SIRI-SX: Best Practice

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1 Introduction

1.1 Background and purpose

1.1.1 Passengers need multi-modal travel information which is accurate, timely, consistent and clear. Never is this more important than when a journey is disrupted. Arguably, disruption information is the most important information to passengers. When everything is running smoothly and as expected, many regular passengers will use information only to confirm what they already know. When there is an incident and the route or schedule of their current journey is disrupted, then they need to know how their journey is changing and how, under these new circumstances, they can still get to their destination.

1.1.2 During 2012-13 and 2015, RTIG held several events to explore with members how disruption information could best be facilitated. This document addresses one of these: the use of incident management system standards, and in particular SIRI-SX, to enable business to business communication of disruption to public transport services.

1.1.3 There are many things that would be useful to communicate in a structured manner about disruption so that receiving systems can better describe disruption to their users. This paper is intended to provide a starting point for this based on the types of data structures that are available. In the future when additional data becomes available – such as standard sharing of accessible routes through a station or ticket applicability – then the method for sharing disruption to these can also be agreed via SIRI-SX and this best practice expanded.

1.1.4 The paper is aimed principally at system architects and designers. As well as SIRI (CEN TS15531, currently being updated to an EN), it benefits from a basic understanding of other UK and CEN public transport data standards such as Transmodel (EN12986), NeTEx (CEN TS16614), NaPTAN, TransXChange and JourneyWeb. The UK standards are available from https://www.gov.uk/government/collections/xml-standards-public-transport.

1.1.5 This paper does not consider the business processes needed to support the provision of such multi-modal disruption issues – these have been outlined in RTIG's companion document *Managing Bus Service Disruptions: a Position Paper* (RTIG-PR015-D002).

1.1.6 We are grateful to Jonathan Shewell-Cooper (Atos), Nick Knowles and the Disruption Working Group for their input and expertise.

1.2 Status of this document

1.2.1 This document is **issued**. We are happy to receive feedback and comment for future revisions; please contact us at secretariat@rtig.org.uk.

2 The SIRI-SX standard

2.1 The SIRI standards family

2.1.1 The Service Interface for Real Time Information (SIRI) specifies a European interface standard for exchanging information about the planned, current or projected performance of real-time public transport operations between different computer systems.

2.1.2 SIRI comprises a carefully modularised set of discrete functional services for operating public transport information systems. SIRI supports a range of information exchange service covering planned and real time timetable exchange; vehicle activity at stops; vehicle movement; and information to assist in the provision of reliable connections between vehicles (see

2.1.3 Figure 1).

2.1.4 SIRI is published in five Parts. Parts 1-3 were first adopted by CEN in 2006 and have since been considerably reworked and revised; Parts 4 and 5 came later, in 2010. "Situations Exchange" (SX) is one of these services (Part 5), and has also been revised.

2.1.5 The published SIRI standards are copyright to CEN and available, at a cost, through national standards bodies (ie BSI in the UK). However a lot of information – including draft revisions and a free access XSD file – is available (in English) on the VDV web site at https://www.vdv.de/siri.aspx. An informal UK site is also available, at http://user47094.vs.easily.co.uk/siri/.

2.1.6 SIRI is built on other standards, in line with normal CEN practice. The base standard is Transmodel, and SIRI can be seen as an implementation of part of Transmodel for the specific purposes of real time information exchange. In addition, SIRI was evolved from a number of national standards, notably VDV454, VDV453, Trident and the draft RTIGXML (which it has superseded).

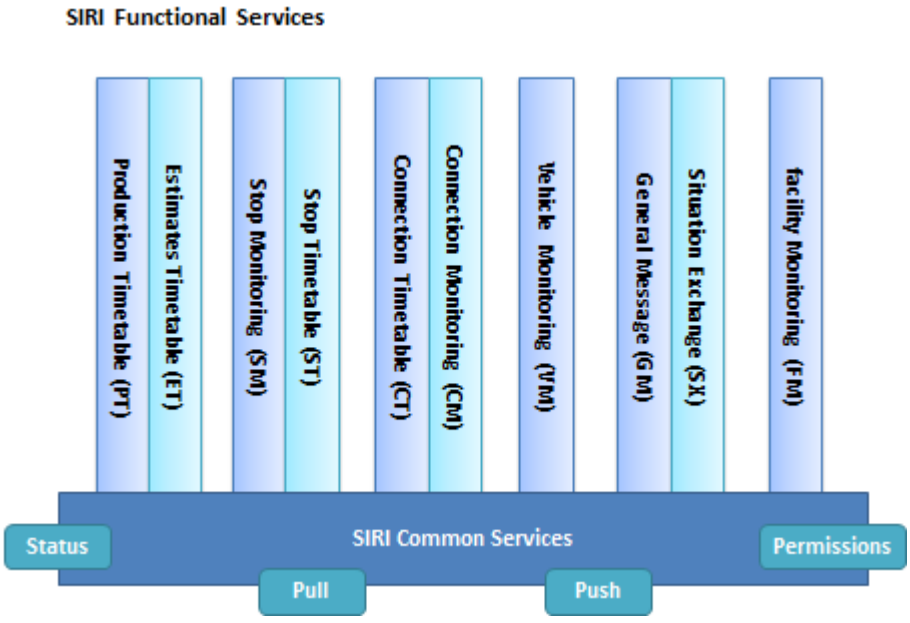

Figure 1: SIRI Functional Services

2.2 Role of SIRI-SX

2.2.1 The SIRI-SX Service is for exchanging situation content in real-time. It uses a structured situation model for describing disruptions to services. Through this, information about incidents can be directly linked to stop points, lines, journeys, pathways, stops etc; to provide an explanation of the disruption to passengers that enables them to understand the impact of the situation on their journey.

2.2.2 The service is designed to exchange incident information between control systems, and to distribute to journey planners, alert systems and displays that wish to process and match incidents based on structured elements.

2.2.3 SIRI-SX supports the exchange of information on the impact of disruption on multiple services, whole routes, whole areas; receiving systems can then apply this information to specific services and passenger journeys.

2.2.4 While SIRI-SX is created as a B2B protocol, it should be assumed that any textual information it contains will be displayed to end users both through personal devices and public screens at stops and stations. This then demands care in the authoring of text that will be exchanged using SIRI-SX. The processes to be considered in creating such textual information are covered in RTIG's companion document *Managing Bus Service Disruptions: a Position Paper* (RTIG-PR015-D002).

2.2.5 SIRI-SX is not intended to be used to provide updates to the progress of a specific Vehicle Journey. The SIRI Estimated Timetable (ET) service should be used for this purpose. Rather SIRI-SX is to be used to describe situations that have a wider impact.

2.2.6 It is recommended that SIRI-SX should be used in the following scenarios:

- Problems at a stop place affecting some or all journeys for some or all modes;
- Problems affecting a whole line or a section of a line between two stop places;
- Problems affecting an interchange;
- Problems affecting a whole network;
- Disruption (eg partial blockage) or degradation (eg crowding) of normal travel;
- Problems affecting particular classes of users, eg those with impaired mobility.

2.2.7 While the focus of SIRI-SX is to deliver information on disruption, SIRI-SX has also been used to attach non-service impacting information messages to services and stops, for example the opening of new facilities at a station, a change to the car parking regime, or the availability of on board breakfast on Saturdays.

2.3 Existing deployments of SIRI-SX

2.3.1 As of March 2015, there are limited live implementations of SIRI-SX in the UK:

- SIRI-SX is used for Situations in both Traveline Cymru and Traveline Scotland.

- During the London 2012 Olympics, TfL published a SIRI-SX subscription feed of incidents from their system, for use within the Games Spectator Journey Planner (SJP), so that other Traveline regions could consume and output consistent information on rail incidents during the Games period.

- A UK PTE is currently testing the use of SIRI-SX to transmit incident information from their incident capture system to bus stop displays as well as to their journey planner.

2.3.2 SIRI-SX is actively in use outside the UK. Examples include:

- In Sydney (Australia) where it is used to ensure consistent information on incidents in both the journey planner and across service status modules.
- In Germany, Deutsche Bahn AG send disruption information in SIRI-SX format to the journey planner of Bayerische Eisenbahngesellschaft BEG (Bavarian Railway Company).
- Also in Germany, Verkehrsverbund Stuttgart (Transport Authority Stuttgart) use SIRI-SX to send messages from the journey planner to SAF (Kassel), which operates the public stop displays in the VVS area.

2.4 Other standards: DATEX II

2.4.1 There are other "Situation Exchange" models that are in use, in particular to distribute information on disruptions to road journeys.

2.4.2 DATEX II has been developed to provide a standardised way of communicating and exchanging traffic information between traffic centres, service providers, traffic operators and media partners. DATEX II has not been built to provide information about public transport.

2.4.3 In the UK DATEX II is used to supply information on roads disruption both current and future by several bodies; for example the Highways Agency and Elgin, the company that runs the http://roadworks.org website.

2.4.4 Most local traffic systems in the UK use the UTMC framework. While this incorporates DATEX II for the centre-to-centre exchange of information, it also includes a lot more detail about the connectivity of roadside systems to a management centre (in a similar way to RTIG's device interface protocols for public transport). UTMC includes models of events, incidents and accidents which are used for local traffic management purposes. While not completely aligned currently, there is a long term programme to evolve UTMC and DATEX II to be more directly compatible.

2.4.5 DATEX II allows the coding of information about situations that impact the road network. Where a road network situation impacts public transport journeys, it is recommend that the impact on public transport services of the situation should be exchanged using SIRI-SX. (As the SIRI-SX situation classification model has been harmonised as far as possible with that of DATEX II, and from there with that of UTMC, this should usually be straightforward.)

2.4.6 In many cases the communicator of the road situation will be a different body from the communicator of the impact on public transport. There will therefore need to be a discussion on where any necessary translation happens. Again, this illustrates the multi-party nature of providing information to travellers about disruption and the need to ensure agreed business processes are in place to support this.

2.4.7 A final information standard is TPEG (Transport Practitioners' Expert Group), which is geared to the broadcast of travel information across a wide variety of contexts. TPEG includes a framework for public transport information and this includes information on disruptions. As with DATEX II, though, the TPEG situation models have been included as far as practical within the SIRI-SX specifications, and TPEG itself would not normally be relevant to B2B functionality.

3 Recommendations on Schema usage

3.1 Introduction

3.1.1 This section is based on version 2.0 of the SIRI standard (ie the 2015 standard documents, currently available in draft). It outlines recommendations for UK best-practice usage for the schema elements to create a level of standardisation between UK information providers. This focuses on the "public transport situation" carried within the PtSituationElement of a SIRI-SX message.

3.2 Producer: <ProducerRef>

3.2.1 Each producer of the SIRI-SX feed should create a reference that clearly identifies them as the creator of the feed. This will support audit and prioritisation in downstream consumers of the data.

3.2.2 The value should show type of producer (role e.g. operator, roads manager, PTE, local authority). If the producer is an operator, then the National Operator Code (NOC) file from the Traveline National Data Set (TNDS) should also be cited.

3.3 Situation reference

3.3.1 This is used to ensure that each situation can be uniquely identified throughout the lifecycle of the situation. This should at least contain the producer system reference <ProducerRef>, a unique (within supplier) situation number <SituationNumber>, and a version <Version> that is updated each time information about that situation is changed.

3.4 Related situations: <RelatedSituation>

3.4.1 This allows one situation to be related to another. The target situation does not have to be described in the same feed, so this would (for example) permit a public transport situation to be related to a roads incident described in a separate DATEX II feed.

3.5 Validity and publication windows

3.5.1 SIRI-SX allows for two different sets of dates to be published associated with a situation – for validity <ValidityPeriod> and publication <PublicationWindow>.

3.5.2 The validity period describes the dates (and days of the week, and times) for which the situation will be active – for example "2100 Wednesday 23 May until 0300 Thursday 24 May". For an active-on-the-day incident, the validity period end time may need to be estimated.

3.5.3 It should be noted that this period applies to the <Reason>, <Affects> and <Consequences> supplied; as a result the validity period will generally change as a situation develops.

3.5.4 This approach removes the need for the data supplier to try and map information to specific vehicle trips (for example though specific Service Journey data) in a manner which is understood by receiving systems. Rather, it becomes the receiving systems' role to use the dates, days and times supplied along with other information about the <Affects> to map situations to trips.

3.5.5 The publication window allows an information supplier to specify when information about a situation should be shown to users. This allows a supplier to prepare information well in advance of when it will be shown. It also allows users of services to be warned about future planned disruption to that service without the <Affects> being automatically applied.

3.5.6 It is recommended that for all situations both of these date intervals are supplied, even if the publication window defaults to the validity period.

3.5.7 NB: if TPEG day type values for special day types (such as public holidays or school days) are used, then additional datasets may need to be agreed to specify what these mean. It is recommended that these are not used.

3.6 Summary and Details elements

3.6.1 For every situation there should be a textual summary <Summary> that can be used as a headline, and a textual detail <Details> of the situation. This should describe what has happened to impact the transport network.

3.6.2 These should focus on what has happened to impact the transport network, not on the details of the impact on passengers; good examples are:

- "Industrial action on Torpoint Ferry"
- "Engineering works on Chiltern Railway between Oxford and Bicester Town; until 9th May 2015"
- "Lands End Airport closed due to runway improvement work. From 4th to 20th July"
- "Dry Lane in Crawley will be closed from 14th - 16th June, affecting bus services"

3.6.3 A system should also provide some categorisation of the situation by using the systematic classification defined in the specification <ReasonCode>. This will help receiving systems using the data to display the information to users more effectively.

3.7 Consequence

3.7.1 A <Consequence> is where the impact of the situation on travel is described both in text and in data. For every situation there will normally be at least one <Consequence> for each public transport operator, and each mode.

3.7.2 For example for the "Dry Lane" closure there may be many bus services from more than one operator impacted, so for a passenger there may need to be a <Consequence> for each bus operator that provides advice to their passengers. If buses and trams run on the same affected road link, the impacts will often be very different: buses can divert, trams cannot.

3.7.3 Similarly, for a rail situation there is likely to be at least one <Consequence> for each Train Operator (TOC). This is because the impact on journeys, of for example a line side fire at Radlett, will usually be different on the different lines / routes run by each TOC.

3.7.4 The SIRI-SX structure for a <Consequence> allows a system to both to provide textual advice for how the passenger should travel because of the situation and it enables information systems to link that situation to networks, lines, operators and stops. For the reasons described, such advice should be contained within the <Consequence> structure and not within the <Details> described in 3.6.

3.7.5 A <Consequence> should include at minimum the following elements:

- Severity – See section 3.8.
- Advice – This should be textual information to provide passengers with the impact of this situation on their journey and the advice from the "operator" for how the passenger should now travel, which could include alternate travel options.
- AffectsScope – This is the data element to describe the impact on operators, stops, lines and services (see section 3.9).
- Blocking – This data element is used to determine whether, because of the situation, impacted transport elements should be removed from journeys planners or real time systems.
- InfoLink – This enables URLs to be provided which supply additional relevant information, such as route maps or revised timetables.
- Delays – This is used to communicate an estimate of the length of delay this situation will cause.

3.8 Severity: <Severity>

3.8.1 To allow end user systems to prioritise information it is useful to supply a <Severity> to the Situation. For example this would then be carried forward in the JourneyWeb Notices structure for journey planner output.

3.8.2 SIRI-SX supports the TPEG PTI26 classification of severity. The table below suggests how those classes should be applied in a UK context in order to achieve consistency in passenger recognition:

Value	Usage
Unknown	When severity is not yet known
Undefined	Not used
No Impact	No impact on a passenger's journey. For example a message about PlusBus ticketing being available or a future event
Normal	The service is running normally – used when a situation is closed and the services has returned to the planned state

Value	Usage
Very Slight	Temporary traffic lights in use – unlikely to impact public transport
Slight	Planned engineering works on some lines Closure of an on street stop in a built up area
Medium	Delays across services of 10 - 20 minutes Planned station or isolated stop closure Planned short term engineering works on all lines Overrunning engineering works Service likely to be busy because of an event
Severe	Unplanned station or port closure, if not covered as very severe Closure of or disruption to a branch line Any service suspension not covered under medium Delays across services of 20 - 30 minutes Emergency engineering works to track, or major thoroughfare or Motorway e.g. to Severn Tunnel Closure of part of an Underground or Metroline Severe delays to a London Underground line, Manchester MetroLink line etc. if not covered as very severe Suspension of a ferry service due to severe weather Planned closure of a motorway (or similar trunk road) slip road preventing access or egress at a particular junction Significant queues or delays on any A road if not very severe
Very Severe	Unplanned closure of a main railway line Significant unplanned disruption to a main railway line (due to, for example, industrial action, derailment, leaf-fall, bad weather, etc) Unplanned incident affecting a significant number of passengers, entire line, and / or all services of a particular train company Any incident causing disruption to a London terminal station, or a major regional 'hub', including an unplanned closure of one of these stations Delays to services of 30 minutes or more on a main railway line An incident expected to result in the operation of an emergency timetable and/or the cancellation of a significant number of journeys (or sections of journeys) Significant disruption to a network of bus or other local transport services (for example, due to a strike) Significant disruption to the flights of a particular airline, or at a specific airport Planned or unplanned closure of a section of motorway or part of the Strategic Road Network

Value	Usage
	Unplanned closure of a motorway (or similar strategic road) slip road preventing access or egress at a particular junction Significant queues of traffic on a motorway or strategic road

3.8.3 Receiving systems can then use the severity measures to provide guidance to passengers on how to respond. A potential usage might be:

- *Very Severe* – becomes a headline all users should see.
- *Very Severe* and *Severe* – a red triangle because the passenger will have to do something different from normal; for example catch their bus from somewhere else.
- *Medium* – a yellow triangle because the passenger may be inconvenienced but not need to travel differently.
- *Slight* – a green triangle indicating "here is some information that it would be useful for you to know about your journey".

3.9 Affected operations: <Affects>

3.9.1 This element is use to provide information about the stops and the services that are impacted by this Situation. The <Affects> information can be used to enable receivers of SIRI-SX to decide how to output the situation, where to output the situation, and what users will be impacted by the situation. SIRI-SX supports a number of methods of doing this. For the UK it is suggested that initially the most useful will be as follows:

Affected Lines / Routes (structured code)

3.9.2 The "affected line" should contain enough information to enable the receiving system to link it to the service in question. For a service that has a route number – which is in practice all public transport except rail - the following elements should enable this to be done:

- Mode <VehicleMode>
- Operator <OperatorRef>
- Service number <LineRef>
- Service Direction <DirectionRef>
- Line number <LineNbr>

3.9.3 For the UK, it is recommended that:

- the <OperatorRef> should be the operator code as supplied by Traveline's National Operator Code database;

– the <LineRef> should be the regional TNDS Service Code. This builds on the work that Traveline are doing to develop service reference persistence in the TNDS[1] project.

The combination of <LineRef>, <OperatorRef> and <LineNbr> should then enable a service to be uniquely identified. (See http://www.journeyweb.org.uk/accessibility/Accessibility-Open-Data-v1.4.pdf for more discussion on this).

3.9.4 If the whole service is not impacted then a line section can be used to supply the first and last stops of the impacted sections.

3.9.5 For UK rail services, as there are no railway route numbers to add to <LineRef>, then operator code and line sections containing all the stops on the impacted routes and direction can be used instead. For example a situation impacting SouthEastern's Hayes Line would list Charing Cross, Waterloo East, Cannon Street, New Cross, St.Johns, Lewisham, Ladywell, Catford Bridge, Lower Sydenham, New Beckenham, Clock House, Elmers End, Eden Park, West Wickham and Hayes.

3.9.6 Stops in a line section should be defined using the NaPTAN ATCO code (being the UK standard code for a stop).

Affected Stops

3.9.7 Where a situation impacts specific stops – for example closed because of road works – a list of these stops may be supplied. In the UK these stops should be specified using their NaPTAN ATCO code. If another coding structure is used, a publicly published NaPTAN conversion table should be available to ensure that receiving systems can interpret and use the data interoperably with NaPTAN-based systems.

3.9.8 Consideration should be given to stations such as Tamworth, Liverpool Lime St and Retford where a situation may just impact the high or low level parts of the station. The use of NaPTAN or TIPLOC would allow these to be separately described.

3.9.9 The closure of specific elements of a station/stop (eg entrance, ticket office) or specific equipment failures (eg ticket machines, lifts) may be described in text and linked to the stop code but not yet linked to all the types of specific sub-element of the station.

Affected Vehicle Journey

3.9.10 This allows specific Vehicle Journey References to be used, in cases where only specific services are impacted and not all services on a line (for example a bus breakdown). However for specific service cancellations a SIRI-ET message would probably be used.

3.9.11 In rail this would be used, where the TOC has not broken down their network into lines, to provide the UIDs of the services impacted by the situation. Again if the whole service is not impacted then a line section can be used to supply the first as last stops of the impacted sections.

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1 Traveline National Data Set – see http://data.gov.uk/dataset/traveline-national-dataset.

3.9.12 As Train Operators publish via Darwin (or Network Rail via VSTP) on the day changes to specific services, the use of Affected Vehicle Journey is expected to be more limited in rail.

3.10 Closing a Situation

3.10.1 When a Situation is ended it is good practice to continue, for a period of time, to provide information indicating that something that was disputing travel is no longer disrupting travel.

3.10.2 This can simply be done in SIRI-SX by setting the Progress elements to "Closed" and by setting the publication window end time to indicate when this situation should no longer be shown.

4 Rail Impacts

4.1 ATOC PIDD

4.1.1 The ATOC Approved Code of Practice for Passenger Information During Disruption[2] set out a three-step structure for the information that should be communicated during disruption:

- **Problem** – What has occurred?
- **Impact** – What does it mean for passengers? What impacts will this have on passenger journeys (including time estimates, where available)?
- **Advice** – What passengers should do.

4.1.2 All these elements can be carried within the SIRI-SX situation:

- **Problem**: This should be carried in the <Summary> and <Details> elements. The summary should provide a meaningful title for the situation. For example "Cycle race, St. Giles', Oxford, Tuesday 22nd May" or "Signalling problems at Lichfield City".
- **Impact**: The impact is associated with the journey services the passengers is using; for example "Buses will replace trains between Cardiff Central and Ebbw Vale Parkway". This should be carried within SIRI-SX as the <Advice> within a <Consequence>. This can be aligned to operators, lines services and stops. This allows for a rail situation where there may be multiple impacts – at least one for each train operator.
- **Advice**: SIRI-SX does not have separate description element for the "what should the passengers do" The text for this will therefore need to also be carried as part of the "Advice" within a Consequence.

4.1.3 The approach to the information to be delivered outlined in the ATOC PIDD is also equally applicable to other modes of transport and should be seen as a best practice approach.

4.2 Ticketing Impacts

4.2.1 A situation allows ticketing impacts of disruption to be separately described – for example to describe the scope of temporary easements. It is recommended this is only done textually using the SIRI-SX <Easements> element rather that attempting to use the detailed ticket restriction referencing.

4.3 Other issues for consideration

4.3.1 In planning to provide a SIRI-SX data feed there are a number of others issues to consider. The following approaches are advised.

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2 See www.atoc.org/clientfiles/files/ACOP015v3%20-%20PIDD%20(2).pdf.

Capabilities

4.3.2 Publications should clearly identify the capabilities and elements supplied by the SIRI-SX feed. This can be done through documentation, the use of a standard non-customisable format, or by implementing a request which reveals the capabilities (e.g. through SIRI capabilities requests).

Provide filtering options

4.3.3 Consumers of the SIRI-SX feed should have the option to filter data by all reasonable criteria in their data requests. This reduces both client-side filtering and the size of the data transmitted across the network.

Performance

4.3.4 Publishers should monitor performance of requests to the real time feed, and provide expected response times to consumers so that they can consider these times in their application design.

Update frequency

4.3.5 Information should be published on how often data is updated in the underlying real time sources, so that consumers of the data can determine appropriate requery times if needed.

Data coverage

4.3.6 SIRI-SX publications should clearly state what routes/services/stops are covered by any real time feeds along with the time range for which they will provide data.

Support to developers

4.3.7 In order to give developers a clear idea of how you plan to implement/structure your data (especially where the schema allows for much variation), provide either documentation with concrete examples of real time requests and responses from your system (including edge cases) or a test site where these can actually be called.

Subscription service

4.3.8 SIRI-SX can be delivered as a subscription service in which a receiving system subscribes for updates. In this case, advice should be provided as to the frequency with which a receiving system should stop and restart their subscription.

Just for decoration

4.3.9 In setting up a SIRI-SX service, the publisher may need to consider whether the information to be supplied is "just for decoration" (ie merely enables receiving systems to add an informative overlay to their output) or to be fully integrated into receiving systems operations. In the latter case elements such as <Blocking> may be needed to enable the receiving systems to alter the base plan data they contain.

Diverted services

4.3.10 In creating information that is to be linked to diverted services, care should be taken to ensure that the information contains both the service details and the stops that are no longer called at, to ensure that a receiving system can supply more complete information to their users.

Textual Display

4.3.11 Receivers of data may wish to display the textual information on a variety of devices and systems. There may be limitations on their capacity to display supplementary text on public screens and on some types of mobile device. The formatting of that output should be the responsibility of the receiving system, and not the supplying system.