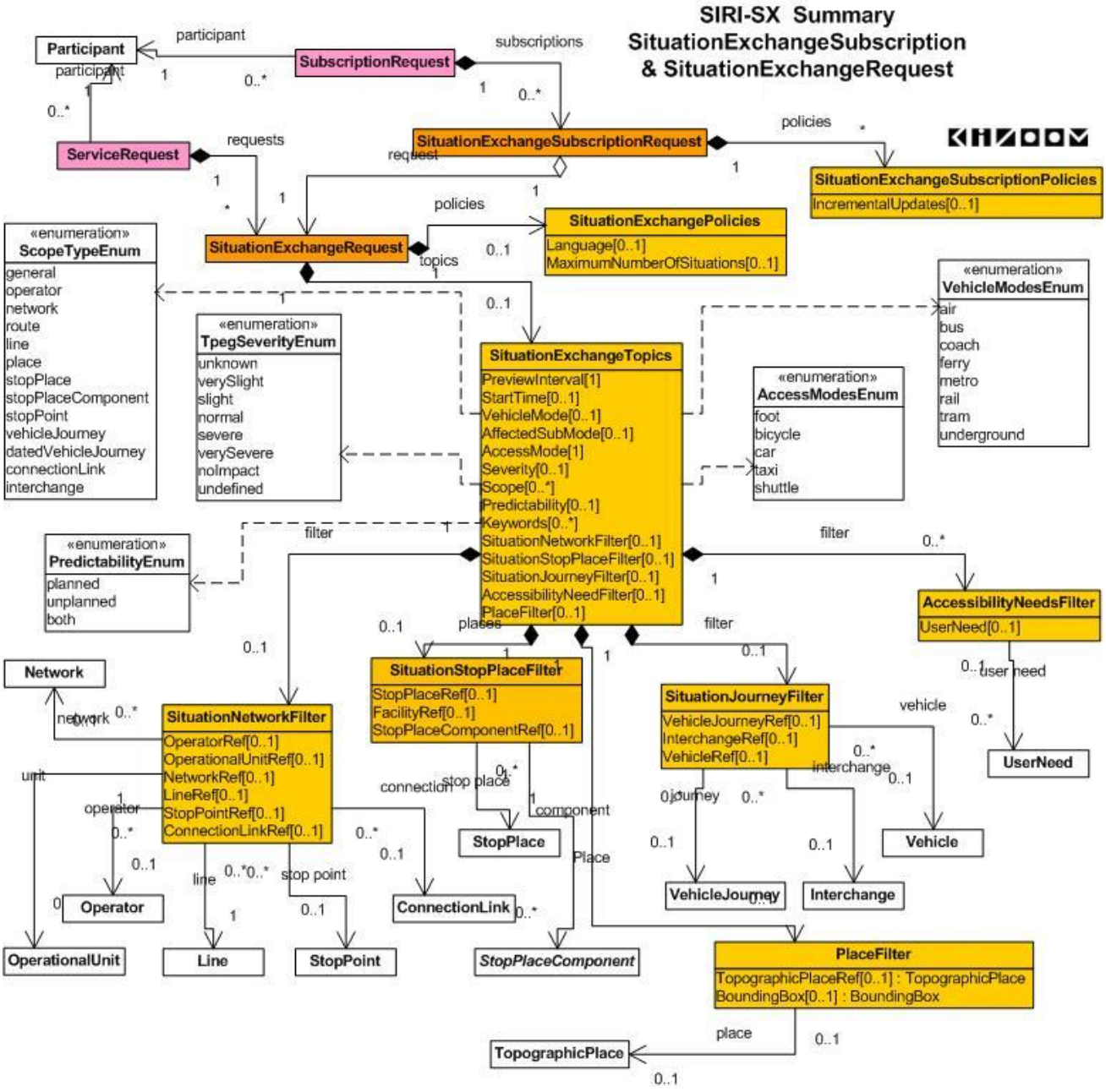

Figure 27 — UML Diagram of SituationExchangeRequest Summary

7.5.2 UML Detailed Diagram of SituationExchangeRequest

Figure 28 elaborates Figure 27 to include details about types and values.

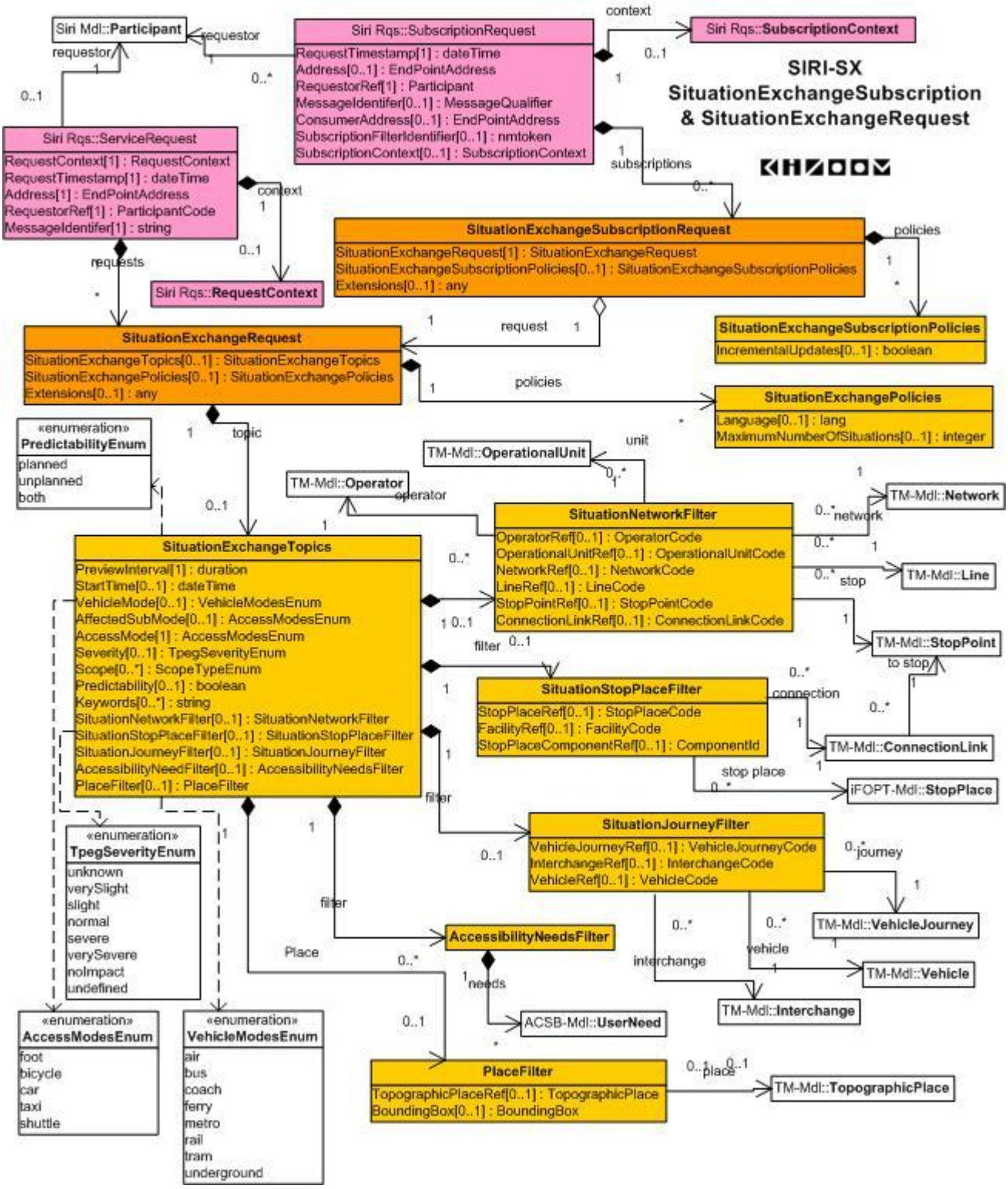

Figure 28 — UML Diagram of SIRI-SX Request

7.5.3 UML Diagram of SituationExchangeDelivery - Summary

Figure 29 summarises the ***SituationExchangeDelivery,*** in particular for a PT Situation The Situation model is described further in Clause 6.

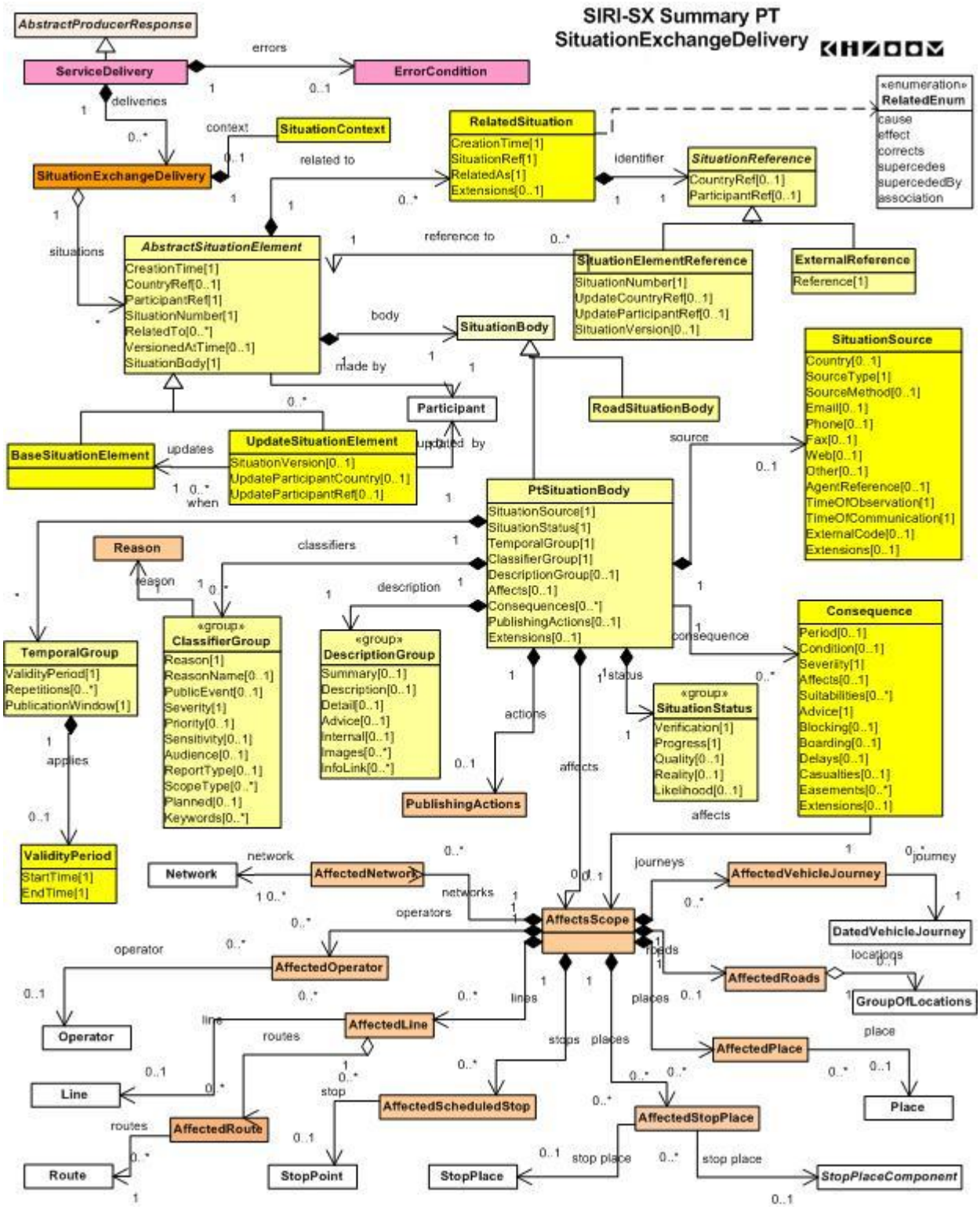

Figure 29 — UML Diagram of SIRI-SX Delivery

7.5.4 UML Diagram of SituationExchangeDelivery - Detail

Figure 29 shows the detailed attributes of a ***SituationExchangeDelivery.*** The Situation model is described further in Clause 6.

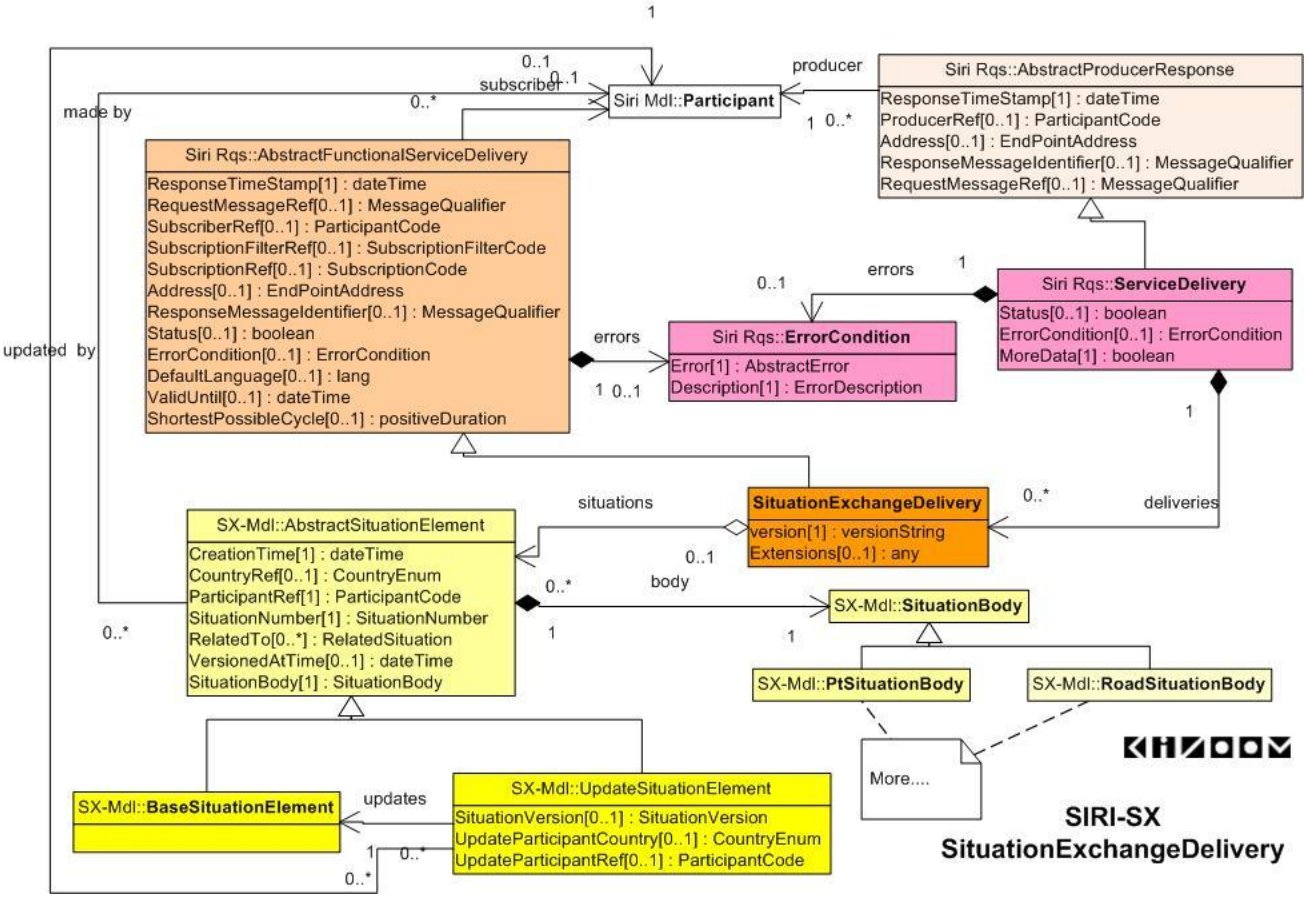

Figure 30 — UML Diagram of SIRI-SX Delivery detail

7.5.5 UML Diagram of SituationContext

Very often, all of the situations in a delivery will be published by the same system (i.e. ***Participant***), and be for the same specific city (i.e. ***Place***) and transport network run by the same ***Operator***. The ***SituationContext*** which includes a ***NetworkContext***, provides an optional means of specifying common defaults that apply to all situation elements in the delivery unless overridden on a specific. Figure 31 illustrates this by showing the relationship of ***PtSituationBody*** elements to the corresponding ***SituationContext*** elements.

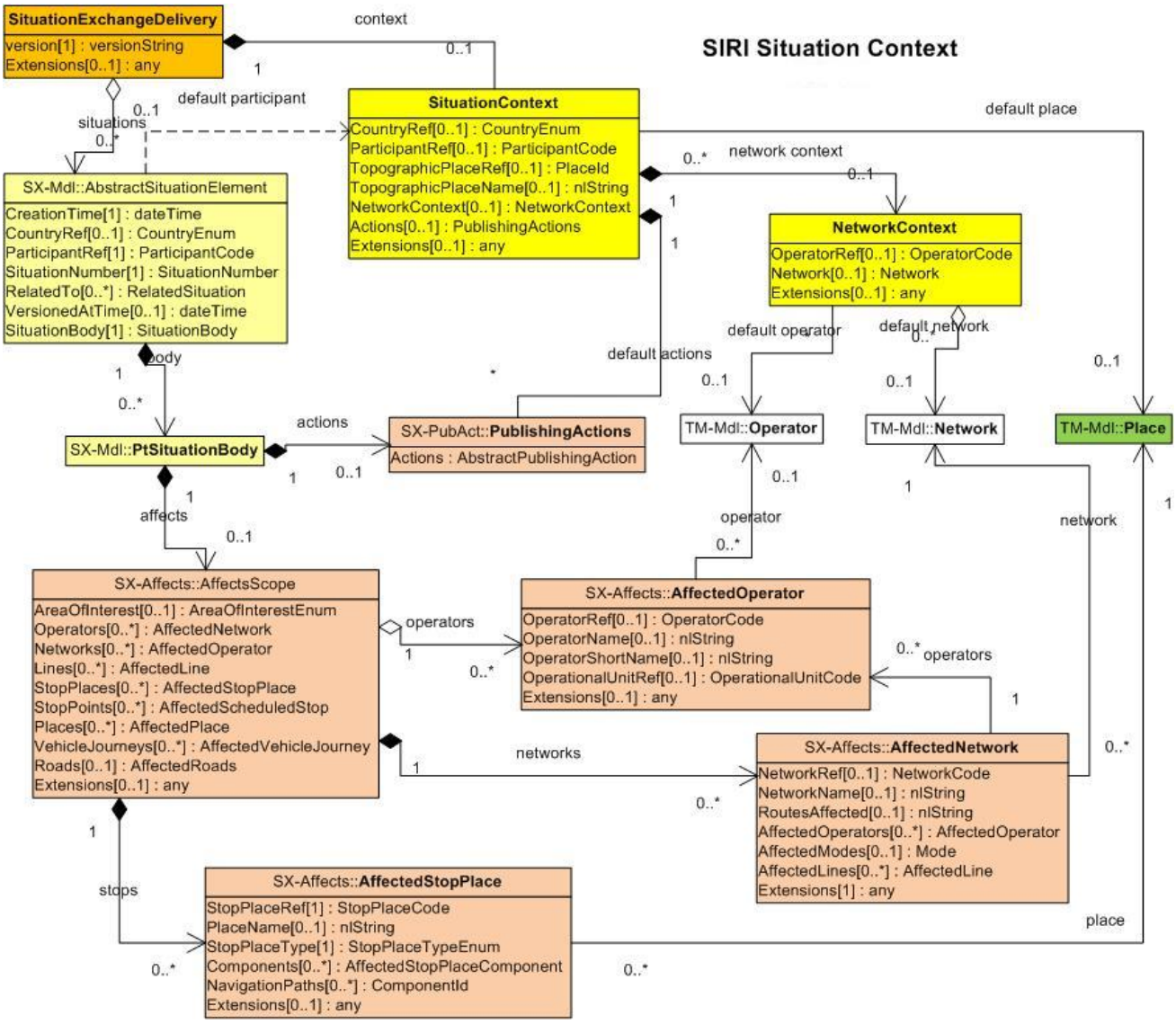

Figure 31 — UML Diagram of SituationContext

7.6 SituationExchangeRequest

7.6.1 SituationExchangeRequest Definition

The ***SituationExchangeRequest*** (Table 4) can be used in both a direct request, and for a subscription. If used for a subscription, additional Subscription Policy parameters apply.

Situations can be filtered by classification, network scope or a combination of both.

Table 4 — ExchangeRequest Elements

SituationExchangeRequest			*+Structure*	Request for information about facilities status
Attrib-utes	***Version***	**1:1**	*VersionString*	Version Identifier of Stop Monitoring Service, e.g. '1.0c'.
Messag e Id	***Request-Timestamp***	**1:1**	*xsd:dateTime*	See SIRI Part 2 Common properties of SIRI Functional Service Requests.
	Message-Identifier	0:1	*Message-Qualifier*	
Topic	***Preview-Interval***	0:1	*Positive-DurationType*	Forward duration for which Situations should be included, that is, only Situations that start before the end of this window time will be included
	StartTime	0:1	*xsd:dateTime*	Initial start time for ***PreviewInterval***. If absent, then current time is assumed. Must be within data Horizon.
	VehicleMode	0:1	*→ModeCode*	The Mode for which Situations will be returned. Default is all
	SubMode	0:1	*→ModeCode*	The Submode for which Situations will be returned. Default is all
	Severity	0:1	*enums*	Severity filter value to apply: only Situations with a severity greater than or equal to the specified value will be returned. See TPEG severities. Default is all.
	Predictability	0:1	*planned | unplanned | both*	Whether just planned, unplanned or both Situations will be returned.
	Keywords	0:*	*string*	Any arbitrary filter keywords to use.
	Situation-StatusFilter			
	Situation-NetworkFilter	0:1	*→structure*	Filter the results to include only Situations relating to the network filter elements
	Situation-StopPlace-Filter	0:1	*→structure*	Filter the results to include only Situations for the given stop place filter elements..
	Situation-JourneyFilter	0:1	*→structure*	Filter the results to include only Situations relating to the given Vehicle Journey filter elements.
	Situation-PlaceFilter	0:1	*→structure*	Filter the results to include only Situations relating to the given Place filter elements.
	Situation-RoadFilter	0:1	*→structure*	Filter the results to include only Situations relating to the given Road filter elements.
	Accessibility NeedFilter	0:*	User	Filter the results to include only Situations marked as affecting these needs
	UserNeed	0:1	UserNeed	Filter the results to include only Situations marked as affecting this User need. User Need can include exclude/include flag.
Request Policy	***Language***	0:1	*xml:lang*	Preferred language in which to return text values. Optional SIRI capability: *NationalLanguage*.
	Maximum-NumberOf-Situations	0:1	*xsd:positive-Integer*	The maximum number of ***SituationElements*** to includes in a given delivery. The n most recent Events within the look ahead window are included.
any	***Extensions***	0:1	any	Placeholder for user extensions.

7.6.2 SituationStatusFilter Definition

The ***Situation***Status***Filter*** (Table 5) can be used in both a direct request, and for a subscription. It specifies any status filtering parameters. Values are logically ANDed together

Table 5 — SituationStatusFilter Elements

SituationStatusFilter			*+Structure*	Filter values for Network elements
Filter	***Verification***	0:1	verified | unverified | unknown	Whether incident has been verified or not. If not specified return all.
	Progress	0:*	Closed | closing | open | published	ProgressStatus. One of a specified set of overall processing states assigned to situation. For example, 'Draft' for not yet published; 'Published' for live situations; 'Closed' indicates a completed situation. If not specified return open, published closing and closed. I
	Reality	0:1	Real | test | security Exercise | technicalExercise	Whether situation is real or a test. If not specified return all

7.6.3 SituationNetworkFilter Definition

The ***SituationNetworkFilter*** (Table 6) can be used in both a direct request, and for a subscription. It specifies any network filtering parameters. Values are logically ANDed together.

Table 6 — SituationNetworkFilter Elements

SituationNetworkFilter			*+Structure*	Filter values for Network elements
Filter	***OperatorRef***	0:1	*→Operator-Code*	Filter the results to include only Situations relating to the Operator.
	Operational-UnitRef	0:*	*→Operational UnitCode*	Filter the results to include only Situations relating to the Opera Operational torational Unit.
	NetworkRef	0:1	*→Network-Code*	Filter the results to include only Situations relating to the Operational Unit.
	LineRef	0:*	*→LineCode*	Filter the results to include only Situations for the given line.
	StopPointRef	0:1	*→StopPoint-Code*	Filter the results to include only Situations relating to the Stop Point or Stop Area.
	Connection-LinkRef	0:*	*→Connection-LinkCode*	Filter the results to include only Situations relating to the given Connection Link

7.6.4 SituationStopPlaceFilter Definition

The ***SituationStopPlaceFilter*** (Table 7) can be used in both a direct request, and for a subscription. It specifies any StopPlace filtering parameters. Values are logically ANDED together

Table 7 — SituationStopPlaceFilter Elements

SituationStopPlaceFilter			*+Structure*	Filter values for Network elements
Filter	***StopPlaceRef***	0:1	*→StopPlaceCode*	Filter the results to include only Situations relating to the StopPlace.
	StopPlace-Component-Ref	0:1	*→Operational UnitCode*	Filter the results to include only Situations relating to the Opera Operational torational Unit.
	FacilityRef	0:1	*→FacilityCode*	Filter the results to include only Situations relating to the Operational Unit.

7.6.5 SituationJourneyFilter Definition

The ***SituationJourneyFilter*** (Table 8) can be used in both a direct request, and for a subscription. It specifies any journey filtering parameters. Values are logically ANDed together

Table 8 — SituationJourneyFilter Elements

SituationJourneyFilter			*+Structure*	Filter values for Journey elements
Filter	***Vehicle-JourneyRef***	0:1	*→Vehicle-JourneyCode*	Filter the results to include only Situations relating to the given Vehicle Journey.
	Interchange-Ref	0:1	*→Interchange Code*	Filter the results to include only Situations relating to the given Interchange.
	VehicleRef	0:1	*→Vehicle-Code*	Filter the results to include only Situations relating to the given Vehicle

7.6.6 SituationPlaceFilter Definition

The ***SituationPlaceFilter*** (Table 7) can be used in both a direct request, and for a subscription. It specifies any Place filtering parameters. Values are logically ANDedtogether

Table 9 — SituationPlaceFilter Elements

SituationStopPlaceFilter			*+Structure*	Filter values for Network elements
Filter	***CountryRef***	0:1	*→CountryeCode*	Unique identifier of a Country where incident takes place If specified only incidents that affect this place country will be returned
	PlaceRef	0:1	*→PlaceCode*	Identifier of Topographic Locality. Only incidents which are deemed to affect this place will be returned
	Location	0:2	*→location*	Bounding box of an arbitrary area . Only incidents geocoded as falliing within area will be included.

7.6.7 SituationExchangeRequest Example

The following is an example of a ***SituationExchangeRequest*** to obtain all the Situations for a line.

```
    <ServiceRequest">
        <!--======ENDPOINT REFERENCES================================-->
        <RequestorRef>NADER</RequestorRef>
        <RequestTimestamp>2004-12-17T09:30:47-05:00</RequestTimestamp>
<SituationExchangeRequest version="1.1">
    <RequestTimestamp>2004-12-17T09:30:47-05:00</RequestTimestamp>
    <!--=======TOPIC ==================================== -->
    <NetworkRef>LUL</NetworkRef>
</SituationExchangeRequest>
    </ServiceRequest>
```

7.7 SituationExchangeSubscriptionRequest

7.7.1 SituationExchangeSubscriptionRequest Definition

The ***SituationExchangeSubscriptionRequest*** requests the asynchronous delivery of the information described by a ***SituationExchangeRequest***. The ***SituationExchangeSubscriptionRequestPolicy*** parameters control the processing of the subscription.

Table 10 — SituationExchangeSubscriptionRequest Parameters

Situation ExchangeMonitoring-SubscriptionRequest			*+Structure*	Request for a subscription to the Vehicle Monitoring Service.
Identity	***SubscriberRef***	0:1	*→Participant-Code*	See SIRI Part 2 Common ***SubscriptionRequest*** parameters.
	Subscription-Identifier	**1:1**	*Subscription-Qualifier*	
Lease	***InitialTermination-Time***	**1:1**	*xsd:dateTIme*	
Request	***SituationExchange Request***	**1:1**	*+Structure*	See ***SituationExchangeRequest***.
Policy	***Incremental-Updates***	0:1	*xsd:boolean*	Whether the producer should only provide updates to the last data returned, i.e. additions, modifications and deletions, or always return the complete set of current data, Default is true, i.e. once the initial transmission has been made, return only incremental updates. If *false* each subscription response will contain the full information as specified in this request. Optional SIRI capability: *IncrementalUpdates.*

7.7.2 SituationExchangeSubscriptionRequest Example

The following is an example of a ***SituationExchangeSubscriptionRequest***.

```
<SubscriptionRequest>
    <!--=======ENDPOINT REFERENCES================================-->
    <RequestorRef>NADER</RequestorRef>
    <RequestTimestamp>2004-12-17T09:30:47-05:00</RequestTimestamp>
    <!-- Subscription 1 for SPR55 -->
    <SituationExchangeSubscriptionRequest>
        <SubscriptionIdentifier>00000456</SubscriptionIdentifier>
        <InitialTerminationTime>2004-12-17T09:30:47-05:00</InitialTerminationTime>
        <!-- ====== ENDPOINT REFERENCE ======================-->
        < SituationExchangeRequest version="1.1">
            <RequestTimestamp>2004-12-17T09:30:47-05:00</RequestTimestamp>
            <!--========TOPIC ================================== -->
            <Severity>high</ Severity >
            <AccessibilityNeedFilter><UserNeed>wheelChair><UserNeed></ AccessibilityNeedFilter >
        </SituationExchangeRequest>
    </SituationExchangeSubscriptionRequest>
    <!-- Subscription 2 for SPR56 -->
    <SituationExchangeSubscriptionRequest>
        <SubscriptionIdentifier>00000456</SubscriptionIdentifier>
        <InitialTerminationTime>2004-12-17T09:30:47-05:00</InitialTerminationTime>
        <!-- ====== ENDPOINT REFERENCE ======================-->
</SubscriptionRequest>
```

7.8 SituationExchangeDelivery

The ***SituationExchangeDelivery*** returns the Situations which meet the filter criteria.

7.8.1 ServiceDelivery with a SituationExchangeDelivery

One or more ***SituationExchangeDelivery*** elements may be returned as part of a SIRI ***ServiceDelivery***, with a common ***ResponseTimestamp***.

Table 11 — ServiceDelivery / SituationExchangeDelivery Elements

ServiceDelivery			*+Structure*	See SIRI Part 2-7.2.1 ***ServiceDelivery***
HEADER	*:::*	**1:1**	See ServiceDelivery	
Payload	***SituationExchangeDelivery***	**1:***	*+Structure*	See ***SituationExchangeDelivery*** element.

7.8.2 SituationExchangeDelivery Element

A ***SituationExchangeDelivery*** is made up of zero, one or many ***Situation*** elements, each representing a Situation or an Update to a Situation.

The ***PtSituationContext*** can be used to declare values that are common to all situations, for example the network.

Table 12 — SituationExchangeDelivery Elements

SituationExchangeDelivery			*+Structure*	Describes the status of facilities.
Attributes	***version***	**1:1**	*VersionString*	Version Identifier of Situation Exchange Service. Fixed, e.g. '1.1a'.
LEADER	***:::***	**1:1**	xxx*ServiceDelivery*	See SIRI Part 2-7.2.1.1 xxx***ServiceDelivery***.
Payload	***PtSituation-Context***	0:1	*+Structure*	Describes values that are common to all situations in the delivery
	PtSituationElement	0:*	*+Structure*	Describes a Situation
any	***Extensions***	0:1	any	Placeholder for user extensions.

7.8.3 SituationContext Element

The ***PtSituationContext*** can be used optionally to declare default values that are common to all situations within the ***SituationDelivery***, for example the ***Participant***, ***Network*** and common ***PublishingActions***.

Table 13 — PtSituationContext Elements

PtSituationContext			*+Structure*	Describes a Context
Identity		0:1	*enum*	Unique identifier of system publishing situation delivery. If situations from other participants are included in delivery, then of immediate publisher must be given here.
Place	***Topographic-PlaceRefo***	0:1	➔*Topographic-PlaceCode*	Topographic Place that applies to Situations, e.g. London
	PlaceName	0:1	*nlString*	Name of Place
	NetworkContext	0:1	*+Structure*	Network context. See below
Actions	***PublishingActions***	0:*	*many*	One or more publishing actions to apply to all situations.
	Publishing-Action	0:1	*+Structure*	Distribution actions to disseminate situation. Defaults to apply to all Situations. See below.
any	***Extensions***	0:1	any	Placeholder for user extensions.

7.8.4 SituationNetworkContext Element

The ***NetworkContext*** can be used optionally to declare network values that are common to all situations within the ***SituationDelivery.*** These in effect provide defaults***.***

Table 14 — NetworkContext Elements

PtNetworkContext				*+Structure*	Describes a Context
Operator	***Operators***		0:*	*+Structure*	
		Operator	0:1	*+Structure*	Affected Operator. See Below
Network	***Network***		0:1	*+Structure*	Network about which situations apply. See AffectedNetwork Element below
		NetworkRef	0:1	➔*NetworkCode*	Identifier of Network
		NetworkName	0:1	*nlString*	Name of network
Mode		***VehicleMode***	0:1	*enum*	VehicleMode. See later below
		SubMode	0:1	*enum*	Transport Sub Mode. See later below
		AccessMode	0:1	*enum*	Access mode. See later below
any	***Extensions***		0:1	*any*	Placeholder for user extensions.

7.8.5 PtSituationElement

In the SIRI-SX model, the ***PtSituation*** element (see Table 14) is the main container for all the situation content of a PT situation and aggregates the ***SituationElement (BaseSituationElement,*** *or* ***UpdateSituationElement)***, ***SituationStatus, PtSituationBody***, ***TemporalGroup***, ***ClassifierGroup***, as shown in Figure 12.

Table 15 — Situation Element

PtSituationElement				*+Structure*	Disruption affecting services.
Log	***CreationTime***		1:1	*dateTime*	Time of creation of Situation
Identity	***CountryRef***		0:1	➔*CountryCode*	Country code of Participant
	ParticipantRef		1:1	➔*Participant-Code*	Identifier of participant system that creates Situation. See Part 2. Unique within Country
	SituationNumber		1:1	*Situation-Numberr*	Unique Identifier of Situation within Participant
	UpdateCountryRef		0:1	➔*CountryCode*	Country code of Participant that creates Update if different from ***CountryRef***.
	UpdateParticipant-Ref		0:1	➔*Participant-Code*	Identifier of participant system that creates Update if different from ***ParticipantRef***. See Part 2.
	SituationVersion		0:1	*Version*	Version of Update Situation element
Xref	***References***		0:1	*many*	Associations with other Situations.
		RelatedToRef	0:*	*+Related-Situation*	A reference to another Situation with an indication of the nature of the association, e.g. a cause, a result.

Table 15 *(continued)*

Source	***SituationSource***	0:1	*+Structure*	Source of Situation content. See below.
Status	***Verification***	0:1	*enum*	Whether the situation has been verified.
	Progress	0:1	*enum*	Status of Situation. See below.
	QualityIndex	0:1	*enum*	Assessment of likely correctness of data.
	Reality	0:1	*enum*	Whether situation is real or a test.
	Likelihood	0:1	*enum*	Likelihood to ascribe to a future situation.
Temporal Group	***ValidityPeriod***	0:*	*range*	On or more Overall inclusive Period of applicability of situation
	Start	0:1	*dateTime*	The (inclusive) start time stamp.
	End	0:1	*dateTime*	The (inclusive) end time stamp. If omitted, the range end is open-ended, that is, it should be interpreted as "forever".
	Repetitions	0:*	*DayType*	Situation applies only on the repeated day types within the overall validity period(s). For example Sunday.
	DayType	1:1	*enum*	Tpeg DayType pti 34
	PublicationWindow	0:1	*range*	Publication Window for situation if different from validity period. Period during which audience is informed of situation may start before or after situation
	Start	0:1	*dateTime*	The (inclusive) start time stamp.
	End	0:1	*dateTime*	The (inclusive) end time stamp. If omitted, the range end is open-ended, that is, it should be interpreted as "forever".
Classifier Group	***Reason***		*enum*	Nature of Situation – TPEG Reason Code See below.
	SubReason	0:1	*enum*	Subclassification of Nature of Situation. See below.
	ReasonName	0:1	*string*	Text explanation of situation reason. Not normally needed.
	Severity	0:1	*enum*	Severity of Situation. Corresponds to TPEG Pti26 severities. Default is normal.
	Priority	0:1	*enum*	Arbitrary rating of priority of message if different from severity 1-High. Note this can be used for Datex2 ***Urgency*** levels 1=extremelyUrgent 2= urgent 3= normal
	Sensitivity	0:1	*enum*	Confidentiality of situation.
	Audience	0:1	*enum*	Intended audience of situation.
	ReportType	0:1	*enum*	Report type of situation Corresponds to TPEG Pti27.
	ScopeType	0:1	*enum*	Scope type of situation. See below.
	Planned	0:1	*boolean*	Whether the situation was planned (e.g. engineering works) or unplanned (e.g. service alteration). Default is false, i.e. unplanned.

Table 15 *(continued)*

	Keywords	0:*	*string*	Arbitrary application specific classifiers.
Description Group	***Language***	0:1	*lang*	Default Language of descriptions
	Summary	0:1	*DefaultedText*	Summary of situation. If absent should be generated from structure elements / and or by condensing Description. For use of defaulted text see below.
	Description	0:1	*DefaultedText*	Description of situation. Should not repeat any strap line included in Summary See below.
	Detail	0:1	*DefaultedText*	Additional descriptive details about the situation. For use of defaulted text see below.
	Advice	0:1	*DefaultedText*	Further advice to passengers. For use of defaulted text see below.
	Internal	0:1	*DefaultedText*	Further advice to passengers. For use of defaulted text see below.
	Image	0:*	*Image*	Image for description. See below.
	InfoLink	0:*	*InfoLink*	Further web links. See below.
Scope	***AffectsScope***	0:1	*+Structure*	Scope model identifying parts of transport network affected by situation. See below.
Consequence	***Consequences***	0:1	*many*	One or more consequences.
	Consequence	0:*	*+Structure*	Consequence of the situation. See below.
Actions	***PublishingActions***	0:1	*many*	One or more publishing actions.
	PublishingAction	0:*	*+Structure*	Distribution actions to disseminate situation. See below.
any	***Extensions***	0:1	any	Placeholder for user extensions.

7.8.5.1 RelatedSituation Element

The ***RelatedSituation*** element can be used to cross-reference the situation with other Situations:

Table 16 — RelatedSituation Element

RelatedSituation			*+Structure*	Cross-reference
Log	***Creation Time***	0:1	*dateTime*	Time of creation of 'related to' association.
Identity	***CountryRef***	0:1	*→Country-Code*	Country code of Participant
	ParticipantRef	1:1	*→Participant-Code*	Identifier of participant system that creates Situation. See Part 2. Unique within country.
	SituationNumber	1:1	*Situation-Numberr*	Identifier of Situation
	UpdateCountryRef	0:1	*→CountryCod e*	Country code of Participant that creates Update if different from ***CountryRef***.
	UpdateParticipant-Ref	0:1	*→Participant-Code*	Identifier of participant system that creates Update if different from ***ParticipantRef***. See Part 2.
	SituationVersion	0:1	*Version*	Version of Update Situation element
Details	***RelatedAs***	0:1	*enum*	Relationship of reference to the referencing Situation e
any	***Extensions***	0:1	any	Placeholder for user extensions.

7.8.5.1.1 RelatedAs Type

The ***RelatedAs*** value describes the nature of the relationship of the Situation Element with the referenced Situation. See Table 19.

Table 17 — Allowed Values for RelatedAs Type

SIRI-SX	Description
cause	Referenced situation was a cause of the referencing Situation.
effect	Referenced situation was a result of the referencing Situation.
correctionTo	Referenced situation contained erroneous data which is corrected by the referencing situation.
update	Referenced situation provides update information to the base Situation of the referencing Situation Update.
supercedes	Referenced situation supersedes the referencing Situation.
supercededBy	Referenced situation is superceded by the referencing Situation.
associated	Referenced situation is associated with the referencing Situation non causally

7.8.5.2 SituationSource Element

The ***SituationSource*** element (Table 18) provides information about the person or system who supplied the information contained in the situation. This may have been captured as part of the logging process, and may be significant for verifying, interpreting or processing the situation, as well as for audit purposes:

Table 18 — SituationSource Element

SituationSource			*+Structure*	Where the information about the Situation came from.
	Country	0:1	*enum*	Country of origin of source element. IANA code
	SourceType	1:1	*enum*	Nature of Source communication type. See below.
	SourceMethodType	0:1	*enum*	How the source obtained the information. See below.
	Phone	0:1	*email*	Email of Supplier of information.
	Fax	0:1	*phoneNumber*	Fax number of Supplier of information.
	Web	0:1	*anyURL*	Fax number of Supplier of information.
	Web	0:1	*string*	Other information about source.
	Other	0:1	*string*	Other information about source situation
	Name	0:1	*string*	Name for source.
	Name	0:1	*string*	Name of source.
	TimeOfObservation	0:1	*dateTime*	Time of observation of situation, if earlier than time of communication.
	TimeOfObservation	0:1	*dateTime*	Time of observation of situation, if earlier than time of communication of Situation Element.
	ExternalCode	0:1	*string*	External system reference to situation.
	SourceFile	0:1	*anyURL*	External system reference to situation.
	Extension	0:1	*any*	Placeholder for user extensions.

7.8.5.2.1 Situation Source Type

SourceType value describes the type of information source that provided the Situation information. See Table 19.

Table 19 — Allowed Values for Source Type

SIRI-SX	Description
directReport	Report came in person
email	Report came by email person
phone	Report came by phone
fax	Report came by fax
post	Report came by post
feed	Report came by automated feed
radio	Report came from radio
tv	Report came from tv
web	Report came from web site
pager	Report came by pager
text	Report came by text message
other	Report came by other means

7.8.5.2.2 Situation Source Method Type

SourceMethodType value describes the type of information source that detected the Situation information. See Table 19.

Table 20 — Allowed Values for Source Sub type

SIRI-SX	Description	Datex2 Source Type
automobileClubPatrol	Source was an Automobile Club Patrol Source was	*automobileClubPatrol*
cameraObservation	Source was a Camera Observation	*cameraObservation*
freightVehicleOperator	Source was a Freight Vehicle Operator	*freightVehicleOperator*
inductionLoopMonitoringStation	Source was an Induction Loop Monitoring Station	*inductionLoopMonitoringStation*
microwavedMonitoringStation	Source was a Microwaved Monitoring Station	*microwavedMonitoringStation*
mobileTelephoneCaller	Source was a Mobile Telephone Caller	*mobileTelephoneCaller*
nonPoliceEmergencyServices-Patrol	Source was a Non Police Emergency Services Patrol	*nonPoliceEmergencyServices-Patrol*
otherInformation	Source was Other	*otherInformation*
otherOfficialVehicle	Source was an Official Vehicle other than a police patrol	*otherOfficialVehicle*
policePatrol	Source was a Police Patrol	*policePatrol*
privateBreakdownService	Source was a Private Breakdown Service	*privateBreakdownService*
publicAndPrivateUtilities	Source was a Public And Private Utility	*publicAndPrivateUtilities*
registeredMobileObserver	Source was a Registered Mobile Observer	*registeredMobileObserver*
roadAuthorities	Source was a Road Authority	*roadAuthorities*
roadOperatorPatrol	Source was a Road Operator Patrol	*roadOperatorPatrol*
roadsideTelephoneCaller	Roadside Telephone Caller	*roadsideTelephoneCaller*
spotterAircraft	Source was a Spotter Aircraft	*spotterAircraft*
trafficMonitoringStation	Source was a Traffic Monitoring Station	*trafficMonitoringStation*
transitOperator	Source was a Transit Operator	*transitOperator*
vehicleProbeMeasurement	Source was a Vehicle Probe Measurement	*vehicleProbeMeasurement*
videoProcessingMonitoring-Station	Source was a Video Processing Monitoring Station	*videoProcessingMonitoring-Station*

7.8.5.3 Situation Status Elements

The ***SituationStatus*** provides information about the status of the situation, allowing systems to process the Situation appropriately.

7.8.5.3.1 Verification Element Values (TPEG Pti32)

Verification describes whether the Situation has been verified. Values are based on TPEG pti32. See Table 21.

Table 21 — Allowed Values for Verification (TPEG Pti32)

SIRI-SX	Description	TPEG Pti32
unknown	Status is unknown	pti32_0
unverified	Situation is not verified	pti32_1
verified	Situation has been verified	pti32_255
verifiedAsDuplicate	Situation has been verified as a duplicate	v

7.8.5.3.2 Progress Element Values

Progress describes the Life Cycle status of the Situation (see 5.4.2). The values are based on TPEG pti32. See Table 22. The Progress status allows distributed workflow applications to coordinate their handling of live situations.

Table 22 — Allowed Values for Situation Progress

SIRI-SX	Description	
draft	Content is being drafted	
pendingApproval	Content is pending approval	
approvedDraft	Content is approved	
open	Situation is open	
published	Situation is open and published	
closing	Situation is in the process of closing	
closed	Situation is closed	

7.8.5.3.3 QualityIndex Element Values

QualityIndex ascribes a certainty level to the information. The values are based on those used in Trident and can be equated to the Datex2 ProbabilityOfOccurrence, see Table 23.

Table 23 — Allowed Values for QualityIndex (Trident)

SIRI-SX	Description	ProbabilityOfOccurrence
certain	Information is certain	
veryReliable	Certainty is	*veryReliable*
reliable	Certainty is Reliable	*reliable*
probablyReliable	Certainty is Probably Reliable	*probable*
improbable	Not confirmed	*unconfirmed*

7.8.5.3.4 Reality Element Values

Reality states whether the situation is real, or is a test of either just the information system, or a process and the information system. The values are based on those used in Datex2 ***InformationStatus***. See Table 24.

Table 24 — Allowed Values for Reality / InformationStatus (Datex2)

SIRI-SX	Description	Datex2 InformationStatus
real	Situation is real	*real*
securityExercise	Situation is a real-world security exercise	*securityExercise*
technicalExercise	Situation is a real-world technical exercise	*technicalExercise*
test	Situation is not real	*test*
unconfirmed	Uncertain	*unconfirmed*

7.8.5.3.5 Likelihood Element Values

Likelihood ascribes a certainty level to a future event. The values are the same as those used Datex2 ***ProbabilityOfOccurrence***. See Table 25.

Table 25 — Allowed Values for ProbabilityOfOccurrence (Datex2)

SIRI-SX	Description	Datex2 ProbabilityOfOccurrence
certain	Event is will definitely happen	*certain*
probable	Event is likely is very likely	*probable*
riskOf	Risk of event happening	*riskOf*
improbable	Uncertain	*improbable*

7.8.5.4 Situation Temporal Elements

The temporal group elements provide information about the time and duration over which the situation applies. The time during which a Situation is displayed to the public (***PublicationWindow***) can be distinct from the time of validity – for example; a Situation may be captured with an embargo date before which it will not be published. Note also that there can be separate validity periods on ***Disruption*** elements describing different effects of the situation. A Situation may include long term situations that are repeated on particular day types, e.g. ***engineering*** works on certain days of the week.

7.8.5.4.1 Day Type Element Values (TPEG Pti34)

DayType specifies a day on which the Situation may apply within the validity period This can be used for example to specify the temporal scope of engineering works which repeat every repeating weekend within a six month period. The values are based on TPEG pti34. See Table 26.

Table 26 — Allowed Values for DayType (TPEG pti 34)

SIRI-SX	Pti34	TPEG
unknown	34_0	Unknown
monday	34_1	Monday
tuesday	34_2	Tuesday
wednesday	34_3	Wednesday
thursday	34_4	Thursday
friday	34_5	Friday
saturday	34_6	Saturday
sunday	34_7	Sunday
weekdays	34_8	Weekdays
weekends	34_9	Weekends
holiday	34_10	Holiday
publicHoliday	34_11	Public Holiday
religiousHoliday	34_12	Religious Holiday
federalHoliday	34_13	Federal Holiday
regionalHoliday	34_14	Regional Holiday
nationalHoliday	34_15	National Holiday
mondayToFriday	34_16	Monday To Friday
mondayToSaturday	34_17	Monday To Saturday
sundaysAndPublicHolidays	34_18	Sundays & Public Holidays
schoolDays	34_19	School Days
everyDay	34_20	Every Day
undefinedDayType	34_255	Undefined DayType

7.8.5.5 Situation Classifier Elements

The classifier elements provides detailed information about the nature and severity of the situation. Where possible these are based on systematic TPEG classifications, allowing SIRI-SX situations to be exchanged into and out of TPEG format with precise semantics.

TPEG based elements include: ***ReasonGroup***, ***Severity***, ***ReportType.***

Datex2 based elements include ***AreaOfInterest, Urgency.***

Additional elements allow further classification of the situation: ***Priority***, ***Sensitivity***, ***Audience***, and ***Keywords.***

7.8.5.5.1 Severity Element Values (TPEG Pti26)

Situation ***Severity*** ascribes a severity Situation. The values are based on TPEG Pti36. See Table 27.

Table 27 — Allowed Values for Severity (TPEG pti26)

SIRI-SX	Description	TPEG Pti26	Datex2.OverallImpact
unknown	unknown	0	
verySlight	very slight	1	lowest
slight	slight	2	low
normal	normal	3	normal
severe	severe	4	high
verySevere	very severe	5	highest
noImpact	no impact	6	
normal	normal	255	

7.8.5.5.2 Audience

Situation ***Audience*** describes any limitations as to whom the Situation is meant to be distributed. This can be used to filter or route the distribution to interested parties. The values correspond to Datex2 ***Confidentiality***. See Table 28.

Table 28 — Allowed Values for Audience

SIRI-SX	Description	Datex2 Confidentiality
public	Of interest to public.	noRestriction
emergencyServices	Primarily of interest for emergency services.	
staff	Primarily of interest for operator staff.	internalUse
stationStaff	Primarily of interest for station staff.	
management	Primarily of interest for operator management.	
authorities	Transport Authorities	restrictedToAuthorities
infoServices	Transport and Traffic operators and information service providers	restrictedToAuthoritiesTrafficOperators andPublishers
transportOperators	Transport and Traffic operators	restrictedToAuthoritiesAndTrafficOperators

7.8.5.5.3 Sensitivity

Situation ***Sensitivity*** *d*escribes any news sensitivity on the Situation content. This can be used to filter or route the distribution to interested parties. For example, security sensitive issues could be flagged. See Table 29.

Table 29 — Allowed Values for Sensitivity

SIRI-SX	Description
veryHigh	Situation is very sensitive
high	Situation is sensitive
medium	Situation is of average sensitiveness
low	Situation is not very sensitive
veryLow	Situation is not of a sensitive nature

7.8.5.5.4 ReportType (TPEG Pti27)

Situation ***ReportType*** describes the nature of the Situation. The values are based on TPEG pti27: report Types. See Table 30.

Table 30 — Allowed Values for ReportType (TPEG Pti27)

SIRI-SX	Description	Pti27
unknown	predictable	27_1
route	Situation concerns a route	27_2
network	Situation concerns a route	27_3
point	Situation concerns a point	27_4
individualService	Situation concerns an individual service	27_255
undefined		27_1

7.8.5.5.5 ScopeType

Situation ***ScopeType*** further describes the nature of the Situation. This can be used to filter or route the distribution to interested parties and to construct descriptions. It can be regarded a expanding on the ***ReportType*** and summarising the nature of the references included in the ***AffectsScope*** element. See Table 31.

Table 31 — Allowed Values for Situation ScopeType

SIRI-SX	Description
general	Situation has a general scope
operator	Situation scope is a specific OPERATOR
network	Situation scope is whole network
route	Situation scope is a specific route
line	Situation scope is a specific LINE
place	Situation scope is a specific PLACE
StopPlace	Situation scope is a specific STOP PLACE
stopPlaceComponent	Situation scope is a specific STOP PLACE COMPONENT
stopPoint	Situation scope is a specific STOP POINT
vehicleJourney	Situation scope is a specific VEHICLE JOURNEY
datedVehicleJourney	Situation scope is a specific DATED VEHICLE JOURNEY
connectionLink	Situation scope is a specific CONNECTION LINK
interchange	Situation scope is a specific Interchange between journeys

7.8.5.5.6 Situation Reason

A Situation ***Reason*** provides taxonomic information about the cause of the situation. Each situation is assigned a single Reason type. A two level classification system is used corresponding to the TPEG PTI ontology. Each main reason type (***PersonnelReason***, ***EquipmentReason***, ***EnvironmentReason*** etc) contains a set of subtypes that explain the reason in more detail; for example for ***EnvironmentReason*** , includes *heavySnow, rain, fog, flooding,* etc.

Arbitrary reasons are represented by an ***OtherReason***.

The following tables show the allowed values for Reasons

7.8.5.5.6.1 Reason list (TPEG Pti18)

There are six main Reason types as described by TPEG Pti18 - Event reason. See Table 32.

Table 32 — Types of Reason (TPEG Pti18)

SIRI-SX	TPEG	Pti18	Further Details	Datex2 CauseType
UnknownReason	unknown	0		
MiscellaneousReason	miscellaneous event reason	1	Pti 19	*accident, congestion, vandalism, obstruction, roadsideEvent, problemsAtBorderPost, problemsAtCustomPost*
PersonnelReason	personnel event reason	2	Pti 20	
EquipmentReason	equipment event reason	3	Pti 21	*equipmentFailure*
EnvironmentReason	environment event reason	4	Pti 22	*poorWeather, InfrastructureFailure*
UndefinedReason	undefined event reason	255		

7.8.5.5.6.2 MiscellaneousReason (TPGE Pti19)

TPEG Pti19 (Miscellaneous Event Type) enumerates miscellaneous reasons for situations – See Table 33.

Table 33 — Allowed Values for MiscellaneousReason (TPEG Pti19)

Group	*SIRI-SX*	Pti19	TPEG	Datex2 CauseType	Datex2 Disturbance Activity
Miscell-aneous	*unknown*	0	unknown		
	incident	1	incident		
	bombExplosion	2	bomb explosion	*terrorism*	*explosion*
	securityAlert	3	security alert	*securityIncident*	*securityAlert*
	fire	4	fire		
	vandalism	5	vandalism	*vandalism*	*asset-Destruction*
	accident	6	accident	*accident*	
	overcrowded	7	overcrowded		*crowd*
	insufficientDemand	8	insufficient demand		
	lightingFailure	9	lighting failure		
	leaderBoardFailure	10	leader board failure		
	serviceIndicatorFailure	11	service indicator failure		
	serviceFailure	12	service failure		
	operatorCeasedTrading	13	operator ceased trading		
	operatorSuspended	14	operator suspended		
	congestion	15	congestion	*congestion*	
	routeBlockage	16	route blockage	*obstruction*	
	personOnTheLine	17	person on the line		
	vehicleOnTheLine	18	vehicle on the line		
	objectOnTheLine	19	object on the line		
	animalOnTheLine	20	animal on the line		
	routeDiversion	21	route diversion		
	roadClosed	22	road closed		
	roadworks	23	roadworks		
	specialEvent	24	special event	*roadsideEvent*	
	bridgeStrike	25	bridge strike		
	overheadObstruction	26	overhead obstruction		
	undefinedProblem	255	undefined problem	*infrastructure-Problem*	*other*

SIRI-SX augments these with some additional subreasons. – See Table 34.

Table 34 — Allowed Values for MiscellaneousReason Subreasons

Group	*SIRI-SX*	---	Subclass of TPEG	Datex2 CauseType	Datex2 Disturbance Activity
Miscell-aneous	*previous disturbances*	0_1	unknown		
TrainSafety Subreason	*safetyViolation*	1_1	incident		
	nearMiss	1_2	incident		
	signalPassedAtDanger	1_3	incident		
	stationOverrun	1_4	incident		
	trainDoor	1_5	incident		
	emergencyServicesCall	1_6	incident		
SecuritySub-Reason	*policeRequest*	3_1	security alert		
	fireBrigadeSafetyChecks	3_2	security alert		
	unattendedBag	3_3	security alert		
	telephonedThreat	3_4	security alert		
	suspectVehicle	3_5	security alert		
	civilEmergency	3_6	security alert		*civilEmergency*
	airRaid	3_7	security alert		*airRaid*
	sabotage	3_8	security alert		*sabotage*
	bombAlert	3_9	security alert		*bombAlert*
	attack	3_10	security alert		*attack*
	evacuation	3_11	security alert		*evacuation*
	terroristIncident	3_12	security alert		*terroristIncident*
	gunfireOnRoadway	3_13	security alert		*gunFireOnRoadway*
	explosion	3_14	security alert		*explosion*
	explosionHazard	3_15	security alert		*explosionHazard*
	securityIncident	3_16	security alert		*securityIncident*
	fireBrigadeOrder	3_17	security alert	*r*	
Accident Subreason	*fatality*	6_1	security alert		
	personUnderTrain	6_2	accident		
	personHitByTrain	6_3	accident		
	personIllOnVehicle	6_4	accident		
	emergencyServices	6_5	accident		
	collision	6_6	accident		
	linesideFire	4_1	fire		
Train-Obstruction-Subreason	*fallenTreeOnTheLine*	19_1	object on the line		
	vegetation	19_2	object on the line		
	trainStruckAnimal	19_3	object on the line		
	trainStruckObject	19_4	object on the line		
	levelCrossingIncident	18_1	vehicle on the line		
Roadworks subreason	*sewerageMaintenance*	23__1	roadworks		
	roadMaintenance	23__2	roadworks		
	asphalting	23__3	roadworks		
	paving	23__4	roadworks		

Table 34 *(continued)*

Special Event Subreason	*march*	24_1	special event		*March*
	procession	24_2	special event		*procession*
	demonstration	24_3	special event		*demonstration*
	publicDisturbance	24_4	special event		*publicDisturbance*
	filterBlockade	24_5	special event		*filterBlockade*
	sightseersObstructing-Access	24_6	special event		*sightseers-ObstructingAccess*
Bridge	*viaductFailure*	25_1	bridgeStrike		
Passenger Subreason	*passengerAction*	5_1	vandalism		
	staffAssault	5_2	vandalism		
	railwayCrime	5_3	vandalism		
	assault	5_4	vandalism		*assault*
	theft	5_5	vandalism		*theft*
	altercation	1_7	incident		*altercationOfVehicle-Occupants*
	illVehicleOccupants	1_8	incident		*illVehicleOccupants*
Border Process Subreason	*problemsAtBorderPost*	255_1	incident	*problemsAtBorderPost*	
	problemsAtCustomsPost	255_2	incident	*problemsAt-CustomsPost*	
	problemsOnLocalRoad	255_3	incident	*problemsOn-LocalRoad*	
Indirect Subreasons	*speedRestrictions*	255_1	incident	*speedRestrictions*	
	logisticProblems	255_2	incident	*logisticProblems*	

7.8.5.5.6.3 PersonnelReason (TPEG Pti20)

TPEG Pti19 (Personnel Problem) enumerates Personnel reasons for situations – See Table 36.

Table 35 — Allowed Values for PersonnelReason (TPEG Pti20)

Group	*SIRI-SX*	Pti20	TPEG	Datex2 Disturbance Activity
Personnel Reason	*unknown*	0	unknown	
	staffSickness	1	staff sickness	
	staffAbsence	2	staff absence	
	staffInWrongPlace	3	staff in wrong place	
	staffShortage	4	staff shortage	
	industrialAction	5	industrial action	*strike*
	workToRule	6	work to rule	*goSlowOperation*
	undefinedPersonnelProblem	255	undefined personnel problem	

SIRI-SX augments these with some additional subreasons – SeeTable 36.

Table 36 — Allowed Values for Personnel Subreasons

Personnel subReason	*staffInjury*	1_1	staff sickness
	contractorStaffInjury	1_1	staff sickness
	unofficialIndustrialAction	5_1	industrial action

7.8.5.5.6.4 EquipmentReason (TPEG Pti2)

TPEG Pti21 (Equipment Event Type) enumerates Equipment reasons for situations – See Table 37. SIRI-SX augments these with some additional subreasons.

Table 37 — Allowed Values for EquipmentReason (TPEG Pti21)

	SIRI-SX	*Pti21*	*TPEG*	*Datex2*
Equipment Reason	*unknown*	0	unknown	
	pointsProblem	1	points problem	
	pointsFailure	2	points failure	
	signalProblem	3	signal problem	
	signalFailure	4	signal failure	
	derailment	5	derailment	
	engineFailure	6	engine failure	
	breakDown	7	break down	
	technicalProblem	8	technical problem	
	repairWork	9	repair work	
	constructionWork	10	construction work	
	maintenanceWork	11	maintenance work	
	powerProblem	12	power problem	
	fuelProblem	13	fuel problem	
	swingBridgeFailure	14	swing bridge failure	
	escalatorFailure	15	escalator failure	
	liftFailure	16	lift failure	
	gangwayProblem	17	gangway problem	
	closedForMaintenance	18	closed for maintenance	
	fuelShortage	19	fuel shortage	
	deicingWork	20	de-icing work	
	wheelProblem	21	wheel problem	
	luggageCarouselProblem	22	luggage carousel problem	
	undefinedEquipmentProblem	255	undefined equipment problem	equipmentFailure

SIRI-SX augments these with some additional subreasons – See Table 39.

Table 38 — Allowed Values for EquipmentReason Subreasons

	SIRI-SX	***Pti21***	***TPEG***
Equipment Subreason	*tractionFailure*	6_1	engine failure
	defectiveTrain	6_2	engine failure
	slipperyTrack	21_1	*wheelProblem* failure
	trainWarningSystemProblem	3_1	signal problem
	trackCircuitProblem	3_2	signal problem
	Signal and Switch Failure	4_1	signal failure
	brokenRail	8_1	technical problem
	poorRailConditions	8_2	technical problem
	wheelImpactLoad	8_3	technical problem
	lackOfOperationalStock	8_4	technical problem
	defectiveFireAlarmEquipment	8_5	technical problem
	defectivePlatformEdgeDoors	8_6	technical problem
	defectiveCctv	8_7	technical problem
	defectivePublicAnnouncementSystem	8_8	technical problem
	ticketingSystemNotAvailable	8_9	technical problem
	levelCrossingFailure	8_10	technical problem
	trafficManagementSystemFailure	8_11	technical problem
	emergencyEngineeringWork	11_1	maintenance work
	lateFinishToEngineeringWork	11_2	maintenance work
	overheadWireFailure	12_1	powerProblem

7.8.5.5.6.5 EnvironmentReason (TPGE Pti22 Environment Event Type)

TPEG Pti21 enumerates Environmental reasons for situations – See Table 39.

Table 39 — Allowed Values for EnvironmentalReason (TPEG Pti22)

Group	*SIRI-SX*	*Pti22*	*TPEG*	*Datex2 Environmental Obstruction Type*
Environment Reason	*unknown*	0	unknown	
	fog	1	fog	
	roughSea	2	rough sea	
	heavySnowFall	3	heavy snow fall	
	heavyRain	4	heavy rain	
	strongWinds	5	strong winds	
	tidalRestrictions	6	tidal restrictions	
	highTide	7	high tide	
	lowTide	8	low tide	
	ice	9	ice	
	frozen	10	frozen	
	hail	11	hail	
	highTemperatures	12	high temperatures	
	flooding	13	flooding	*flooding*
	waterlogged	14	waterlogged	
	lowWaterLevel	15	low water level	
	highWaterLevel	16	high water level	
	fallenLeaves	17	fallen leaves	
	fallenTree	18	fallen tree	*fallenTrees*
	landslide	19	landslide	*landslips*
	undefinedEnvironmentalProblem	255	poorWeather	*other*

SIRI-SX augments these with some additional subreasons. See Table 40.

Table 40 — Allowed Values for EnvironmentalReason Subreasons

Group	*SIRI-SX*	Pti22	TPEG	*Datex2 Environmental Obstruction Type*
Environment Weather Subreason	*driftingSnow*	3_1	heavy snow fall	
	blizzardConditions	3_2	heavy snow fall	
	stormDamage	5_1	strong winds	*stormDamage*
	stormConditions	5_1	strong winds	
	slipperiness	9_1	ice	
	iceDrift	9_2	ice	
	glazedFrost	9_3	ice	
	lightningStrike	255_1	undefined environmental problem	
	avalanches	3_1	heavy snow fall	*avalanches*
	flashFloods	13_1	flooding	*flashFloods*
Environment ground Subreason	*mudslide*	19_1	landslide	*mudslide*
	rockfalls	19_2	landslide	*rockfalls*
	subsidence	19_3	landslide	*subsidence*
	earthquakeDamage	19_4	landslide	*earthquakeDamage*
	sewerOverflow	255_2	undefined environmental problem	*sewerOverflow*
	grassFire	255_3	undefined environmental problem	*grassFire*

7.8.5.5.6.6 PublicEvent Type

A Situation ***PublicEventType*** provides further taxonomic information about a public event which may be the cause or affect the situations.

7.8.5.5.6.6.1 Public Event Type (Datex2))

There are a number of event types as described by **Datex2 CauseType**
- Event reason. See Table 32.

Table 41 — Types of PublicEvent (Datex2 PublicEventType)

SIRI-SX	**Description**	**Datex2 CauseType**
athleticsMeeting	Athletics Meeting	*athleticsMeeting*
ballGame	Ball Game	*ballGame*
baseballGame	Baseball Game	*baseballGame*
basketballGame	Basketball Game	*basketballGame*
bicycleRace	Bicycle Race	*bicycleRace*
boatRace	Boat Race	*boatRace*
boxingTournament	Boxing Tournament	*boxingTournament*
bullFight	Bull Fight	*bullFight*
ceremonialEvent	Ceremonial Event	*ceremonialEvent*
concert	Concert	*concert*
cricketMatch	Cricket Match	*cricketMatch*
exhibition	Exhibition	*exhibition*
fair	fair	*fair*
festival	festival	*festival*
filmTVMaking	Film or TV on location	*filmTVMaking*
footballMatch	Football Match	*footballMatch*
funfair	funfair	*funfair*
golfTournament	Golf Tournament	*golfTournament*
hockeyGame	Hockey Game	*hockeyGame*
horseRaceMeeting	Horserace Meeting	*horseRaceMeeting*
internationalSportsMeeting	International Sports Meeting	*internationalSportsMeeting*
majorEvent	Major Event	*majorEvent*
marathon	marathon	*marathon*
market	market	*market*
match	match	*match*
motorSportRaceMeeting	Motor Sport Race Meeting	*motorSportRaceMeeting*
parade	Parade	*parade*
raceMeeting	Race Meeting	*raceMeeting*
rugbyMatch	Rugby Match	*rugbyMatch*
severalMajorEvents	Several Major Events	*severalMajorEvents*
show	show	*show*
showJumping	Show Jumping	*showJumping*
sportsMeeting	Sports Meeting	*sportsMeeting*
stateOccasion	State Occasion	*stateOccasion*
tennisTournament	Tennis Tournament	*tennisTournament*
tournament	tournament	*tournament*
tradeFair	Trade Fair	*tradeFair*
waterSportsMeeting	Water Sports Meeting	*waterSportsMeeting*
winterSportsMeeting	Winter Sports Meeting	*winterSportsMeeting*
other	other	*other*
flowerParade	*Flower Parade*	*(parade)*
rummageSale	*Rummage Sale*	*(market)*
carnival	*Carnival*	*(parade)*
fete	*Fete*	*(fair)*
Royal birthday		*majorEvent*
massWalk	Mass Walk	*(sportsMeeting)*
Cycle Tour		*(bicycleRace)*
Organised walk		*(sportsMeeting)*

7.8.5.6 Description Elements

The set of description elements provide a human readable text description of the situation. The provision of separate summary and detail elements enables a layered presentation in different formats and devices and for different contexts and audiences. Separate ***Summary***, ***Description***, ***Details***, ***Advice*** and ***Internal*** elements are provided

The ***Image*** and ***InfoLinks*** allow the association of other electronic presentation resources with the textual description.

7.8.5.6.1 Defaulted Text

In many cases it is possible to generate descriptive text for a situation automatically from the other structured elements such as the ***Reason*** and ***AffectsScope***. One of the benefits of a structured incident capture system is that in many cases the text explanation can be generated automatically from the structured content elements, allowing operators to produce consistent, high quality, error free explanations. Generation is also desirable as it allows for the automatic translation into different human languages.

For each descriptive text element a Defaulted Text data type is used which can indicate whether the text is the default text or a manually entered override.

Table 42 — DefaultedText Element

DefaultedText			*+Structure*	Overridable Text element
Identity	***lang***	0:1	*lang*	Language for text content.
	overridden	0:1	*boolean*	Whether the default text phrase has been overridden The ***overridden*** attribute indicate whether the text has been changed from the computer generated default - And therefore cannot be regenerated or translated automatically. This is useful to know because a text that has not been modified may be regenerated in different languages, and also may be processed in IVR speech systems using pre-recorded elements.
	string	0:1	*string*	Text content

7.8.5.6.2 Images

Each descriptive text element can be associated with one or more ***Image*** elements providing graphical resources relating to the situation. The images may be given a simple classification – See Table 44.

Table 43 — Image Element

Image			*+Structure*	Graphic Resource
	ImageRef	0:1	*anyUrl*	Reference to an image
	ImageBinary	0:1	*Base64Binary*	Embedded image in binary form
	ImageContent	0:1	*enum*	Classification of image. See **Error! Reference source not found.**

Table 44 — Allowed Values for ImageContent

SIRI-SX	Description
map	Image is a map
logo	Image is a logo
graphic	Image is other graphic

7.8.5.6.3 InfoLinks

Each descriptive text element can be associated with one or more ***InfoLink*** elements providing structured links to the resources relating to the situation**.** The links may be given a simple classification. See Table 46. Each link may have a single image associated with it.

Table 45 — Infolink Element

InfoLink			*+Structure*	Web Link
	Uri	1:1	*anyUrl*	Link url
	Label	0:1	*nlString*	label for link
	Image	0:1	*Image*	Image associated with link
	LinkContent	0:1	*enum*	Classification of link content. See Table 45

Table 46 — Allowed Values for LinkContent

Value	Description
other	Other
timetable	Link is to a timetable
relatedSite	Link is to a related Site
details	Link is to a page of further details

7.8.5.7 Consequence Element

The SIRI-SX ***Consequence*** element (See Table 47) represents a specific consequence for a PT incident. It aggregates the ***Consequence***, ***Blocking***, ***Boarding***, ***Advice***, ***Casualties*** and ***Easement*** elements shown in Figure 14.

Table 47 — SituationConsequence Element

Consequence			*+Structure*	Effect of a Situation on services.
Time	***Period***	0:*	*range*	On or more overall inclusive Period of applicability of consequence
	Start	0:1	*dateTime*	The (inclusive) start time stamp.
	End	0:1	*dateTime*	The (inclusive) end time stamp. If omitted, the range end is open-ended, that is, it should be interpreted as "forever".
Classifiers	***Condition***	1:1	*enum*	Classification of effect on service. TPEG Pti13 Service Condition values.

Table 47 *(continued)*

	Severity	0:1	*enum*	Severity of Situation. Corresponds to TPEG Pti26 severities. Default is normal.	
Scope	***Affects***	0:1	*AffectsScope*	Structured model identifying parts of transport t affected by consequence. See Below	
	Suitabilities	0:*	*many*	Effect on different passenger needs.	
	Suitability	0:1	*Suitability*	Effect on a passenger need. See Below.	
Advice	***Advice***	0:1	*+Structure*	Advice to passengers.	
	AdviceRef	0:1	*id*	Identifier of standard Further advice message to passengers.	
	Details	0:1	*nlString*	Further Textual advice to passengers.	
Blocking	***Blocking***	0:1	*+Structure*	How Disruption should be handled in Info systems	
	JourneyPlanner	0:1	*boolean*	Whether information about parts of the network identified by ***AffectsScope*** should be blocked from the Journey Planner. Default is false; do not suppress.	
	RealTime	0:1	*boolean*	Whether information about parts of the network identified by ***AffectsScope*** should be blocked from real-time departure info systems. Default is false; do not suppress.	
Activity	***Boarding***	0:1	*+Structure*	Intended audience of situation.	
	ArrivalBoarding-Activity	0:1	*enum*	Type of boarding and alighting allowed at stop. Default is Alighting	
	DepartureBoardingActivity	0:1	*enum*	Type of boarding and alighting allowed at stop. Default is Alighting	
Delay	***Delays***	0:1	*+Structure*	Predicted delays	
		DelayBand	0:1	*enum*	Timeband of likely delay length
	DelayType	0:1	*enum*	Nature of delay	
	Delay	0:1	*duration*	Additional Journey time needed to overcome disruption.	
Description Group	***NumberOf-Deaths***	0:1	*integer*	Number of fatalities	
	NumberOf-Injured	0:1	*integer*	Number of injured persons.	
Easements	***Easements***	*0:*	*+Structure*	Description of fare exceptions allowed because of disruption.	
	TicketRestriction	0:1	*enum*	Ticket restriction conditions in effect. TPEG pti table pti25.	
	Easement	0:1	*nlString*	Description of fare exceptions allowed because of disruption.	
	EasementRef	0:1	*nlString*	Identifier of a fare exceptions code allowed because of the disruption.	
any	***Extensions***	0:1	any	Placeholder for user extensions.	

7.8.5.7.1 Service Condition (TPEG Pti13)

The Situation ***Consequence ServiceCondition*** describes the nature of the consequence. The values are based on TPEG pti13. See Table 48.

Table 48 — Allowed Values for Service Condition (TPEG Pti13)

SIRI-SX	Description	Pti13
unknown	unknown	0
altered	altered	1
cancelled	cancelled	2
delayed	delayed	3
diverted	diverted	4
noService	no service	5
disrupted	disrupted	6
additionalService	additional service	7
specialService	special service	8
onTime	on time	9
normalService	normal service	10
intermittentService	intermittent service	11
shortFormedService	short formed service	12
fullLengthService	full length service	13
extendedService	extended service	14
splittingTrain	splitting train	15
replacement Transport	replacement transport	16
arrivesEarly	arrives early	17
shuttleService	shuttle service	18
replacementService	replacement service	19
alternateTrack	redirected to an alternate track	20
undefined	undefined service information	255

7.8.5.7.2 Suitability

Suitability describes the consequence of the Situation for accessibility and user special needs. The data type is the same as used in prCEN IFOPT.

A ***Consequence*** can have multiple ***Suitability*** instances, each of which specifies whether the effect of the Consequence (as specified by the ***AffectsScope*** element) is a change that makes accessibility suitable or unsuitable for a specific ***UserNeed***

Status is specified by the ***Suitable*** value – see Table 50.

User needs are specified by the ***UserNeed*** – see Table 51 for allowed values.

Note that changes to ***Suitability*** s and ***Limitations*** can be specified by the ***AffectsStopPlace*** element using the ***AccessibilityAssessment*** element.

Table 49 — Suitability Element

Suitability				*+Structure*	Overridable Text element
Identity	***Suitable***		1:1	*enum*	Language for text content.
	UserNeed		1:1	*choice*	
	a	***MobilityNeed***	1:1	*enum*	Specific User need see **Error! Reference source not found.**
	b	***MedicalNeed***	1:1	*enum*	Specific User need see **Error! Reference source not found.**
	c	***PsychoSensoryNeed***	1:1	*enum*	Specific User need see **Error! Reference source not found.**
	d	***EncumbranceNeed***	1:1	*enum*	Specific User need see **Error! Reference source not found.**

Table 50 — Allowed values for Suitable

SIRI-SX	Description
suitable	Suitable for specified user need
notSuitable	Not suitable for specified user need
unknown	Suitability is unknown

Table 51 — Allowed values for User Need

Need Group	SIRI-SX	Description
MobilityNeed	*wheelchair*	User needs wheelchair
	motorizedWheelchair	User needs motorized wheelchair
	walkingFrame	User needs walking frame
	restrictedMobility	User has limited mobility
	otherSpecificNeed	User has other need
MedicalNeed	*allergic*	User has severe allergies
	heartCondition	User has heart condition
PsychosensoryNeed	*visualImpairment*	User has visual impairment
	auditoryImpairment	User has Auditory impairment
	cognitiveImpairment	User has cognitive impairment
	averseToLifts	Use is averse to lifts
	averseToEscalators	User is averse to Escalators
	averseToConfinedSpaces	User dislikes confined spaces
	averseToCrowds	User dislikes Crowds
	otherSensoryNeed	User has other need
EncumbranceNeed	*luggageEncumbered*	User has luggage encumbered
	pushchair	User has pushchair
	baggageTrolley	User has Baggage trolley
	oversizeBaggage	User has Oversize baggage
	guideDog	User has Guide dog
	otherAnimal	User has Other animal
	otherEncumbrance	User has Other encumbrance

7.8.5.7.3 ArrivalBoardingActivity (SIRI)

Boarding describes any effect of the consequence on boarding or alighting at the Stop. See Table 52 (alighting) and Table 53 (boarding).

Table 52 — Allowed Values for ArrivalBoardingActivity (Siri)

SIRI-SX	Description	
alighting	Passengers may alight at stop	
noAlighting	Passengers may not alight at stop	
passThrough	Passengers may pass through at stop	

7.8.5.7.4 DepartureBoardingActivity (SIRI)

Table 53 — Allowed Values for DepartureBoardingActivity (Siri)

SIRI-SX	Description	
boarding	Passengers may board at stop	
noBoard	Passengers may not board at stop	
passThrough	Passengers may pass through at stop	

7.8.5.7.5 DelayBand (Datex2 DelayCode)

DelayBand describes the nature of the delay. The values are based on Datex2 ***DelayCode***. See Table 56.

Table 54 — Allowed Values for DelayBand (Datex2)

SIRI-SX	Description	Datex2 DelayCode
delayLongerThanSixHours	> 6 Hours	*delayLongerThanSixHours*
delayBetweenThreeHousrAndSixHours	3-6 Hours	*delayBetweenThreeHousrAndSixHours*
delayBetweenOneHourAndThreeHours	1-3 Hours	*delayBetweenOneHourAndThreeHours*
delayBetweenThirtyMinutesandOneHour	30min-1 Hour	*delayBetweenThirtyMinutesandOneHour*
delayLessThanThirtyMinutes	< 30 minutes	*delayLessThanThirtyMinutes*
negligble	negligble	*negligble*

7.8.5.7.6 DelayType (Datex2 DelaysType)

DelayType describes the nature of the delay. The values are based on Datex2:***DelaysType***. See Table 56.

Table 55 — Allowed Values for DelayType (Datex2)

SIRI-SX	Description	Datex2 DelaysType
delays	Material delays	*delays*
delaysOfUncertainDuration	Delays Of Uncertain Duration	*delaysOfUncertainDuration*
longDelays	Long Delays	*longDelays*
veryLongDelays	Very Long Delays	*veryLongDelays*

7.8.5.7.7 TicketRestrictions (TPEG Pti25)

Situation ***ServiceCondition*** describes the nature of the consequence. The values are based on TPEG pti13. See Table 56.

Table 56 — Allowed values for Ticket Restriction

SIRI-SX	Description	TPG Pti 25
unknown	unknown	pti25_0
allTicketClassesValid	All Ticket Classes Valid	pti25_1
fullFareOnly	Full Fare Only	pti25_2
certainTicketsOnly	Certain Tickets Only	pti25_3
ticketWithReservation	Ticket with Reservation	pti25_4
specialFare	Special Fare	pti25_5
onlyTicketsOfSpecifiedOperator	Only Tickets of Specified Operator	pti25_6
noRestrictions	No Restrictions	pti25_7
noOffPeakTickets	No Off-peak Tickets	pti25_8
noWeekendReturnTickets	No Weekend Return Tickets	pti25_9
noReducedFareTickets	No Reduced Fare Tickets	pti25_10
unknownTicketRestriction	Unknown Ticket Restriction	pti25_255

7.8.5.8 AffectsScope Element

The ***AffectsScope*** element (Table 57) brings together more detailed elements describing the scope of a situation or consequence.

Table 57 — AffectsScope Element

AffectsScope				*+Structure*	The scope of the situation or consequence
Operat-ors	***Operators***		0:1	*choice*	Networks scope.
	a	***AllOperators***	0:1	*empty*	All operators are effected
	b	***AffectedOperator***	0:*	*+Structure*	Annotated reference to Operator of services affected by situation. See Below.
Stop	***StopPoints***		0:*	*+Structure*	Scheduled Stop Point scope
		AffectedStopPoint	0:1	*+Structure*	Scheduled Stop Point scope. See below.
network	***Networks***		0:*	*+Structure*	Networks scope.
		AffectedNetwork	0:1	*+Structure*	Network scope. See below.
	Lines		0:*	*+Structure*	Lines scope
		AffectedLine	0:1	*+Structure*	Line scope. See below.
Journey	***VehicleJourneys***		0:*	*+Structure*	Vehicle Journeys scope. See below.
		VehicleJourney	0:1	*+Structure*	Vehicle Journey scope
Place	***StopPlaces***		0:*	*+Structure*	Stop Places scope
		AffectedStopPlace	0:1	*+Structure*	Annotated reference to Stop Place. See below.
Level	***AreaOfInterest***		0:1	*enum*	High level geographic scope
Roads	***AffectedRoads***		0:1	*Datex2:GroupOfLocations*	Scope of Road/transport network as described by datex3 location model. See Datex2 documentation
any	***Extensions***		0:1	any	Placeholder for user extensions.

7.8.5.8.1 AreaOfInterest (Datex2)

Situation ***AreaOfInterest*** describes the geographical area of the Situation. The values are based on Datex2 AreaOfInterest values. See Table 30.

Table 58 — Allowed Values for ReportType (TPEG Pti27)

SIRI-SX	Description	Datex2
continentWide	Applies to whole continent	*continentWide*
national	Affects a whole country	*national*
neighbouringCountries	Affects a country and its neighbours	*neighbouringCountries*
regional	Affects a region within a country	*regional*
notSpecified	Situation concerns an individual service	*notSpecified*

7.8.5.8.2 AffectedNetworks Element

The ***AffectedNetwork*** element groups information about the MODEs, networks and any LINEs or parts of a LINE (Sections) affected by the situation The operator, MODE and network will default to the values in the ***Context.***

Table 59 — Affected Network Element

AffectedNetwork				*+Structure*	The scope of the situation or consequence
Operators	***Operators***		0:*	*choice*	Networks scope.
	b	***AffectedOperator***	0:1	*+Structure*	Annotated reference to Operator of services affected by situation. See Below.
network	***NetworkRef***		0:1	*Network-Code*	Network of affected line. If absent, may be taken from context.
	NetworkName		0:1	*nlString*	Name of Network.
	RoutesAffected		0:1	*nlString*	Textual description of overall routes affected. Should correspond to any structured description.
	VehicleMode			*enum*	Modes Affected Vehicle mode- Tpeg ModeType pti1.
Mode	***Submode***			*Choice*	
	a	***AirSubmode***	0:1	*enum*	TPEG pti08 Air submodes.
	b	***BusSubmode***	0:1	*enum*	TPEG pti05 Bus submodes.
	c	***Coach***	0:1	*enum*	TPEG pti03 Coach submodes.
	d	***MetroSubmode***	0:1	*enum*	TPEG pti04 Metro submodes.
	e	***RailSubmode***	0:1	*enum*	TPEG pti02 Rail submodes loc13.
	f	***TramSubmode***	0:1	*enum*	PEG pti06 Tram submodes.
	g	***WaterSubmode***	0:1	*enum*	TPEG pti07 Water submodes.
	h	***TelecabineSubmode***	0:1	*enum*	TPEG pti09 Telecabin submodes.
	i	***TaxiSubmode***	0:1	*enum*	TPEG pti11 Taxi submodes.
network	***Lines***		0:1	*choice*	Line scope.
	a	***AllLines***	0:1	*emptyType*	All lines in the network are affected.
	b	***SelectedRoutes***	0:1	*emptyType*	Only some routes are affected, line level information not available. See the AffectedRoutes element for textual description.
	c	***AffectedLine***	0:*	*+Structure*	Line affected by situation. See Below.
any	***Extensions***		0:1	any	Placeholder for user extensions.

7.8.5.8.2.1 AffectedOperator Element

The ***AffectedOperator*** element (Table 60) groups information about the Operator affected by the situation**.**

Table 60 — AffectedOperator Element

AffectedOperator			*+Structure*	Annotated Reference to Operator & Unit
Operat-or	***OperatorRef***	0:1	→Operator-Code	Identifier of Operator.
	OperatorName	0:1	*nlString*	Name of Operator.
	OperatorShortName	0:1	*nlString*	ShortName for Operator. E.g. TfL, LUL
Unit	***OperationalUnitRef***	0:*	*→UnitCode*	Identifier of Operational unit responsible for managing services
any	***Extensions***	0:1	*any*	Placeholder for user extensions.

7.8.5.8.2.2 AffectedLine Element

The ***AffectedLine*** element groups information about the LINEs affected by the situation**.**

Table 61 — AffectedLine Element

AffectedLine			*+Structure*	Annotated Reference to Line
Operators	***Operators***	0:*	*choice*	Networks scope.
	AffectedOperator	0:1	*+Structure*	Annotated reference to Operator of services affected by situation. See Below.
Operat-or	***LineRef***	0:1	*→LineCode*	Identifier of Line.
	PublishedLineName	0:1	*nlString*	Public Number or Name of Line.
	Destinations	0:*	*choice*	Routes scope.
	AffectedStop-Point	0:1	*+Structure*	Annotated reference to destination Stop Point affected by Situation
	Directions	0:*	*+Structure*	Directions affected.
	DirectionRef	0:1	*→DirectionCode*	Identifier of Direction.
	DirectionName	0:1	*nlString*	Name of direction
Routes	***Routes***	0:*	*choice*	Routes scope.
	AffectedRoute	0:1	*→Affect+Structure edRoute*	Route affected by Situation..
Sect-ions	***Sections***	0:*	*choice*	Section of Line scope.
	SectionRef	0:1	*→SectionCode*	Identifier of Section affected by Situation.
any	***Extensions***	0:1	*any*	Placeholder for user extensions.

7.8.5.8.2.2.1.1 AffectedRoute Element

The ***AffectedRoute*** element groups information about the ROUTEsRoutes affected by the situation.

Table 62 — AffectedRoute Element

AffectedRoute				*+Structure*	Annotated Reference to Route
Operat-or	***RouteRef***		0:1	*→RouteCode*	Identifier of Line.
	Directions		0:*	*+Structure*	Directions affected.
		DirectionRef	0:1	*→DirectionCode*	Identifier of Direction.
		DirectionName	0:1	*nlString*	Name of direction
Sect-ions	***Sections***		0:*	*choice*	Section of route scope.
		SectionRef	0:1	*→SectionCode*	Identifier of Section affected by Situation.
Routes	***RouteLinks***		0:*	*choice*	Route scope.
		RouteLinkRef	0:1	*→RouteCode*	Identifier of Route Limnk affected by Situation.
any	***Extensions***		0:1	*any*	Placeholder for user extensions.

7.8.5.8.3 AffectedStopPoint Element

The ***AffectedStopPoint*** element groups information about the SCHEDULED STOP POINTs affected by the situation.

Table 63 — AffectedStopPoint Element

AffectedStopPoint				*+Structure*	Annotated Reference to Stop Point
Stop	***StopPointRef***		0:1	*→StopPointCode*	Identifier of Stop Point.
	PrivateRef		0:1	*string*	Additional external code of
	StopPointName		0:1	*nlString*	Name of Stop.
	StopPointType		0:1	*enum*	Type Of Stop. See below
	Location		0:1	*Location*	Point Projection to use for stop point
Modes	***AffectedModes***		0:1	*choice*	Mode scope.
	a	***AllModes***	0:1	*emptyType*	All modes for the StopPoint are affected.
	b	***mode***	0:*	*+Structure*	Annotated reference to Operator of services affected by situation. See Below.
Zone	***PlaceRef***		0:1	*PlaceId→PlaceId*	Identifier of Place in which Stop lies
	PlaceName		0:1	*nlString*	Name of Stop.
	AccessibilityAssessment		0:1	*+Structure*	Accessibility Disruption
	ConnectionLinks		0:*	*choice*	Connection Link scope.
		Affected-ConnectionLink	0:1	*+Structure*	Annotated reference to ConnectionLink affected by Situation
any	***Extensions***		0:1	*any*	Placeholder for user extensions.

7.8.5.8.3.1 StopPointType (TPEG Pti17 Stop)

Situation ***StopPointType*** describes the type of the STOP POINT. The values are based on IFOPT and have equivalences in the TPEG pti27 service delivery point type. See Table 64.

Table 64 — Allowed Values for StopPointType (IFOPT / TPEG Pti17)

SIRI-SX	TPEG	TPEG Pti 17
--	unknown	pti17_0
railPlatform	Platform Number	pti17_1
metroPlatform	(platformNumber)	
airlineGate	Terminal Gate	pti17_2
boatQuay	Ferry Berth	pti17_3
(boatQuay)	Harbour Pier	pti17_4
ferryLanding	Landing Stage	pti17_5
busStop	Bus Stop	pti17_6
coachStop	(bus Stop)	
tramStop	(bus Stop)	
taxiStand	undefined	
setDownPlace	undefined	
telecabinePlatform	undefined	
unknown	undefined	pti17_255

7.8.5.8.3.2 AffectedConnectionLink Element

The ***AffectedConnectionLink*** element groups information about the SCHEDULED STOP POINTs affected by the situation.

Table 65 — AffectedConnectionLink Element

AffectedConnectionLink			*+Structure*	Annotated Reference to ConenctionLink
Stop	***ConnectionLinkRef***	0:1	*→ConnectionLink Code*	Identifier of Stop Point.
	ConnectionName	0:1	*nlString*	Name of Stop.
	Location	0:1	*Location*	Point Projection to use for stop point
Lines	***Lines***	0:1	*choice*	Mode scope.
	a ***AllLines***	0:1	*→LineCode*	Identifier of Line.
	b ***LineRef***	0:*	*nlString*	Public Number or Name of Line.
	PublishedLine-Name	0:1	*nlString*	Public Number or Name of Line.
To Stop	***ConnectingStop-PointRef***	0:1	*StopPointCode*	Identifier of Connecting Stop Point.
	ConnectingStop-PointName	0:1	*nlString*	Name of Connecting Stop.
	ConnectingZoneRef	0:1	*→ZoneCode*	Identifier of Zone in which Connecting Stop lies
Operat-or	***ConenctionDirection***	0:1	*from | to | both*	Direction of Connection. Default is both
Links	***AffectedLinks***	0:*	*choice*	Connection Link scope.
	Affected-ConnectionLink	0:1	*+Structure*	Annotated reference to ConnectionLink affected by Situation
any	***Extensions***	0:1	*any*	Placeholder for user extensions.

7.8.5.8.4 AffectedStopPlace Element

The ***AffectedStopPlacee*** element groups information about the STOP PLACEs places affected by the situation.

Table 66 — AffectedStopPlace Element

AffectedStopPlace			*+Structure*	Annotated Reference to StopPlace
	AccessibilityAssessment	0:1	*+Structure*	Accessibility Disruption to Journey
	FacilityDisruption	0:1	*+Structure*	Facility Disruption to
Operators	***Operators***	0:*	*choice*	Operator scope.
	AffectedOperator	0:1	*+Structure*	Annotated reference to Operator of services affected by situation. See AffectedOperator Element.
Stop Place	***StopPlaceRef***	0:1	*→OperatorCode*	Identifier of Stop Place.
	StopPlaceName	0:1	*nlString*	Public Number or Name of Stop Place.
	StopPlaceType	0:1	*enum*	Type of Stop Place. See below.
Routes	***Components***	0:*	*choice*	Stop Place Components scope.
	Affected-Component	0:1	*→RouteCode*	Identifier of Stop Place Component affected by Situation. See below.
Sect-ions	***NavigationPaths***	0:*	*choice*	Navigation path scope.
	NavigationPath-Ref	0:1	*→PathId*	Identifier of a path affected by Situation.
any	***Extensions***	0:1	*any*	Placeholder for user extensions.

7.8.5.8.4.1 StopPlaceType (TPEG Pti17 Stop)

Situation ***StopPlaceType*** describes the type of the STOP PLACE. The values are from IFOPT. See Table 64.

Table 67 — Allowed Values for StopPlaceType (IFOPT)

SIRI-SX	Description
airport	Airport
railStation	Rail Station
metroStation	Metro Station
coachStation	Coach Station
busStation	Bus Station
shipPort	Ship Port
ferryPort	Ferry Port
ferryStop	Ferry Stop
onStreetBus	On Street Bus
onStreetTram	On Street Tram
skiLift	Ski Lift
other	other

7.8.5.8.4.2 AffectedStopPlace Component

The ***AffectedStopPlaceComponent*** element groups information about the STOP PLACE COMPONENTs affected by the situation. It can be used to indicate that the scope of a situation is a specified part of a STOP PLACE such as a QUAY, ACCESS AREA, BOARDING POSITION, ENTRANCE or EQUIPMENT PLACE.

Table 68 — AffectedStopPlaceComponent Element

AffectedStopPlaceComponent			*+Structure*	Annotated Reference to a Stop Place Component
	AccessibilityAssessment	0:1	*+Structure*	Accessibility Disruption to Component
	FacilityDisruption	0:1	*+Structure*	Facility Disruption to Component
Identity	***StopPlaceRef***	0:1	→OperatorCode	Identifier of Stop Place that contains component.
	ComponentRef	0:1	→ComponentId	Identifier of Component.
	ComponentName	0:1	*nlString*	Public Number or Name of Component.
	ComponentType	0:1	*enum*	Type of Stop Place Component. See below
	AccessFeatureType	0:1	*enum*	Access Feature of Stop Place Component. See below
any	***Extensions***	0:1	*any*	Placeholder for user extensions.

7.8.5.8.4.2.1 StopPlaceComponentType

Situation ***StopPlaceComponentType*** describes the type of the ***StopPlaceComponent***. The values are from IFOPT. See Table 69.

Table 69 — Allowed Values for StopPlaceComponentType (IFOPT)

SIRI-SX	Description
quay	Quay
accessSpace	Access Space
boardingPosition	Boarding Position
stoppingPlace	Stopping Place
stoppingPosition	Stopping Position
entrance	Entrance
stopPathLink	Stop Path Link
accessPathLink	Access Path Link
other	other

7.8.5.8.4.2.2 StopPlaceAccessFeatureType

Situation ***StopAccessFeatureType*** describes the access feature type of the ***StopPlaceComponent***. The values are from IFOPT. See Table 70.

Table 70 — Allowed Values for StopPlaceAccessFeatureType (IFOPT)

SIRI-SX	Description
lift	Lift
escalator	Escalator
travelatorr	Travelator
ramp	Ramp
stairs	Stairs
shuttle	Shuttle
barrier	Barrier
narrowEntrance	Narrow Entrance
confinedSpace	Confined Space
queueManagement	Queue Management
unknown	Unknown

7.8.5.8.5 AffectedVehicleJourney Element

The ***AffectedVehicleJourney*** element groups information about the VEHICLE JOURNEYs affected by the situation.

Table 71 — AffectedVehicleJourney Element

AffectedVehicleJourney			*+Structure*	Annotated Reference to Vehicle Journey
Operators	***VehicleJourneyRef***	0:1	*→:VehicleJourneyCode*	Identifier of a service vehicle journey.
	DatedVehicleJourneyRef	0:1	*→DatedVehicleJourneyCode*	Identifier of a specific vehicle journey.
	JourneyName	0:1	*nlString*	Name of Journey
	Operator	0:1	*AffectedOperator*	Annotated reference to Operator of services affected by situation. See AffectedOperator Element.
Operator	***LineRef***	0:1	*→OperatorCode*	Identifier of Line.
	PublishedLineName	0:1	*nlString*	Public Number or Name of Line.
	DirectionRef	0:*	*→DirectionCode*	Directions affected.
	Origins	0:*	*choice*	Scope within Journey
	AffectedStopPoint	0:1	*+Structure*	Annotated reference to origin Stop Point affected by Situation
	Destinations	0:*	*choice*	Scope within Journey
	AffectedStopPoint	0:1	*+Structure*	Annotated reference to destination Stop Point affected by Situation
	ZoneRef	0:1	*→DirectionCode*	Identifier of Direction.
	ZoneName	0:1	*nlString*	Name of direction
Routes	***RouteRef***	0:1	*→RouteCode*	Identifier of Route affected by Situation.
Times	***OriginAimedDepartureTime***	0:1	*dateTime*	Timetabled DepartureTime from Origin.
	DestinationAimedArrivalTime	0:1	*dateTime*	Timetabled Arrival time at Destination.
Sections	***Calls***	0:*	*choice*	Scope within Journey
	AffectedCall	0:1	*+Structure*	Annotated reference to Call affected by Situation.
	AccessibilityAssessment	0:1	*+Structure*	Accessibility Disruption to Journey
	FacilityDisruption	0:1	*+Structure*	Facility Disruption to Journey
any	***Extensions***	0:1	*any*	Placeholder for user extensions.

7.8.5.8.5.1 AffectedCall Element

The ***AffectedCall*** element groups information about a call at a SCHEDULED STOP POINTs affected by the situation*.*

Table 72 — AffectedCall Element

AffectedStopPoint			*+Structure*	Annotated Reference to Stop Point
Stop	***StopPointRef***	0:1	*→StopPointCode*	Identifier of Stop Point.
	PrivateRef	0:1	*string*	Additional external code of
	StopPointName	0:1	*nlString*	Name of Stop.
	StopPointType	0:1	*enum*	Type Of Stop
	Location	0:1	*Location*	Point Projection to use for stop point
Modes	***AffectedModes***	0:1	*choice*	Mode scope.
	a AllModes	0:1	*emptyType*	All modes for the StopPoint are affected.
	b mode	0:*	*+Structure*	Annotated reference to Operator of services affected by situation. See Below.
Zone	***PlaceRef***	0:1	*→ZoneCode*	Identifier of Topographic Place in which Stop lies
	PlaceName	0:1	*nlString*	Name of Stop.
	AccessibilityAssessment	0:1	*+Structure*	Accessibility Disruption
	ConnectionLinks	0:*	*choice*	Connection Link scope.
	Affected-ConnectionLink	0:1	*+Structure*	Annotated reference to ConnectionLink affected by Situation
	Order			
Status	***CallCondition***	0:1	*enum*	Status of call – TPEG value
	AdditionalCall	0:1	*boolean*	Whether this is an additional unscheduled call
	VehicleAtStop	0:1	*boolean*	Whether vehicle is located at stop
Times	***ArrivalTimes***	0:1	*+Structure*	Arrival times of call See SIRI-Part3
	ArrivalInfo	0:1	*+Structure*	Arrival info of call See SIRI- Part3
	DepartureTimes	0:1	*+Structure*	Departure times of call See SIRI-Part3
	DepartureInfo	0:1	*+Structure*	Departure info of call See SIRI- Part3
	HeadwayInfo	0:1	*+Structure*	Headway info of call See SIRI- Part3
	AffectedConnection-LinkRef	0:	*➔Connection-LinkCode*	Reference to ConnectingLink affected by Situation
	Affected-Interchanges	0:*	*+Structure*	Journey Interchanges affected by Situation
any	***Extensions***	0:1	*any*	Placeholder for user extensions.

7.8.5.8.5.1.1 AffectedInterchange Element

The ***AffectedInterchange*** element groups information about any journey interchanges of a call that are affected by the situation.

Table 73 — AffectedInterchange Element

AffectedInterchange			*+Structure*	Annotated Reference to a Place
Identity	***InterchangeRef***	0:1	→InterchangeId	Identifier of Journey Interchange
	InterchangeStop-PointRef	0:1	→*StopPointCode*	Identifier of stop point to which interchange connects
	InterchanegStop-PointName	0:1	*nlString*	Name of interchjange stop point.
	ConnectingVehicle-JourneyRef	0:1	→*DatedVehicle-JoruneyCode*	Reference to Connnecting journey affected by Situation
	Interchange-StatusType	0:1	*enum*	TpegInterchangeStatusCOde
	AffectedConnection-LinkRef	0:1	➔*Connection-LinkCode*	Reference to ConnectingLink affected by Situation
any	***Extensions***	0:1	*any*	Placeholder for user extensions.

7.8.5.8.6 AffectedPlace Element

The ***AffectedPlace*** element groups information about the affected PLACE such as a POI affected by the situation.

Table 74 — AffectedPlace Element

AffectedPlace			*+Structure*	Annotated Reference to a Place
Identity	***PlaceRef***	0:1	→PlaceIde	Identifier of Place
	PlaceName	0:1	*nlString*	Name of place.
	Location	0:1	*Location*	Point refercne for place
	PlaceCategory	0:1	*nmtoken*	Type of Place . See below
	AccessibilityAssessment	0:1	*+Structure*	Accessibility Disruption to Component
any	***Extensions***	0:1	*any*	Placeholder for user extensions.

7.8.5.8.7 AffectedRoad Element

The ***AffectedRoads*** element groups information about the affected roads. It uses a Datex2 GroupOfLocations element. It is used to annotate a PT situation. For a road incident locations will normally be specified as part of the .

Table 75 — AffectedRoad Element

AffectedRoads			*+Structure*	Annotated Reference to a list of roads
	GroupOfLocations	0:1	*Datex2: GroupOfLocations*	Group of Locations. See Datex2 specification
any	***Extensions***	0:1	*any*	Placeholder for user extensions.

7.8.5.8.8 AccessibilityAssessment Element

The ***AccessibilityStatus*** element describes the accessibility properties associated with another element such as aSTOP PLACE component*.*

Table 76 — AccessibilityAssessment Element

AccessibilityStatus			*+Structure*	Annotated Reference to Vehicle Journey
Operators	***MobilityImpaired-Access***	0:1	*boolean*	Whether stop or service is accessible to mobility impaired users. This may be further qualified by one ore more Limitation & Suitability instances to specify which types of access are available
Limitation	***Limitation***	0:1	*+Structure*	Limitation of entity
	Wheelchair-Access		*true* | *false* | *unknown*	Whether a Place is wheelchair accessible.
	StepFreeAccess		*true* | *false* | *unknown*	Whether a Place has step free access.
	EscalatorAccess		*true* | *false* | *unknown*	Whether a Place has escalator free access.
	LiftFreeAccess		*true* | *false* | *unknown*	Whether a Place has lift free access.
	AudibleSigns-Available		*true* | *false* | *unknown*	Whether a Place has Audible signals for the visually impaired.
	VisualSigns-Available		*true* | *false* | *unknown*	Whether a Place has visual signals for the hearing impaired.
Suitability	***Suitabilities***	0:*	*many*	Suitabilities of facility for specific passenger needs
	Suitability	0:1	*+Structure*	Suitability of facility for a specific passenger need. See earlier
any	***Extensions***	0:1	*any*	Placeholder for user extensions.

7.8.5.8.9 Transport Modes & Submodes

The Transport Modes attribute classifies the type of transport. A two level classification system is used corresponding to the TPEG PTI ontology. **TransportMode** defines top level modes Each main mode type (***AirMode***, ***RailMode***, ***BusMode*** etc) contains a set of subtypes that explain the mode in more detail; for example for ***BusMode*** , includes *highSpeed, rain, fog, flooding,* etc.

Arbitrary reasons are represented by an ***OtherReason***.

The following tables show the allowed values for Reasons

7.8.5.8.9.1 TransportMode (TPGE Pti 21)

These are Main Transport types as described by TPEG Pti21. See Table 77.

Table 77 — Allowed Values for VehicleMode (TPEG Pti21)

SIRI-SX	**Pti 01**	**Loc 05**	**Submodel**	**Datex 2 TransitServiceType**
unknownSubmodel	0	0	<none>	
railwayServiceSubmode	1	02	**pti02_x**	rail
coachServiceSubmode	2	03	**pti03_x**	
suburbanRailwayServiceSubmode	3	04	<none>	
urbanRailwayServiceSubmode	4	--	pti04_x	
metroServiceSubmode	5	16	<none>	undergroundMetro
undergroundServiceSubmode	6	05	<none>	undergroundMetro
busServiceSubmode	7	06	**pti05_x**	bus
trolleyBusServiceSubmode	8	--	<none>	
tramServiceSubmode	9	07	**pti06_x**	tram
waterTransportServiceSubmode	10	08	**pti07_x**	
airServiceSubmode	11	09	**pti08_x**	air
ferryServiceSubmode	12	--	<none>	farry, hydrofoil
telecabinServiceSubmode	13	10	**pti09_x**	
funicularServiceSubmode	14	11	**pti10_x**	
taxiServiceSubmode	15	12	**pti11_x**	
selfDriveSubmode	16	13	**pti12_x**	
allServicesSubmode	17	--	<none>	
cableDrawnBoat	--	14	--	
monoRail	--	15	--	
allServicesExceptSubmode	18	255	<none>	

The submodes are described by TPEG Tables

7.8.5.8.9.2 AirSubmode (TPEG Pti08 air_type, Loc15/air link)

Table 78 — Allowed Values for AirSubmode (TPEG Pti08)

SIRI-SX	Pti 8	Loc 15
unknown	0	0
internationalFlight	1	2
domesticFlight	2	(4)
intercontinentalFlight	3	1
domesticScheduledFlight	4	4
shuttleFlight	5	9
intercontinentalCharterFlight	6	5
internationalCharterFlight	7	6
round-tripCharterFlight	8	(6)
sightseeingFlight	9	8
helicopterService	10	10
domesticCharterFlight	11	7
SchengenAreaFlight	12	(2)
airshipService	13	(255)
allAirServices	14	
shortHaulInternationalFlight	(1)	3
undefinedAircraftService	255	255

7.8.5.8.9.3 BusSubmode (TPEG Pti05 bus_type, Loc10/bus type)

Table 79 —Allowed Values for BusSubmode (TPEG Pti05)

SIRI-SX	**Pti 05**	***Loc 10***
unknownBusType	0	*0*
regionalBus	1	*06*
expressBus	2	*01*
bus	3	--
localBusService	4	*05*
nightBus	5	*02*
postBus	6	*04*
specialNeedsBus	7	*08*
mobilityBus	8	*(08)*
mobilityBusFor-RegisteredDisabled	9	*(08)*
sightseeingBus	10	*09*
shuttleBus	11	
schoolBus	12	*07*
schoolAndPublicService-Bus	13	*03*
railReplacementBus	14	--
demandAndResponseBus	15	--
allBusServices	16	--
airportLinkBus	(11)	*10*
undefinedBusService	255	*255*

7.8.5.8.9.4 CoachSubmode (TPEG Pti03 coach_type)

Table 80 — Allowed Values for CoachSubmode (TPEG Pti03)

SIRI-SX	**Pti 03**	***Loc***
unknownCoachType	0	
internationalCoachService	1	
nationalCoachService	2	
shuttleCoachService	3	
regionalCoachService	4	
specialCoachService	5	
sightseeingCoachService	6	
touristCoachService	7	
commuterCoachService	8	
allCoachServices	9	
undefinedCoachService	255	

7.8.5.8.9.5 MetroSubmode (TPEG Pti04 urban_railway_type / Loc11 metro rail link)

Table 81 — Allowed Values for MetroSubmode (TPEG Pti04)

SIRI-SX	*Pti04*	*Loc11*
unknownUrbanRailway-Type	0	*0*
metro	1	*3*
tube	2	*1*
urbanRailway	3	*2*
allUrbanRailwayServices	4	--
airportRailLink	(3)	*4*
monoRailLink	(255)	*5*
undefinedUnderground-Service	255	*255*

7.8.5.8.9.6 RailSubmode (TPEG Pti02 railway_type)

Table 82 — Allowed Values for RailSubmode (TPEG Pti1102)

SIRI-SX	Pti 02	*Loc 13*
unknownRailwayType	0	*00*
highSpeedRailService	1	--
longDistanceTrain	2	*03*
interRegionalRailService	3	*02*
carTransportRailService	4	--
sleeperRailService	5	--
regionalRail	6	*04*
touristRailway	7	*07*
railShuttle	8	--
suburbanRailway	9	*05*
replacementRailService	10	--
specialTrainService	11	--
lorryTransportRailService	12	--
allRailServices	13	--
crossCountryRailService	14	--
vehicleRailTransport-Service	15	--
rackAndPinionRailway	16	*08*
additionalTrainService	17	
local	(3)	*06*
international	(9)	*01*
undefinedRailService	255	*255*

7.8.5.8.9.7 TramSubmodel (TPEG Pti06)

Table 83 — Allowed Values for TramSubmodel (TPEG Pti06)

SIRI-SX	Pti6	Loc12
unknown	0	--
cityTramService	1	1
localTramService	2	(1)
regionalTramService	3	(1)
sightseeingTramService	4	2
shuttleTramService	5	(1)
allTramServices	6	--
undefinedTramService	255	255

7.8.5.8.9.8 WaterSubmode (TPEG Pti07 WaterTransportType)

Table 84 — Allowed Values for WaterSubmode (TPEG Pti07)

SIRI-SX	Pti7	Loc 15	Datex2
unknown	0	0	
internationalCarFerryService	1	8	ferry
nationalCarFerryService	2	7	ferry
regionalCarFerryService	3	6	ferry
localCarFerryService	4	5	ferry
internationalPassengerFerryService	5	4	ferry
nationalPassengerFerryService	6	3	ferry
regionalPassengerFerryService	7	2	ferry
localPassengerFerryService	8	1	ferry
postBoatService	9	9	ferry
trainFerryService	10	10	ferry
roadLinkFerryService	11	12	ferry
airportLinkBoatService	12	13	ferry
carHighSpeedFerryService	13		hydrofoil
passengerHighSpeedFerryService	14		hydrofoil
sightseeingBoatService	15	14	ferry
schoolBoat	16	15	ferry
cableDrawnBoatService	17		ferry
riverBusService	18		ferry
scheduledFerryService	19		ferry
shuttleFerryService	20		ferry
allWaterTransportServices	21		ferry
undefinedWaterTransport	255	255	

7.8.5.8.9.9 TelecabinSubmode) TPEG Pti09 TelecabinType

Table 85 — Allowed Values for TelecabineSubmode (TPEG 9Pti11)

SIRI-SX	Description	Pti 9	Loc 14
unknown	unknown	0	0
telecabinService	Telecabin Service	1	1
cableCarService	Cable Car Service	2	3
elevatorService	Elevator Service	3	4
chairLiftService	Chair lift Service	4	5
dragLiftService	Drag Lift Service	5	6
smallTelecabinService	Small Telecabin Service	6	
allTelecabinServices	All Telecabin Services	7	
funicular	funicular		2
eggLift	Egg Lift		7
MineralBuckets	Mineral Buckets		8
undefinedTelecabinType	Undefined Telecabin Type	255	255

7.8.5.8.9.10 FunicularSubmode (TPEG Pti10 FunicularType)

Table 86 — Allowed Values for FunicularSubmode (TPEG Pti11)

SIRI-SX	Description	Pti 10	Loc 14
unknown	unknown	0	
funicularService	Funicular Service	1	2
allFunicularServices	All Funicular Services	2	
Undefined	Undefined Funicular	255	

7.8.5.8.9.11 TaxiSubmode (TPEG Pti11 TaxiType)

Table 87 — Allowed Values for TaxiSubmode (TPEG Pti11)

SIRI-SX	Description	Pti 11
Unknown	Unknown	0
communalTaxiService	Communal Taxi Service	1
waterTaxiService	Water Taxi Service	2
railTaxiService	Rail Taxi Service	3
bikeTaxiService	Bike Taxi Service	4
licensedTaxiService	Licensed Taxi Service	5
privateHireVehicleService	Private Hire Vehicle Service	6
allTaxiServices	All Taxi Services	7
Undefined	Undefined Taxi Service	255

7.8.5.8.9.12 SelfDriveSubmode (TPEG Pti12 Self-Drive Vehicle)

Table 88 — Allowed Values for SelfDriveMode (TPEG Pti12)

SIRI-SX	Description	Pti 12
unknown	Unknown	0
hireCar	Hire Car	1
hireVan	Hire Van	2
hireMotorbike	Hire Motorbike	3
hireCycle	Hire Cycle	4
allSelfDriveVehicles	All Self Drive Vehicles	5
undefined	Undefined Self Drive Service	255

7.8.5.8.9.13 Access Mode (IFOPT)

Access modes describe non PT modes used to access an interchange. The values come from IFOPT.

Table 89 — Allowed Values for AccessMode

SIRI-SX	
foot	
bicycle	
car	
taxi	
shuttle	

7.8.6 RoadSituationElement

In the SIRI-SX model, the ***RoadSituation*** element (see Table 14) is the main container for all the situation content of a Road situation and aggregates the ***SituationElement (BaseSituationElement,*** *or* ***UpdateSituationElement)***, ***SituationStatus, RoadSituationBody***, ***TemporalGroup***, ***ClassifierGroup***, as shown in Figure 12.

Table 90 — Road Situation Element

RoadSituationElement			*+Structure*	Disruption affecting services.
Log	***CreationTime***	1:1	*dateTime*	Time of creation of Situation
Identity	***CountryRef***	0:1	*→CountryCode*	Country code of Participant
	ParticipantRef	1:1	*→Participant-Code*	Identifier of participant system that creates Situation. See Part 2. Unique within Country
	SituationNumber	1:1	*Situation-Numberr*	Unique Identifier of Situation within Participant
	UpdateCountryRef	0:1	*→CountryCode*	Country code of Participant that creates Update if different from ***CountryRef***.
	UpdateParticipant-Ref	0:1	*→Participant-Code*	Identifier of participant system that creates Update if different from ***ParticipantRef***. See Part 2.
	SituationVersion	0:1	*Version*	Version of Update Situation element
Xref	***References***	0:1	*many*	Associations with other Situations.
	RelatedToRef	0:*	*+Related-Situation*	A reference to another Situation with an indication of the nature of the association, e.g. a cause, a result.

Table 90 *(continued)*

Source	***SituationSource***	0:1	*+Structure*	Source of Situation content. See below.
Status	***Verification***	0:1	*enum*	Whether the situation has been verified.
	Progress	0:1	*enum*	Status of Situation. See below.
	QualityIndex	0:1	*enum*	Assessment of likely correctness of data.
	Reality	0:1	*enum*	Whether situation is real or a test.
	Likelihood	0:1	*enum*	Likelihood to ascribe to a future situation.
Temporal Group	***ValidityPeriod***	0:*	*range*	On or more Overall inclusive Period of applicability of situation
	Start	0:1	*dateTime*	The (inclusive) start time stamp.
	End	0:1	*dateTime*	The (inclusive) end time stamp. If omitted, the range end is open-ended, that is, it should be interpreted as "forever".
	Repetitions	0:*	*DayType*	Situation applies only on the repeated day types within the overall validity period(s). For example Sunday.
	DayType	1:1	*enum*	Tpeg DayType pti 34
	PublicationWindow	0:1	*range*	Publication Window for situation if different from validity period. Period during which audience is informed of situation may start before or after situation
	Start	0:1	*dateTime*	The (inclusive) start time stamp.
	End	0:1	*dateTime*	The (inclusive) end time stamp. If omitted, the range end is open-ended, that is, it should be interpreted as "forever".
Classifier Group	***Reason***		*enum*	Nature of Situation – TPEG Reason Code See below.
	SubReason	0:1	*enum*	Subclassification of Nature of Situation. See below.
	ReasonName	0:1	*string*	Text explanation of situation reason. Not normally needed.
	Severity	0:1	*enum*	Severity of Situation. Corresponds to TPEG Pti26 severities. Default is normal.
	Priority	0:1	*enum*	Arbitrary rating of priority of message if different from severity 1-High. Note this can be used for Datex2 ***Urgency*** levels 1=extremelyUrgent 2= urgent 3= normal
	Sensitivity	0:1	*enum*	Confidentiality of situation.
	Audience	0:1	*enum*	Intended audience of situation.
	ReportType	0:1	*enum*	Report type of situation Corresponds to TPEG Pti27.
	ScopeType	0:1	*enum*	Scope type of situation. See below.
	Planned	0:1	*boolean*	Whether the situation was planned (e.g. engineering works) or unplanned (e.g. service alteration). Default is false, i.e. unplanned.
	Keywords	0:*	*string*	Arbitrary application specific classifiers.

Table 90 *(continued)*

Description Group	***Language***	0:1	*lang*	Default Language of descriptions
	Summary	0:1	*DefaultedText*	Summary of situation. If absent should be generated from structure elements / and or by condensing Description. For use of defaulted text see below.
	Description	0:1	*DefaultedText*	Description of situation. Should not repeat any strap line included in Summary See below.
	Detail	0:1	*DefaultedText*	Additional descriptive details about the situation. For use of defaulted text see below.
	Advice	0:1	*DefaultedText*	Further advice to passengers. For use of defaulted text see below.
	Internal	0:1	*DefaultedText*	Further advice to passengers. For use of defaulted text see below.
	Image	0:*	*Image*	Image for description. See below.
	InfoLink	0:*	*InfoLink*	Further web links. See below.
Scope	***AffectsScope***	0:1	*+Structure*	Scope model identifying parts of transport network affected by situation. See below.
Consequence	***Consequences***	0:1	*many*	One or more consequences.
	Consequence	0:*	*+Structure*	Consequence of the situation. See below.
Actions	***PublishingActions***	0:1	*many*	One or more publishing actions.
	PublishingAction	0:*	*+Structure*	Distribution actions to disseminate situation. See below.
any	***Extensions***	0:1	any	Placeholder for user extensions.

8 SituationExchangeDelivery Examples - SituationExchangeDelivery PT Examples

The following is an example of a ***SituationExchangeDelivery***. It shows a single facility status.

```
<ServiceDelivery>
    <!--=======ENDPOINT ================================== -->
    <RequestorRef>NADER</RequestorRef>
    <RequestRef>2004-12-17T09:30:47</RequestRef>
    <!--=======FIRST SUBSCRIPTION======================== -->

<SituationExchangeDelivery version="1.1">
    <ResponseTimestamp>2004-12-17T09:30:47</ResponseTimestamp>
        <SubscriberRef> NADER </SubscriberRef>
        <Status>true</Status>
    <MoreData>false</MoreData>
        <!--=======PAYLOAD ==================================== -->
<:PtSituation xsi:schemaLocation="http://www.siri.org.uk/siri siri_situationExchange_service.xsd"
xmlns:acsb="http://www.ifopt.org.uk/acsb" xmlns:siri="http://www.siri.org.uk/siri" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance">
    <CreationTime>2001-12-17T09:30:47.0Z</CreationTime>
    <ParticipantRef>RAILCO01</ParticipantRef>
    <SituationNumber>000354</SituationNumber>
    <Version>0</Version>
    <References>
        <RelatedToRef>
            <CreationTime>2001-12-17T09:30:47.0Z</CreationTime>
            <ParticipantRef>RAILCO01</ParticipantRef>
            <SituationNumber>000354</SituationNumber>
            <Version>0</Version>
        </RelatedToRef>
    </References>
    <Source>
        <Phone>017654</Phone>
        <AgentReference>03274</AgentReference>
        <TimeOfCommunication>2001-12-17T09:30:47.0Z</TimeOfCommunication>
        </Source>
    <Verification>verified</Verification>
    <Progress>open</Progress>
    <QualityIndex>certain</QualityIndex>
    <ValidityPeriod>
        <StartTime>2001-12-17T09:30:47.0Z</StartTime>
    </ValidityPeriod>
    <MiscellaneousReason>bombExplosion</MiscellaneousReason>
    <Severity>severe</Severity>
    <Audience>public</Audience>
    <ReportType>point</ReportType>
    <Summary overridden="false">Bomb at Barchester station</Summary>
    <Description overridden="true" xml:lang="en-us">Building evacuated. Avoid station until further notice</Description>
    <Affects>
        <Operators>
            <AllOperators/>
        </Operators>
        <StopPoints>
            <AffectedStopPoint>
                <StopPointRef>BAAR0003</StopPointRef>
                <StopPointName>Barchester Station</StopPointName>
                <StopPointType>pti17_0</StopPointType>
                <Location srsName="wgs84">
                    <Longitude>-180</Longitude>
                    <Latitude>-90</Latitude>
                </Location>
            </AffectedStopPoint>
        </StopPoints>
        <StopPlaces>
            <AffectedStopPlace>
                <StopPlaceRef>BArF001</StopPlaceRef>
                <AffectedComponents>
                    <AffectedComponent>
                        <ComponentRef>BAR00021</ComponentRef>
                        <ComponentName>Platform 3</ComponentName>
                    </AffectedComponent>
                </AffectedComponents>
```

```
                </AffectedStopPlace>
            </StopPlaces>
        </Affects>
        <Consequences>
            <Consequence>
                <Period>
                    <StartTime>2001-12-17T09:30:47.0Z</StartTime>
                </Period>
                <Condition>pti13_0</Condition>
                <Severity>pti26_0</Severity>
                <Blocking>
                    <JourneyPlanner>true</JourneyPlanner>
                    <RealTime>true</RealTime>
                </Blocking>
                <Boarding>
                    <ArrivalBoardingActivity>noAlighting</ArrivalBoardingActivity>
                    <DepartureBoardingActivity>noBoarding</DepartureBoardingActivity>
                </Boarding>
            </Consequence>
        </Consequences>
        <PublishingActions>
            <PublishToWebAction>
                <Incidents>true</Incidents>
                <HomePage>true</HomePage>
                <Ticker>false</Ticker>
            </PublishToWebAction>
            <PublishToMobileAction>
                <Incidents>true</Incidents>
                <HomePage>false</HomePage>
            </PublishToMobileAction>
            <PublishToAlertsAction>
                <ClearNotice>true</ClearNotice>
                <ByEmail>true</ByEmail>
                <ByMobile>true</ByMobile>
            </PublishToAlertsAction>
        </PublishingActions>
</PtSituation> </SituationExchangeDelivery>

        </ServiceDelivery>
```

Annex A
(normative)

Notation

A.1 General

The diagrams in this document follow normal UML notation for class diagrams, with the addition of colour (see below), and the use of certain conventions to represent composition as used in XML.

A.2 Classes

Classes are indicated by square boxes with the name of the class across the top. Operations / methods and also Visibility (public private etc) are omitted. The attribute types, or all of the attributes may be suppressed in summary diagrams, or to show a summary reference.

Typically these will correspond to XML elements of the same name.

A.3 Enumerations

Enumerations are generally shown as data types – a square box with an <<*enumeration*>> stereotype. They are included in diagrams in context if space permits, using a dependency relationship (dotted line) from the class with attributes that are constrained by the enumeration. They are also summarised on separate diagrams at the end. Visibilities are omitted.

A.4 Groups

As well as the normal use of Classes to indicate the entities of the model, classes are also used for named groups of reusable elements which occur on more than one entity, for example ***AimedArrivalInfo***, or ***ServiceInfo* –** see discussion of serialisation and containment below. In this case a stereotype of <<*group*>> is shown. These can be considered as complex data types.

A.5 Notes

Notes are indicated as boxes with turned up corners, generally connected to the class or relationship they annotate with a dotted dependency line.

A.6 Relationships

Normal UML relationships are used:

— Inheritance: line with white arrow from subtype to supertype. The subtype has all the attributes and operations of the supertype.

— Association: other unbroken lines.

  — **Cardinalities** of associations are marked using UML conventions for **multiplicities** and **optionality**, i.e. min:max, for example [0:1] indicates there may be a minimum of zero and a maximum of one, [1:*] indicates there must be a minimum of one and there can be many. [1] by itself means [1:1]. [*]

by itself means [0:*]. The multiplicities indicate if there are one or many. The optionality indicates whether the end must be populated if the relationship is present.

- **Aggregation** is indicated by a black diamond (this typically corresponds to direct containment in an XML document): indicating the part is created and destroyed with the whole.

- A shared **composition** is indicated by a white diamond, in which case the child element is integral to the parent component, but the child exists independently (and typically will have a unique identifier).

- Direction of **Navigability** is indicated by an arrow head in the direction of navigability.

— Dependency: Dotted Line. These are also used to show enumerated values.

A.7 Use of Colour

To facilitate reading, Classes are coloured to indicate their nature. This is purely a local Handbook convention (not part of UML) and is used as follows:

— *Purple*: Common Abstract Message Transport Framework elements. Typically these are the request & response wrapper elements. E.g. ***ServiceDelivery*** and are the same for all Functional services.

— *Salmon*: Common Abstract Transport Framework elements, Typically these are supertypes. E.g. ***AbstractItem.***

— *Orange*: Functional Service Elements. E.g. ***SituationExchangeDelivery.*** *These are specific and different for each service,* but populated to a common pattern, e.g. with xxxTopics. xxxPolicies, xxxDeliveries etc.

— *Yellow:* Domain model elements that correspond to the main payload content of deliveries: typically these are views of Transmodel entities. *Dark yellow* indicates the concrete container class, e.g. ***MonitoredVehicleJourney***. *Light Yellow* indicates an embedded reusable element that makes up part of a concrete composite (And may correspond to a Transmodel Entity).

— *White:* References to the identifiers domain model entities, corresponding to the Transmodel concepts.

A.8 Serialisation: Containment & Reference

The primary concrete expression of SIRI is as an XML schema, for which object references must be serialised either through containment (i.e. expressing an aggregation by embedding a child entity within a parent element's tags) or reference (i.e. serialising an association by including a reference to the identifier of the associated entity. It is therefore useful to adopt diagramming and naming conventions that indicate whether a particular relationship is expressed in the SIRI XML schema by containment or by reference.

— An explicit attribute is shown on the UML diagrams to indicate an aggregation relationship is implemented as physical **containment**, using the element name indicated by the attribute. The attribute name will be in the plural if the multiplicity is 'many'. The data type of the attribute will be that of the contained element. For example, the ***DatedCalls*** attribute in Figure A.2. Figure A.2 below holds multiple instances of ***DatedCall***.

— An explicit attribute is shown on the UML diagrams to indicate that an association is serialised as a **reference**. The attribute name on the referring entity generally ends in 'Ref' to indicate a reference to another entity, and the data type name generally ends in 'Code' or 'Id'. The data type of the attribute will be the unique identifier of the referenced element. For example, the ***StopPointRef*** attribute in Figure A.2 below which implements the reference from ***DatedCall*** to ***StopPoint*** is of type ***StopPointCode***.

Where attribute values are constrained to particular values a dotted line to a enumeration is shown, e.g. the line to ***ArrivalActivityEnum*** in Figure A.2 below.

Where attributes are grouped as XML groups and used to compose different entities, a class is used to indicate the group. Such classes are usually shown in a lighter shade of colour with a stereotype of <<*group*>>. For example the ***AimedArrivalInfoclass*** in Figure A.2 below.

A.9 Alternative Representations of XML Structures in UML

Note that to depict a pure object model in UML one does not strictly need to show an explicit attribute in the parent for a child component (it could be represented just by an association to the contained element), but doing so helps to make clear the order in which attributes appear in the XML and the name of any wrapper tag used to group multiple child instances. In the UML diagrams for SIRI we therefore generally show an attribute with which to implement the association.

UML supports a variety of ways for depicting the reuse of data structures, corresponding to different OO programming mechanisms, for example, by *inheritance* (single or multiple) using either class inheritance or interface conformance; or by *aggregation*, embedding complex data types in more than one entity. XML allows only single parent class inheritance, so the SIRI XML schema makes greater use of composition than of inheritance, assembling standard data structures (encoded as **Groups** in XML) into concrete classes. For clarity, we therefore often show these groups in the diagrams as distinct classes with a <<group>> stereotype, even though in the concrete XML they are repeated inline.

We illustrate these differences in Figure A.1 and Figure A.2 below, which show two different representations in UML of the same model of a timetable (this is a simplified version of the SIRI Dated Journey).

In Figure A.1, no attributes are shown to implement the aggregation, and all the attributes are shown in-line. References to external entities are shown as attributes though these too might be omitted (***JourneyPatternRef***, ***BlockRef***, ***CourseOfJourneyRef***, ***StopPointRef***).

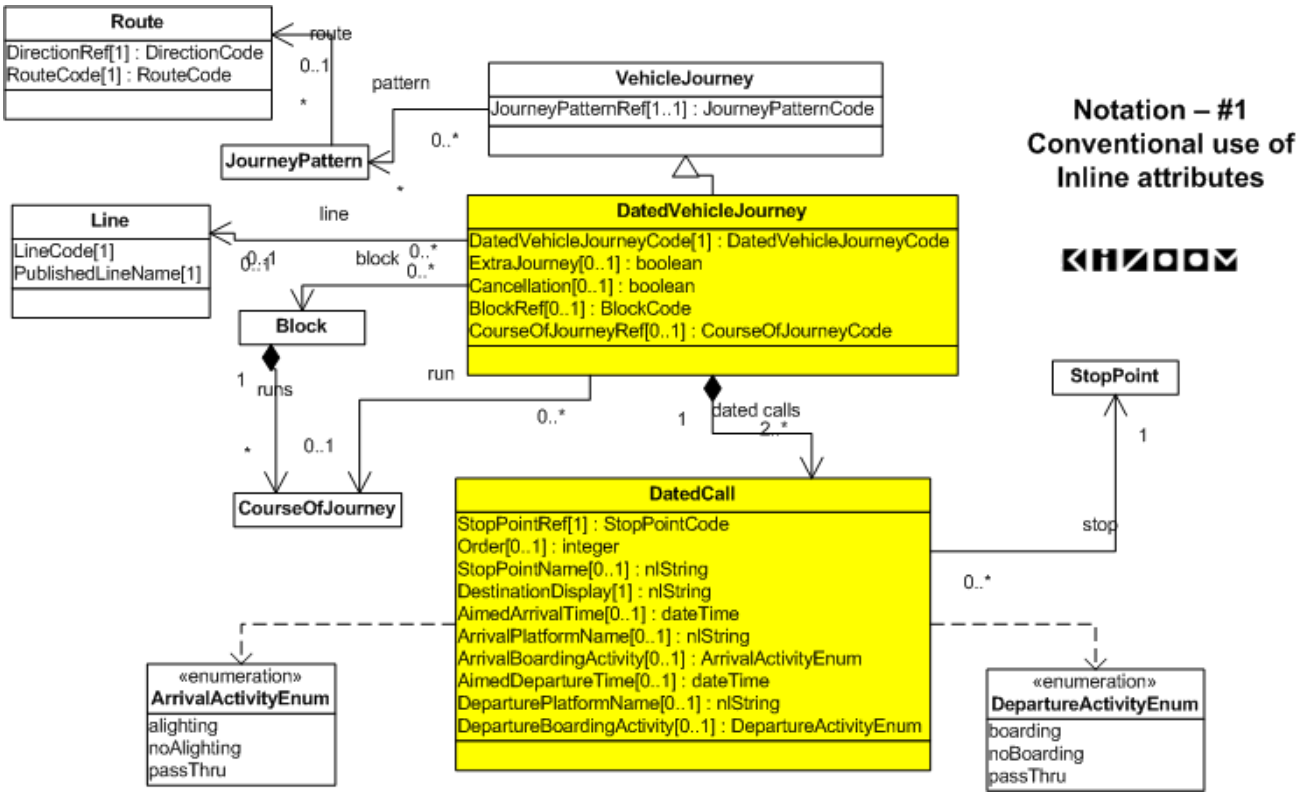

Figure A.1 — Simple Object model

In Figure A.2, an attribute *Calls* is shown on ***DatedVehicleJourney*** to implement the ***DatedCalls*** aggregation. Furthermore, certain of the attributes which occur in groups that are reused elsewhere are shown as separate 'view' classes (***JourneyPatternInfo***, ***AimedArrivalInfo***, ***AimedDepartureInfo***, ***StopPointInSequence***), with a <<group> stereotype. These are inlined in the XML. Points where extensions may be added are indicated by an ***Extensions*** attribute. Operations are not shown.

The data structures are functionally equivalent.

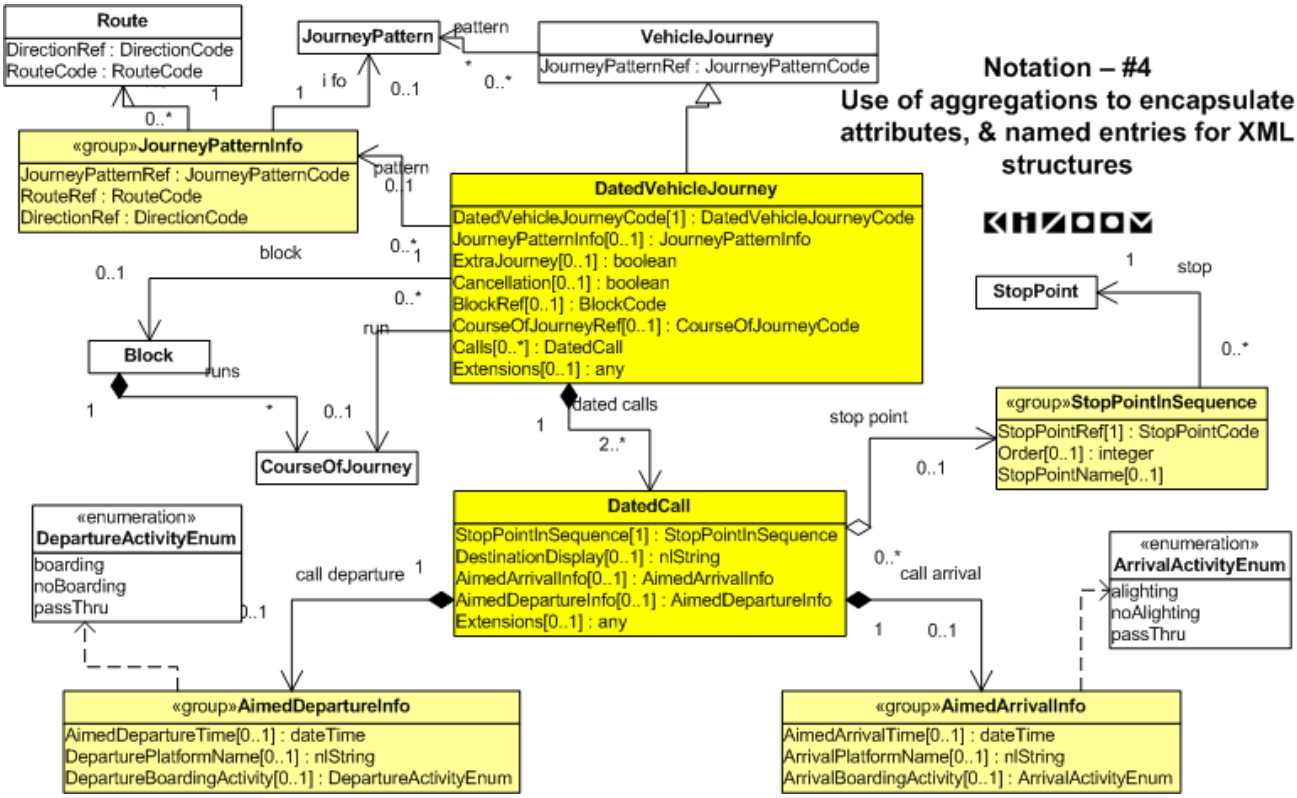

Figure A.2 — Explicit representation of references and of groups

A.10 XML Fragment for Example

The following XML fragment shows a serialisation of some data in an XML document in accordance with Figure A.2, (This is a simplified version of the actual SIRI ***DatedVehicleJourney*** entity.)

```
<DatedVehicleJourney>
    <!-- Inherited properties -->
    <JourneyPatternRef>JP56789T</JourneyPatternRef>
    <!-- Specific properties -->
    <DatedVehicleJourneyCode>DVC0008767</DatedVehicleJourneyCode>
    <!—Journey Pattern Info -->
    <RouteRef>RT0004</RouteRef >
    <DirectionRef>Northbound</DirectionRef >
    <ExtraJourney>false</ExtraJourney>
    <!—Association to Block -->
    < BlockRef>013564</BlockRef
    <!—Contained children - Callss -->
    <Calls>
        <!-- == CALL 1 == -->
        <DatedCall>
            <!—Stop point in sequence Group -->
            <StopPointRef>HLTS00101</StopPointRef>
            <StopName>Market Place</StopName >
            <DestinationDisplay>Hospital</DestinationDisplay>
```

```
            <!-- Departure Info Group -->
            <AimedDepartureTime>2001-12-17T09:32:47-05:00</AimedDepartureTime >
            <DeparturePlatformName>Stance 1</DeparturePlatformName>
        </DatedCall>
        <!-- == CALLI 2 ==-->
        <DatedCall>
            <!—Stop point in sequence Group -->
            <StopPointRef>HLTS00102</StopPointRef>
            <StopName>Hospital</StopName>
            <DestinationDisplay>Station</DestinationDisplay>
            <!--Arrival Info Group -->
            <AimedArrivalTime>2001-12-17T09:38:47-05:00</AimedArrivalTime>
            <!-- Departure Info Group -->
            <AimedDepartureTime>2001-12-17T09:39:47-05:00</AimedDepartureTime>
        </DatedCall>
        <!-- == CALL 3 == -->
        <DatedCall>
            <!—Stop point in sequence Group -->
            <StopPointRef>HLTS00103</StopPointRef>
            < StopName>Main Station</ StopName >
            <!--Arrival Group -->
            <AimedArrivalTime>2001-12-17T09:40:47-05:00</AimedArrivalTime>
            <!-- Departure Info Group -->
            <AimedDepartureTime>2001-12-17T09:43:47-05:00</AimedDepartureTime>
            <DepartureBoardingActivity>NoBoarding</DepartureBoardingActivity>
        </DatedCall>
        …..
    </Calls>
</DatedVehicleJourney>
</DatedTimetableVersionFrame>
```

A.11 Order of Attributes

Attributes appear within classes within the same order as in the XML.

A.12 Direction of Reading

Where possible a convention is followed to places parent elements above or left and child elements below, or to the right.

A.13 Simple Data Types

XML simple types are used, along with a number of common types such as string tagged with a language attribute. These are generally shown in lower Camel Case, e.g. *dateTime*.

Simple data type names that are defined for SIRI are shown in Upper Camel case.

A.14 Reusable Complex Data Types

A small number of basic complex type: **Location**, **FacilityChange**, **HalfOpenDate** **FramedVehicleJourneyRef** are used extensively and are not repeated on individual pages. They are shown on a separate page

Annex B
(normative)

Comparison of Terms

B.1 SIRI-SX and Datex2

Table B.1 compares the usage of terms and attribute values in SIRI-SX with those in Datex2

Table B.1 — Comparison of SIRI-SX & Datex2 terms

	SIRI-SX	DATEX2	Note	SIRI
	SituationExchangeDelivery	***SituationPublication***	*class*	*1.2*
	ResponseTime	***publicationTime***	*dateTime*	*1.2*
	DefaultLanguage	***defaultLanguage***	*enum*	*1.4*
	SourceType	***feedType***	*string*	*1.2*
	Situation	***Situation***	*class* Datex holds summary attributes	*1.2*
	SituationElement	***SituationRecord***	class	*1.0*
	CountryRef	***sourceCountry***	enum	*1.2*
	ParticipantRef	***nationalIdentifier***	string	*1.2*
	---	***internationalIdentfiier***	string	--
	SituationNumber	***Situation/#id***	string	*1.2*
	Version	***situationRecordVersion***	*nnInteger*	*1.2*
log	***CreationTime***	***situationRecordCreationTime***	*dateTime*	*1.2*
log	***VersionedAtTime***	***situationRecordFirstSupplierVersionTime***	*dateTime*	*1.4*
log	***NA***	***situationRecordVersionTime***	Not in SIRI	*1.4*
sts	***Progress***	***Management/lifCycleManagement/end***		
sts	***Quality***	***Reliable***	enum/boolean map	*1.2*
sts	***Reality***	***InformationStatus***	*enum* exact	
sts	***ProbabilityOfOccurrence***	***ProbabilityOfOccurrence***	*enum*	*1.4*
cfy	***Severity***	***OverallImpact***	*enum* map SX/D2	*1.2*
cfy	***Priority***	***Urgency***	*enum* map SX/D2	*1.2*
cfy	***Audience***	***Confidentiality***	*enum* map SX/D2	*1.2*

Table B.1 *(continued)*

cfy		***Reason***			enum	*1.2*
cfy		***ReasonCode***		***??***		*1.2*
cfy		***SubReasonCode***		***ManagedCause/ CauseType***	*enum* map SX/D2	*1.2*
dsc		***Summary***		***GeneralPublicCOmment/commentValue***		
dsc		***Description***		***NonManagedCause/causeDescription***		
dsc		***??***		***GeneralPublicComment/comment/value***		
dsc		***Detail***		***GeneralPublicCOmment/commentValue***		
dsc		***Advice***				
dsc		***Internal***		***nonGeneralPublicCOmment/commentValue***		
	SituationSource					
log		***TimeOfCommunication***		***??***	*dateTime*	*1.2*
log		***TimeOfObservation***		***situationRecordObservationTime***	*dateTime*	*1.4*
log		***ExternalCode***		***situationRecordCreationReference***	*string*	*1.2*
src		***AgentReference***		***SourceInformation/sourceIdentification***	string	*12*
src		***Country***		***SourceInformation/sourceCountry***	*enum* exact	*1.2*
src		***Other***		***SituationRecord/sourceName***	*nlString*	*1.2*
src		***SourceType***		***--***	*enum*	*1.2*
src		***SourceMethodType***		***SourceInformation//sourceType***	*enum exact*	*1.4*
		Quality		***reliable***	Enum/boolean map	*1.2*
xrf	***RelatedSituation***					*1.2*
xrf		***SituationReference***	***Situation/relatedSituation***			
xrf		***RelatedAs***	***situationRecordCreationReferenceManagedCause/ Reference (cause)***		DX2 single cause	
xrf			***Management/lifCyclemanagement/cancel (corrects/supercedes)***		Enum/boolean map	
xrf	***SituationElementReference***					
xrf		***CountryRef***				
xrf		***ParticipantRef***				
xrf		***SituationNumber***				
xrf		***UpdateCountryRef***				
xrf		***UpdateParticipantRef***				
xrf		***Version***				
xrf	***ExternalReference***		***Situation/Reference***			
tme	***ValidityCondition***		***Validity***		TODO	
caq	***Consequence***		***Impact***		Road & PT differ	*1.0*

Table B.1 *(continued)*

dly	***Delays***	***SituationRecord/Impact/Delays***		1.4
dly	***DelayBands***	***delaysCode***	*enum* exact	1.4
dly	***DelayType***	***delaysType***	*enum* exact	1.4
dly	***Delay***	***delayTimeValue***	Duration / secs	*1.0*
	AffectsScope			
	AreaOfInterest	***SituationRecord/AreaOfInterest***	Enum eact	
	AffectsRoads	***GroupOLocations***	Datedx2	
	PublishingAction	***(InformationUsageEnum)***	Siri is more elaborate)	
	TrafficElement	***TrafficElement***	Emebed	

Annex C
(informative)

Use Cases for Situation Exchange

C.1 General

Situation data, including cause, effect, nature, severity, etc, has a very wide variety of uses in PT Information Systems. It may describe both planned and unplanned events of varying duration. It can describe disruptions to all or part of the network, including physical stop points, transport interchanges, lines, services and operators, and is relevant for journey planning, real time operations and passenger information. Often Situations will provide a causal explanation of other information events, such as a delayed arrival, that allow human judgement to decide how to react. Both computer and human readable representations are needed.

The following Use Cases illustrate functional cases for using the Situation Exchange service in PT information systems and provide specific scenarios that the SIRI-SX service is intended to support. The purpose of the Use Cases is to identify specific behaviour which requires corresponding support in the SIRI-SX Situation model and protocol.

The Use Cases are organised under the following headings:

— Capture/Origination of situations and incidents.

— Relating Situations to other SIRI services.

— Onwards Distribution to other systems.

C.2 Use Cases: Capture & Origination of Situations

The following Use Cases describe the capture and origination of Situations using an incident management system (IMS).

C.3 CAPT#01 Situations entered manually by operator staff

Transport Operator staff may see or receive news of an Situation as a phone call, fax, email, or gather information from the television, radio, internet, database or other source. Information about Planned events may arrive long in advance as part of a schedule of engineering works, major events or other bulletin. Staff in a control room may enter the description of the situation into an incident management system using a capture terminal. Staff in the field may use a mobile device. Situations will be captured in a structured format including a severity, time of origin, source etc. The operator may also direct the requirements for distribution of the Situation to other systems and to specific staff, either directly by selecting their email phone or pager ids, or by the use of business rules that despatch to particular channels according to the message content.

C.4 CAPT#02 Situations updated manually by operator staff

Once in the system, the status of live Situations will continue to be monitored by control staff who may add updates and further details. The staff will select the current Situation and add extra information to update its status.

C.5 CAPT#03 Situations being generated automatically from a situation analyser

Situations may be created automatically by other systems, for example Situation Analysers which might detect a pattern of events such a slow down in vehicle movement against plan and create a Situation automatically. This Situation can be fed into an incident management system through a structured interface. Once in the system a Situation may be disseminated automatically, or await review by a manual process first.

C.6 CAPT#04 Situations arising from Facility Monitoring (e.g. lift failure)

Other automated sources of Situations are equipment monitoring systems, which may give rise to situation messages about the availability of specific items of equipment such as lifts and escalators, or services, such as a ticket office or accessibility assistance. The information may be tagged with location and equipment identifiers allowing it to be associated with specific routes and journeys.

C.7 CAPT#05 Situations arising from Control Actions (e.g. short running, platform change)

Many Control Actions, such as changing of a platform, short running, or delayed departure to wait for a late connection give rise to a corresponding Situation that explains the change. Such Situations may be fed automatically from a control system to an incident management system and transformed into Situations, or entered directly.

C.8 CAPT#06 Situations supplied automatically from a related PT network (e.g. rail incidents being fed to bus system) in both SIRI & TPEG formats

In multimodal transport networks, Situations arising in a one public transport network may be of relevance for operations and passengers in another connecting network. An automatic feed can be used to exchange such Situations. The identifiers used to tag the stops and services affected need to be mutually intelligible to both producer and consumer system. The same Situation may be passed repeatedly between systems, gathering updates along the way.

C.9 CAPT#07 Situations supplied automatically from a related Road network (e.g. road situations being fed to bus system) Datex2 formats

Situations arising in a road network may be of relevance for operations and passengers in a transport network that uses the road, such as buses or coaches, or to another connecting network whose access is affected, such as an airport. Road management systems typically have their own incident management systems. An automatic feed can be used to exchange Situations with such systems. A method is needed to relate the links and nodes of the road network model to those of the PT transport system in order to relate road situations to specific bus services.

C.10 CAPT#08 Road work affecting bus lanes

As for CAPT#06, where buses have dedicated road lines arising in a road network Situations may be of relevance. However they may have different implications and consequences from the impact on general use of the public highway.

C.11 CAPT#09 Parking not available at an interchange to PT

Non-availability of parking is another form of disruption that can affect multi-modal transport use, having an affect on the accessibility of transport interchanges or the travel times needed. Situations can be used to highlight both routine – for example full up – and abnormal situations – for example an accident. Car parks are

often operated by different organisations from those that run the Stop Place, using different operational systems.

C.12 CAPT#10 Weather or non-network specific Situation or event

Use of the transport networks may be affected by other circumstances, such as adverse weather, or major events which may either disrupt services, increase congestion, or both. Information about such conditions may be recorded as situations with various degrees of specificity as to its scope and consequences.

C.13 CAPT#11 Cross referencing Situations with previous Situations

A Situation may reveal itself as a series of disconnected events which are then realised to have a common cause and wider consequences. For example a jam may turn out to be due to a burst water main which will then need road works to repair. Incident management systems will report these as a succession of disconnected Situations which then need to be connected up as a causal chain and consolidated as a single bulletin for presentation to users. Similarly updates to a previous Situation need to be cross-referenced.

C.14 CAPT#12 Workflow for verification, validation and editorial correction

A transport operator may want to validate and coordinate the information given out by its dissemination systems as part of a workflow process. To do this a review process may be used to check all new messages, especially those arriving automatically from other systems before marking them as ready for wider distribution. Staff will use an incident management console to review current Situations. They may make additional checks to verify the content, add additional structured content, and also make editorial corrections to improve the human readable content. There may be different staff roles – for example data entry, data review assigned to different users with different capabilities. In order to support this operation the Situation model must include various status and quality attributes.

C.15 CAPT#13 Providing of collective guidance of passengers

One of the editorial functions for message management may be to add to the Situation advice to passengers as to the course to take to overcome the disruption caused by the Situation. This may include alternative routes, alternative travel times, information about fare easements, etc.

C.16 CAPT#14 Audit trails, retrospectives and process views

The timely and accurate capture and circulation of information can be of great importance in crisis conditions and it is desirable to keep an exact audit log of all changes made. This can be used both to record the handling of the Situation and to improve future processes. This can include time of capture, as well as time of despatch. The Situation structure should record such information.

C.17 Use Cases: Relating Situations to other SIRI services

The following Use Cases describe the correlation and association of Situations with the data content of other systems, including the content of other SIRI functional services. By linking the situation to the other service, the Situation may provide an explanation to the passenger that is important for them to understand its likely impact and to choose the best journey repair strategy.

C.18 XREF#01 Problem affecting a specific vehicle journey

The Situation may provide a useful explanation of the disruption of a specific dated vehicle journey. Each of the SIRI services that reference a dated vehicle journey can associate a Situation reference with the journey element, and a Situation may reference a specific journey identifier. This association may have been made

manually, by choosing the journey as part of the incident capture process, or inferred automatically, for example by noting that the journey uses a network, line or station that is affected by a situation (see other XREF use cases). This can be used by any information system with access to the relevant Situation service to obtain the Situation description, or by a situation presentation system to provide information about the transport service.

C.19 XREF#02 Problem at a stop place affecting some or all journeys for some or all modes

A situation at a stop place, such a full or partial closure, may affect access to transport, or transfer between particular lines or modes at the stop place. The Situation needs to be tagged with identifiers that can be used to automatically collate it with the references to stop places used in other information services. Once the relevance is established, the identifier of the Situation can be associated with the data of the other service to allow linking of data. It may be relevant to show Situation data in Stop departures (e.g. as part of the SIRI-SM results), on journey planner results and in estimated Vehicle Journeys (e.g. in the SIRI-ET and VM results), and in travel news lists, localised by area or mode or route (e.g. in the SIRI-SX results). Planned events may be associated with information long in advance and shown as warnings. Current situations may be sent out in real-time and associated by the distribution systems.

C.20 XREF#03 Problem affecting a whole line or a section of a line between two stop places

Some situations, such as line blockages, affect all services using a section of the network. In this case a Situation can be tagged as affecting a particular part of the network for a particular period. Subsequently journeys and trips that use the line section can be associated with the Situation, as in use case XREF#02. The situation reference can be used by any information system with access to the relevant Situation Exchange service to obtain the Situation description as an explanation.

C.21 XREF#04 Problems affecting an interchange

Certain types of disruption affect not the whole stop place or interchange, but just the ability to transfer between particular services. For example, transfer in rush hour between certain metro lines may be restricted during building works within a tunnel. In this case the Situation can be tagged with the details of the specific connection links and or journey interchanges that are affected. Subsequently journeys and trips that use the line section can be associated with the Situation, as in use case XREF#02.

C.22 XREF#05 Problem affecting a whole network

It may be that the whole network is subject to disruption, say from a strike or adverse weather conditions. In this case a Situation can be tagged as affecting a particular network for a particular period as a more general case for XREF#03.

C.23 XREF#06 Disruption (e.g. partial blockage) or degradation (e.g. crowding) of normal travel

Not all disruption involves the complete loss of service; often the effect will be a reduce capacity or increased passenger load (as with a major event) leading to slower travel times. It is important to keep passengers informed about such events so they can allow extra time and if necessary make alternative plans. Often the effects are approximate and an exact quantitative treatment is not possible, however various QoS measures such as passenger load, etc can be useful if available, as can an indication whether abnormal conditions – for example a jam is underway.

C.24 XREF#07 Problems affecting particular classes of users e.g. impaired mobility

Certain types of disruption affect certain categories of passenger disproportionately. For example, lift failures affect wheelchair users, and excessive crowding affects most mobility impaired users. A systematic tagging of Situations with the effect on accessibility is important.

C.25 Use Cases: Onwards Distribution to other systems (e.g. in TPEG & Datex2)

The following Use Cases describe the distribution of Situations to different types of dissemination system.

C.26 DIST#01 Distribution of Situations to displays

An incident management system may send the situations it captures or aggregates to in-station, at stop and onboard displays of the transport operators own systems. In some cases the Situations will be displayed as additional notes and warnings accompanying other data, such as stop departures. In other cases relevant Situations will be shown as a specific bulletin. Content on displays is typically highly filtered for a particular context, for example a station or route, so the Situations will need to be tagged with precise scope information (or be associated with other entities so tagged) so that they can to be distributed automatically.

C.27 DIST#02 Distribution of Situations to external information services, e.g. broadcasters

In order to disseminate information to the public, an incident management system may pass its Situation data to other distribution systems, which will format it for presentation on different types of devices and presentation channels, for example web, DAB radio, mobile internet, voice. The distribution system will often compose appropriate messages from the structured content of the Situation model, for example mode, stop, line, severity, reason etc. The distribution system may also be responsible for deciding when to start and stop displaying the Situation data, using embargo dates, expiry dates etc that are part of the Situation content to control the presentation process.

C.28 DIST#03 Distribution of Situations to staff

A transport operator may want to inform their staff about Situation s as they occur so that they are in a position both to conduct operations and to inform passengers. Management may need to be informed of certain types of situation as well. Distribution may need to be targeted at particular staff or groups of staff, as in DIST#04. When capturing a Situation, it may be marked for distribution to specific users or classes of user as part of the structured content. Information about some types of Situation is for internal use only.

C.29 DIST#04 Distribution of Situations to alerts and travel angels

Situations typically describe exceptional events which may require action by the users to reduce the impact, so distribution systems that notify users in a timely manner are especially appropriate. Push systems which immediately notify users using pagers, email, SMS or other channels can do this. However in order to avoid spamming users with irrelevant content, Situations must be tagged with appropriate scope, time and categorisation values that allow for exact filtering for relevance. Personal incident systems may be designed for intermittent loss of access to the distribution channel (as for example when underground) so again, Situations must have temporal values that allow the retirement of stale data after a certain time regardless of whether the distribution channel is still open.

C.30 DIST#05 Projection of Situations on maps

Distribution systems may wish to present Situations in a spatial context, for example road-works on maps. In order to be able to do this, Situations must be spatially tagged, either directly, or through the use of references to other entities such as Stop Places or line sections that themselves have known geospatial coordinates. It should be remarked that for some types of Public transport Situation, knowledge of the location alone is not sufficient to judge its impact. For example, a northbound service might be unaffected by a signal failure at a particular point, while a southbound service is suspended; or a metro service might be unaffected by a road accident; or if there is a dedicated bus lane a traffic jam may have less impact on bus services. Typically Direction, line and mode are all of relevance.

C.31 DIST#06 Distribution of Situations to journey planners

Journey planners can integrate Situation data into their results, showing both planned and unplanned situations that may affect a particular journey. In order to do this they need Situations to me tagged with identifiers that can be elated to specific journeys.

C.32 DIST#07 Distribution of Situations to personal navigators and smart devices

Personal navigation devices, including mobile phones and SatNav devices, may be capable of showing relevant Situation data as part of their journey guidance. Devices will typically obtain their real-time data from an on-line system which will in turn connect using a Situation exchange service such as SIRI-SX. In order to support such use, Situations need to be tagged with geospatial and semantic identifier values such as Stop codes that can be used to overlay the data on the device presentation.

C.33 DIST#08 Distribution of Situations to other incident management systems

An incident management system may send the situations it aggregates to other incident management systems (that is, which also capture and originate Situations), as well as itself receiving them from other systems. In some cases the same Situation may make a round trip, that is, pass out to and then return from another system. The other systems may use the same or a different representation of Situations. In order to interface with other systems with minimal loss of data, messages must have unique identity, follow a versioned lifecycle model, and establish a systematic mapping of elements, especially categories and classification codes that can be used to map between representations such as that of TPEG.

C.34 DIST#09 Distribution of updates to existing Situations

There may be updates to a previously propagated situation that also need to be distributed. The update may add additional information, or supply more current versions of previous information values, or signal that the Situation is closed. The receiving system needs to be able to apply the updates to its previous data. It is possible that updates may reach the consumer system via different routes and specific update may be lost. The consumer system must therefore be able to judge which update is the most recent.

C.35 DIST#10 Aging of Situations and updates

If communication is lost between the producer and consumer situation system, the consumer system must degrade gracefully and act so as to maintain its credibility. Situations that reach their expiry point should be removed. After a while the remaining Situations may also become stale, as without regular updates, the information they contain may become out of date. In these circumstances the situation store may cease to show all or certain types of Situation after a given duration. In order for systems to be able to do this Situations must contain appropriate content and metadata.

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