

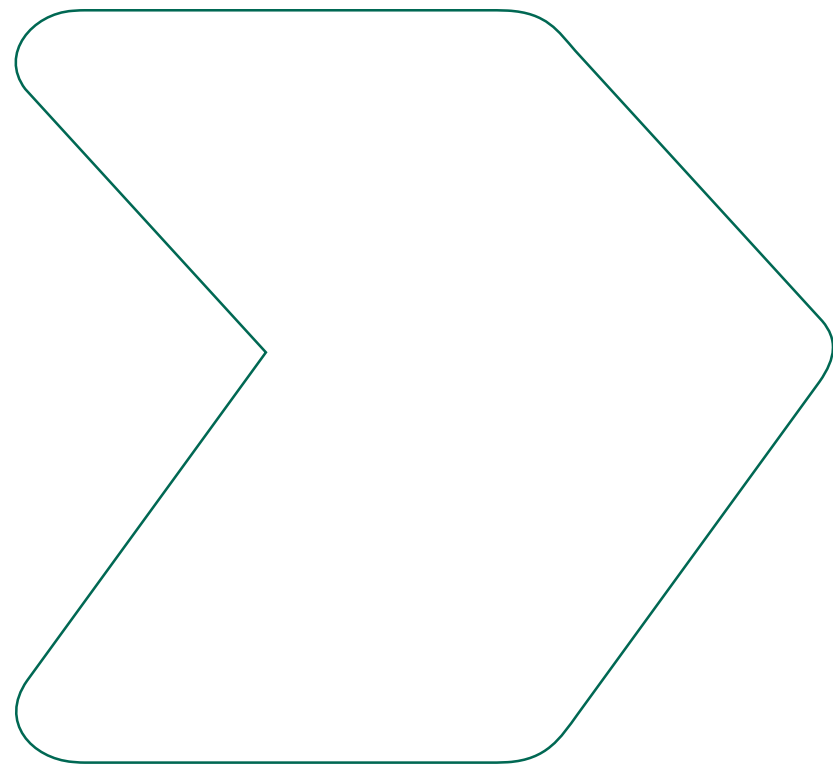
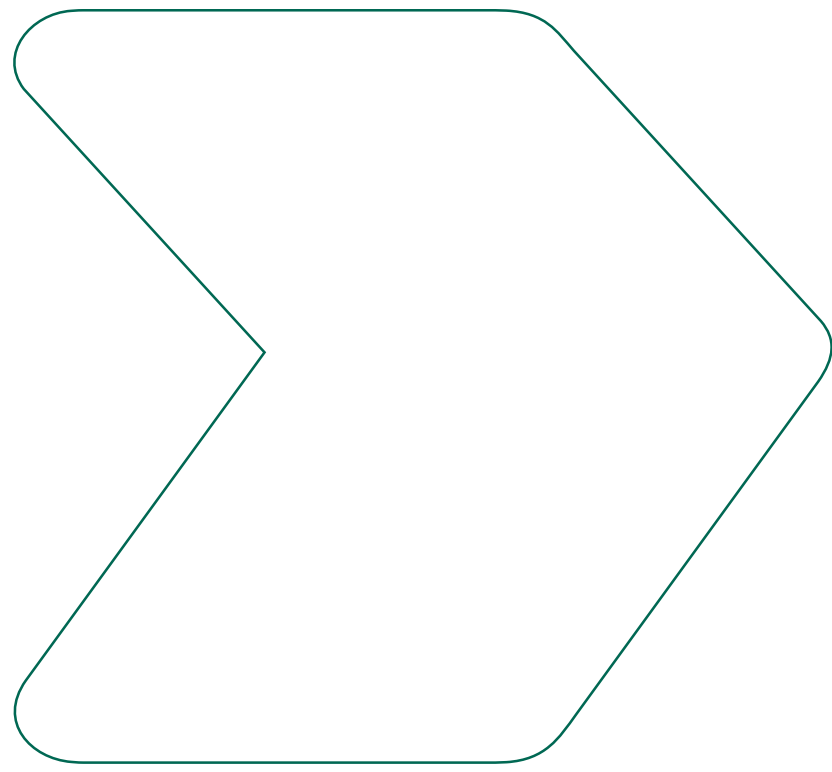
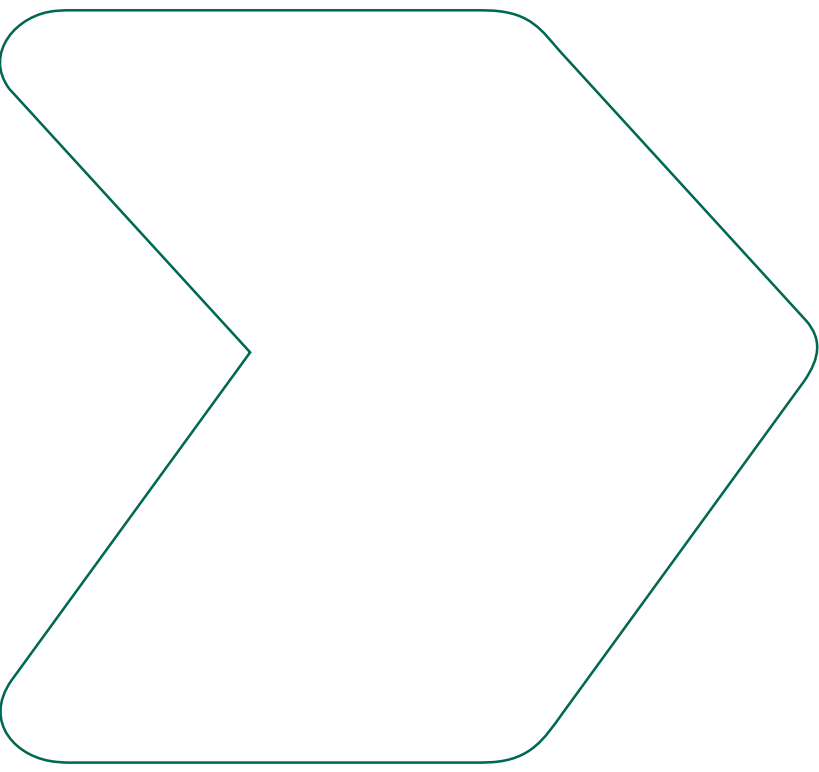
# NeTEx Workshop #2 – Routes & Timetables

London & Sheffield



# Using NeTEx for Stops, Routes and Timetables

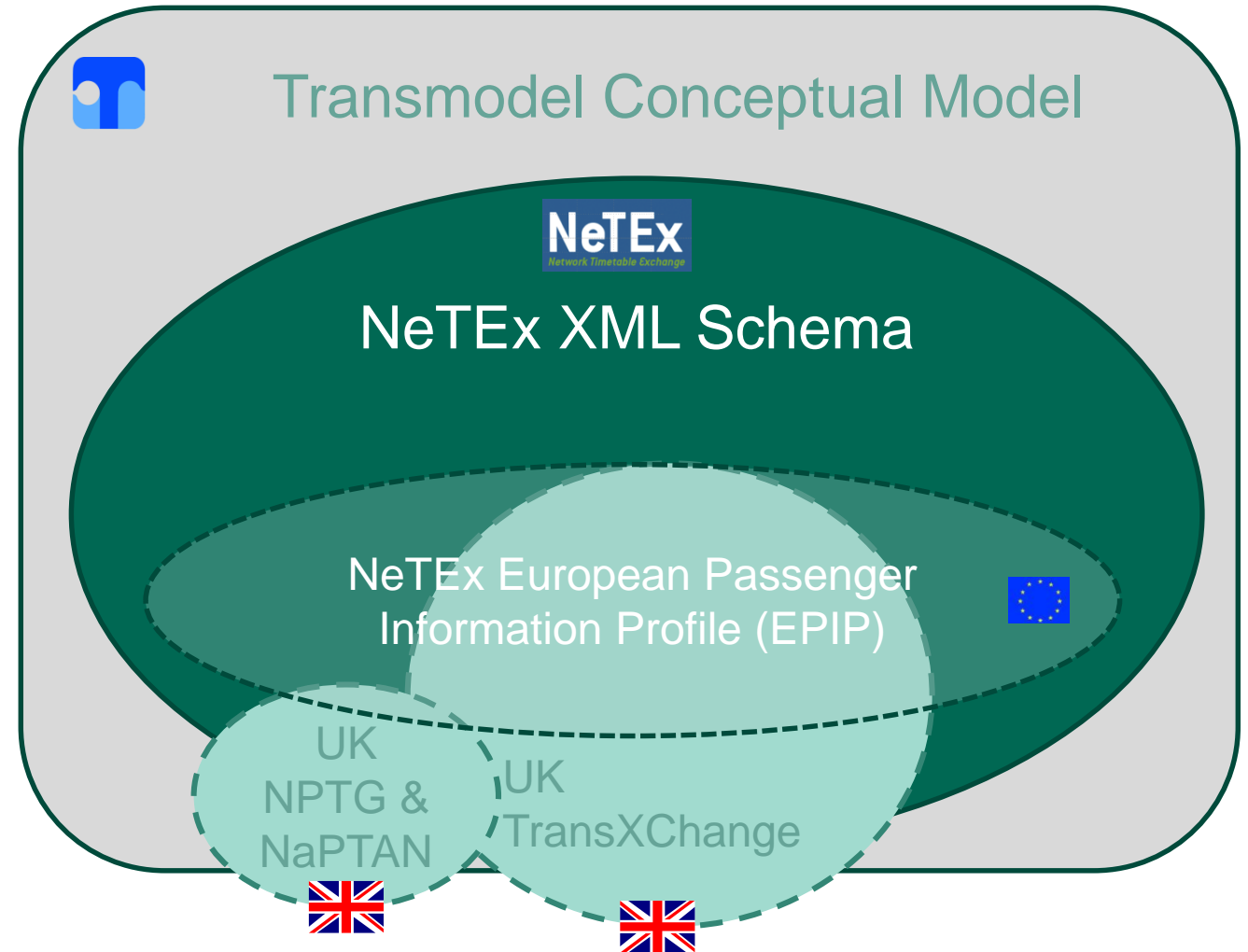
## 1. Introduction





# Recap: Standards for Stops, Routes and Timetables

- Transmodel covers many PT functional domains
  - Timetables, fares, scheduling, driver management, etc
- NeTEx implements a subset of Transmodel
  - Stops, Timetables, Fares, etc
- EU Minimum NeTEx profile (EPIP) covers a subset of NeTEx for passenger information
  - Stops, Timetables, Interchanges, etc
- TransXChange includes NeTEx elements not in EPIP
  - Data elements for Operations, etc
  - Operations, etc
  - Calls, etc
- TransXChange includes some UK specific concepts not in Transmodel or NeTEx
  - EBSR registration info (TxC)
  - Traveline Region (NPTG), etc



The UK NeTEx Profile for Stops, Routes and Timetables will be an enhanced version of the European Passenger Information Profile (EPIP) – the “EU Minimum”





## EPIP : Why Not!

- Mandated by EC (Priority Action A), but developed by CEN committee of which UK is member (and will remain a member post-Brexit)
- Much of the consideration as to what is needed in a PI profile has already been done – just adjust for UK
- “UK plc” will want to trade with Europe – having common standards will help sell systems to Europe
- Conversely, will be able to buy “off the shelf” products from Europe for UK usage ⇒ lower costs
- Data sharing UK / EU (e.g. Northern Ireland / Republic of Ireland)



- EPIP

- Minimum data set for passenger information
- Can be populated fully from NaPTAN/TXC data
  - EC requirements satisfied
- Does not have all elements found in TransXChange
  - E.g. operational data, Dead Runs, layover points, Registrations etc
- Does not have “view” elements to optimise encoding
  - E.g. CALL (Point in Pattern + Passing times + Destination Display + op data)



- UK NeTEx Profile
  - EPIP conformant
  - Doesn't remove anything that EPIP requires, but adds in additional elements for UK usage
  - Topological Places (localities), Stops, Lines, Timetables, Interchanges
  - Include CALLs to simplify timetable mapping to TXC and aid diagnostics / validation
  - Additional allowable attributes or values over and above what is in EPIP
  - Standardise on classifications and “metadata” (e.g. day types) for UK usage.



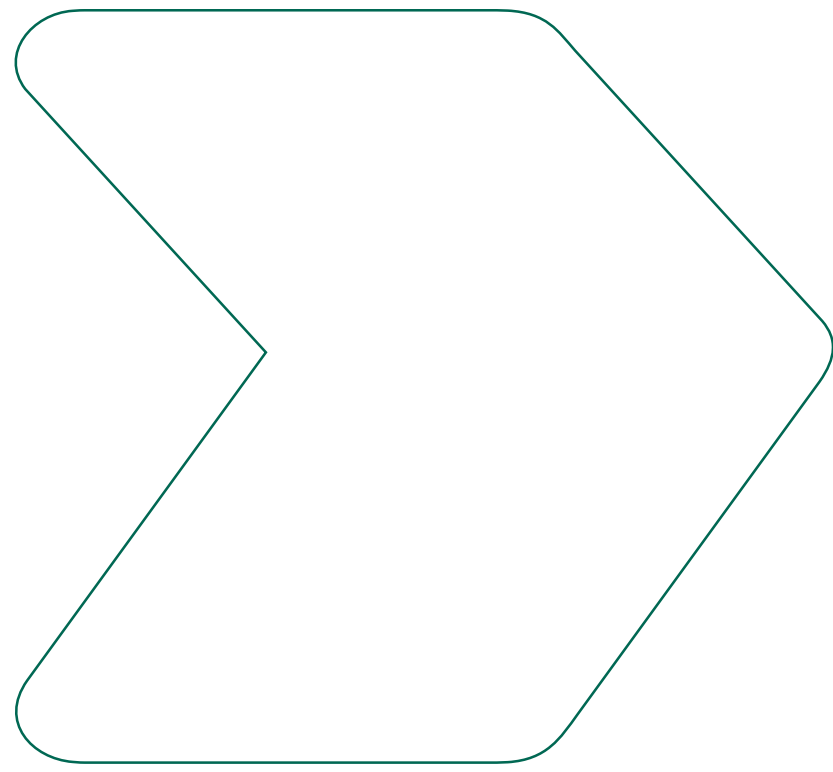
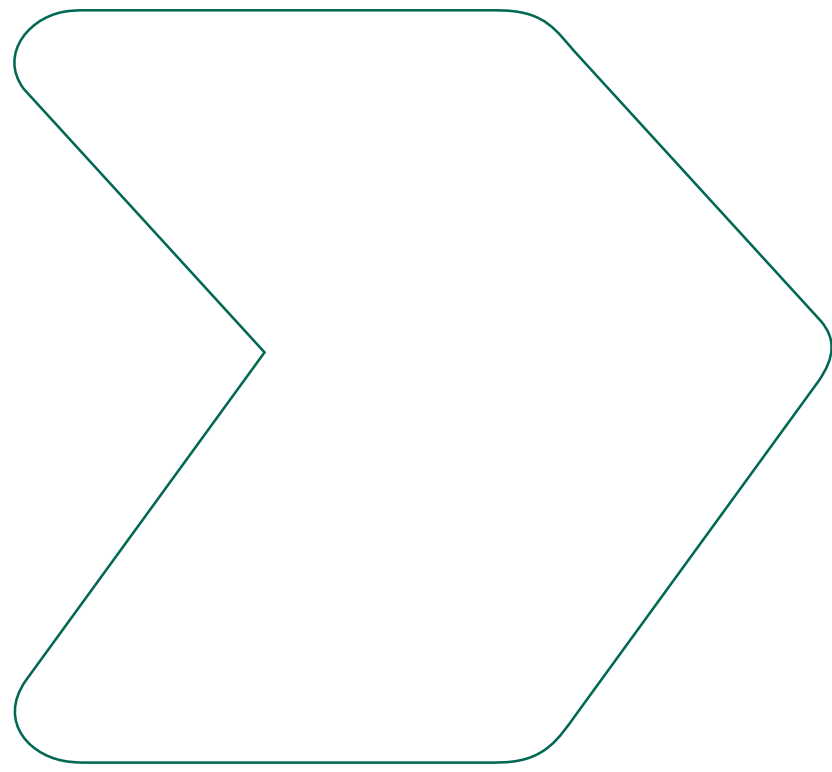
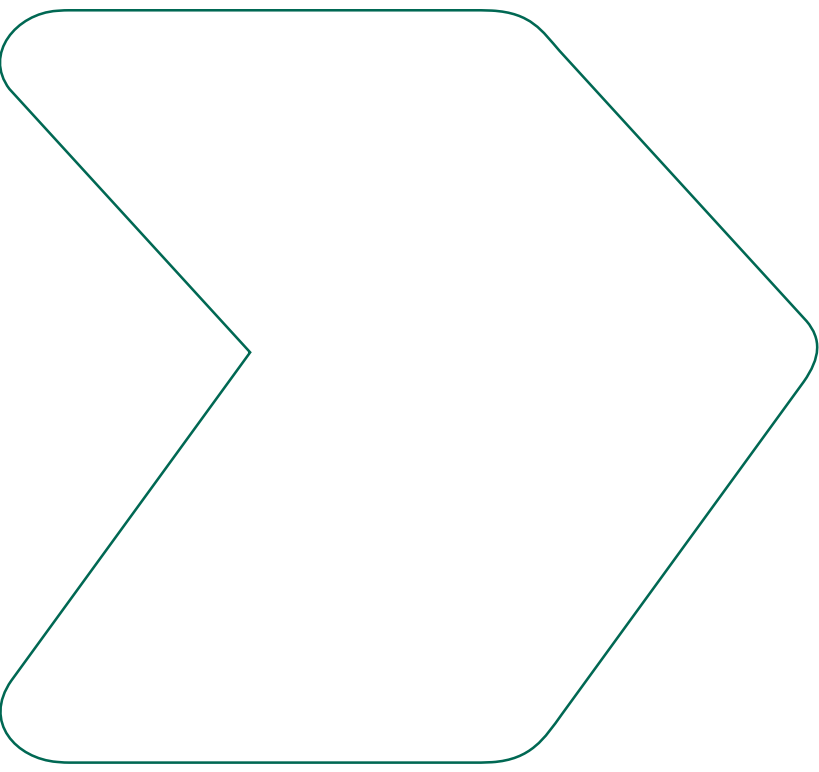
- TXC BODS Profile is a subset of TXC
  - Simplifications in usage
  - Standardisation of ways of populating data into schema
- UK NeTEx Profile will contain elements that allow “round trip” conversion
  - TXC → NeTEx → TXC
  - No loss of information
- Simplifications to TXC ⇒ Simplifications to UK NeTEx Profile





# Using NeTEx for Stops, Routes and Timetables

## 2. EPIP





- Minimal: Can be summarised on seven diagrams
  - **Network:** (2)
    - Stops, Lines & Routes, Service Patterns
  - **Timetables:** (3)
    - Vehicle Journeys (As Points in pattern), +Compound Journeys
    - Day Types . Service Calendars:
  - **Accessibility:** (1)
- Key Differences from TransXChange representation
  - No TIMING PATTERNS, just the passing times
  - No operational data
    - DEAD RUNs, LAYOVER POINTS, BLOCKs, VEHICLE TYPE, DUTY CREWs, REVERSING MANOEVRs, etc
  - Added capability:
    - Accessibility, COUPLED JOURNEYS



# EPIP: Key Differences from TransXChange

- **Functional**
  - No TIMING PATTERNS, timings, just the resolved passing times ⇒ **UK Profile Extension**
  - No operational data ⇒ **UK will omit, for now**
    - DEAD RUNs, LAYOVER POINTS, BLOCKs, DUTY CREWs, Ticket Machine Codes, etc
  - No EBSR Registration elements ⇒ **UK will omit, for now**
    - Registration, VOA numbers, Licences etc, Service Classification, Service Information, etc,
- **Representational**
  - POINT IN PATTERN representation of Service patterns, journey patterns, journeys
    - (No CALLs, POINTs rather than LINKS, etc) ⇒ **UK profile extension will include some of this information**
  - No use of SECTIONS to reduce volume
  - Separation of Time and Frequency/Headway based Journeys
  - Simpler DAY Types
- **Some Terminology differences, e.g.**
  - TXC Service → TIMETABLE
  - TXC Route → SERVICE PATTERN (and DIRECTION)







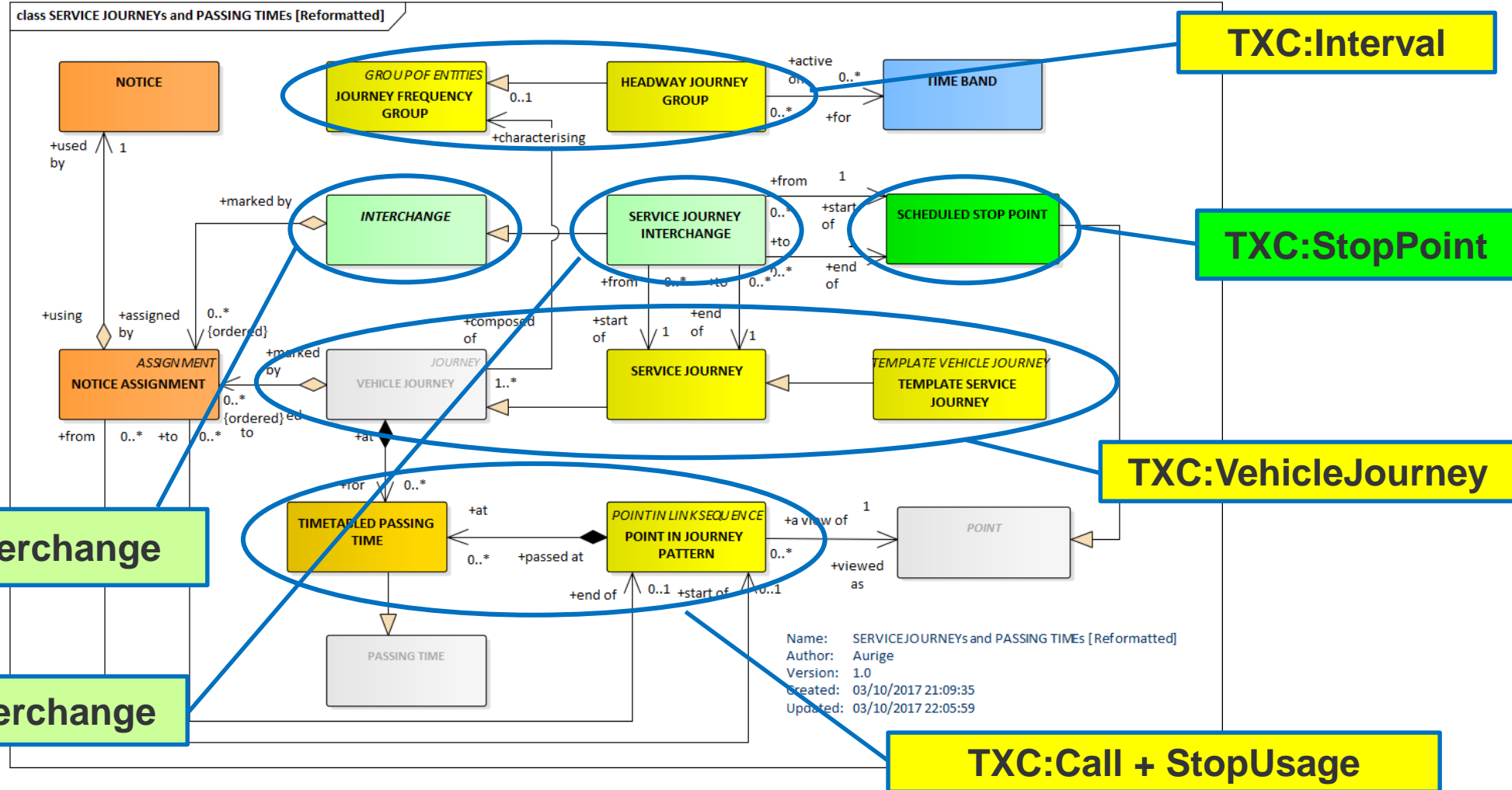




# EPIP

## 4. Journeys and Passing Times

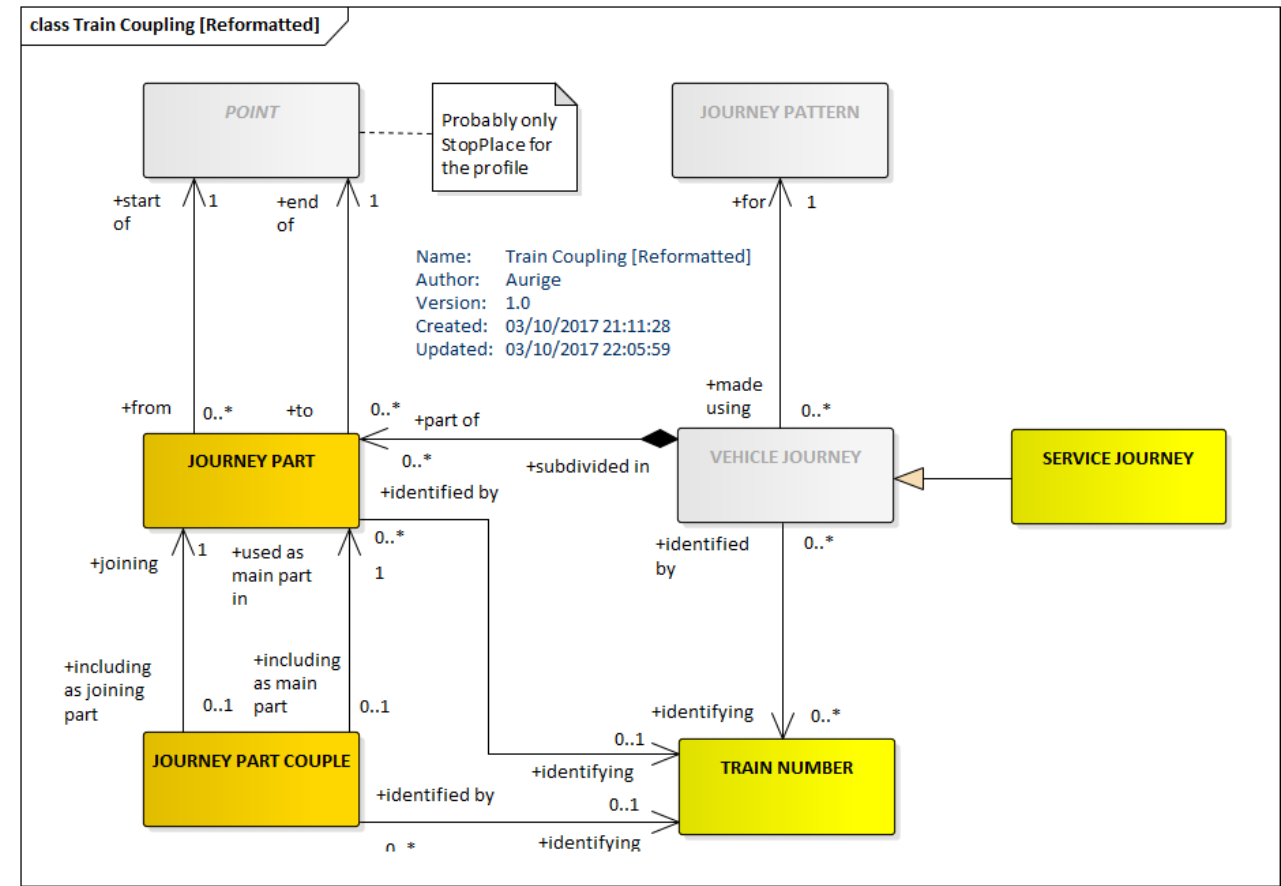
- Uses POINTs IN JOURNEY PATTERN rather than CALLS
- NeTex has Generic mechanism for notices



# EPIP

## 5. Journey Coupling

- Not In TXC

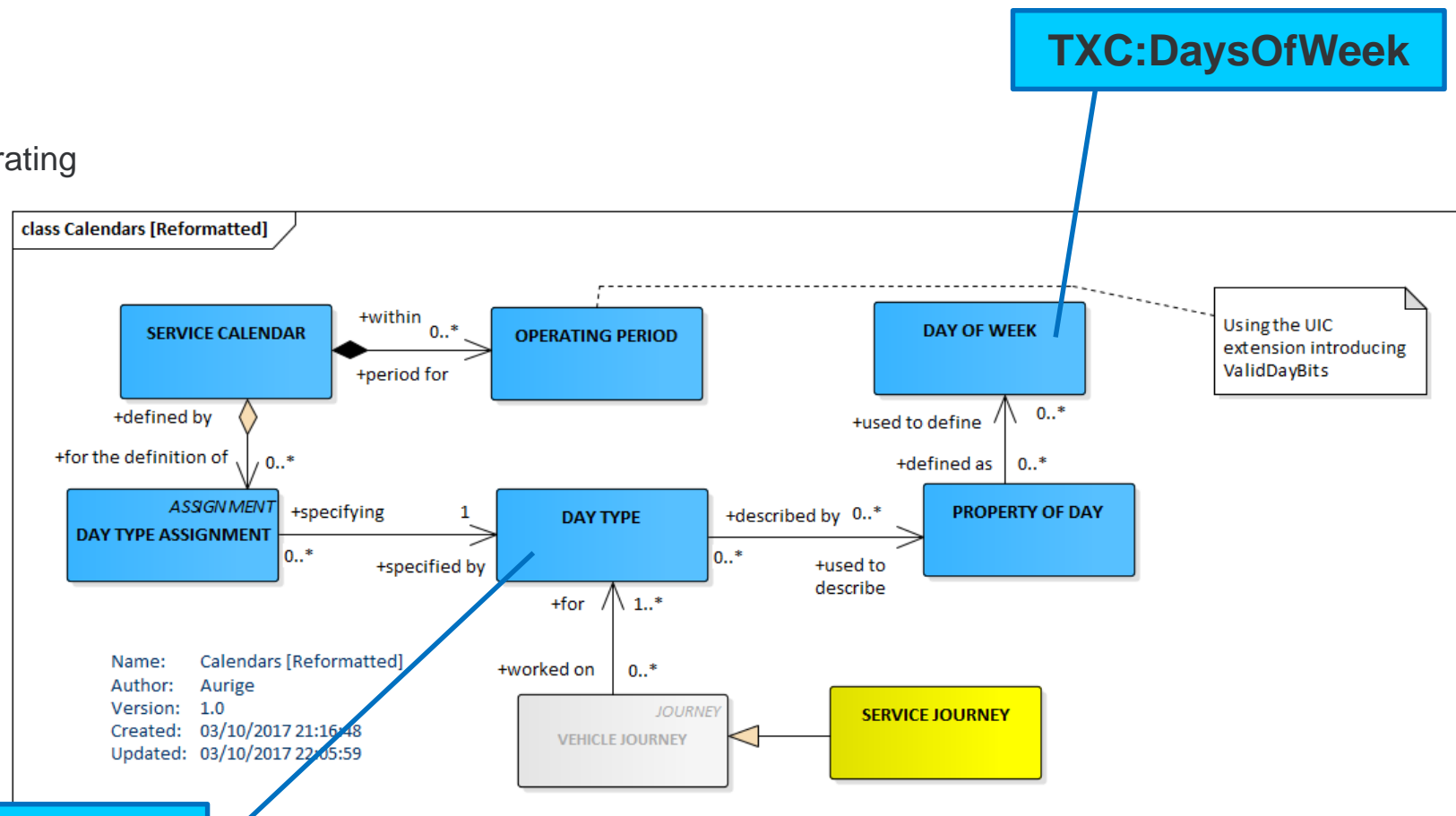




# EPIP

## 6. Day Types and Service Calendar

- Defines day types and mapping to calendar
- Equivalent to TXC operating profile elements



**TXC:RegularDaytype,  
TXCPeriodicDayType**

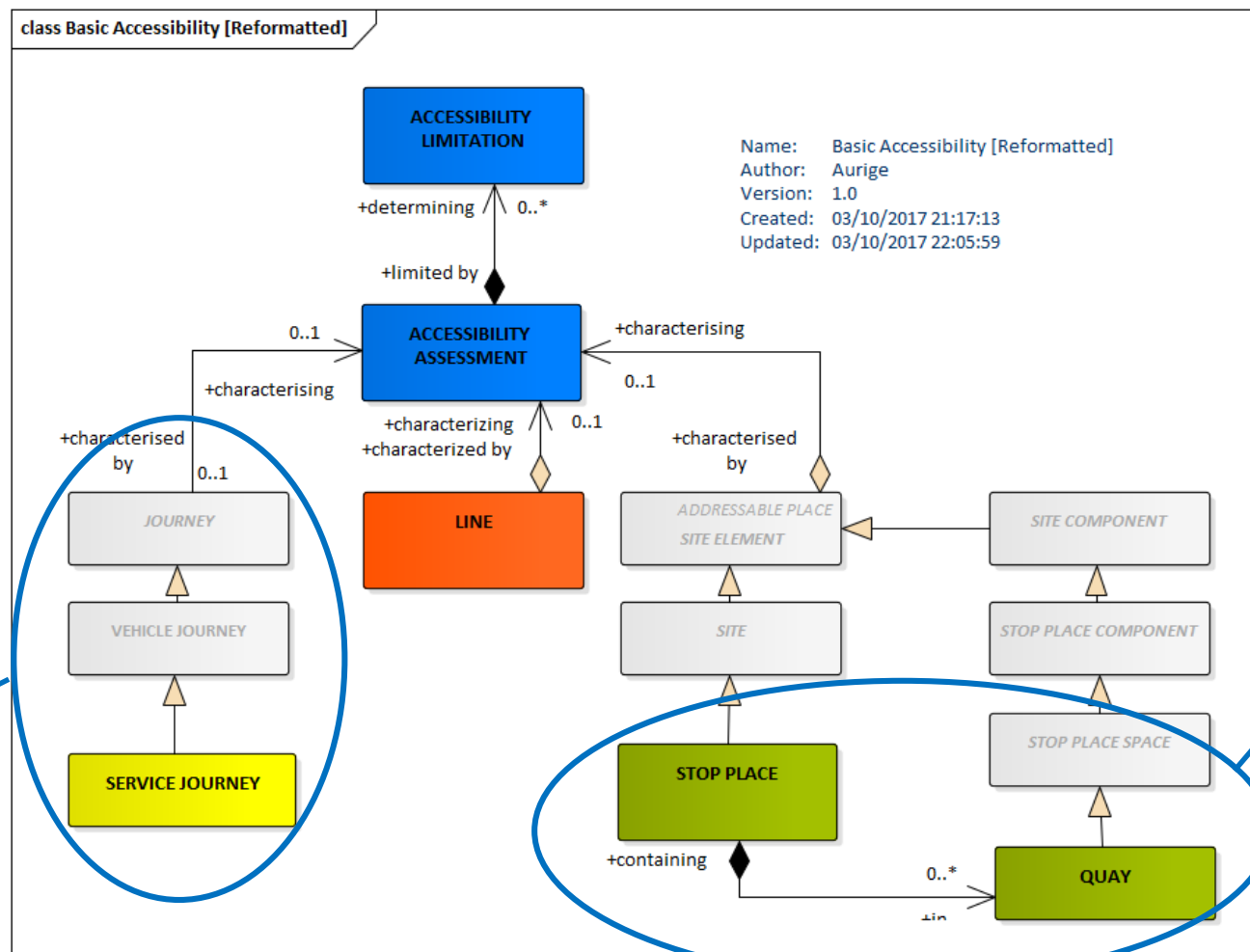
**TXC:DaysOfWeek**



# EPIP

## 7. Accessibility

- Allows accessibility of Services, stop places and lines to be described
- Not in TXC 2.1,
- Some in NapTAN & TXC 2.5 but not populated?



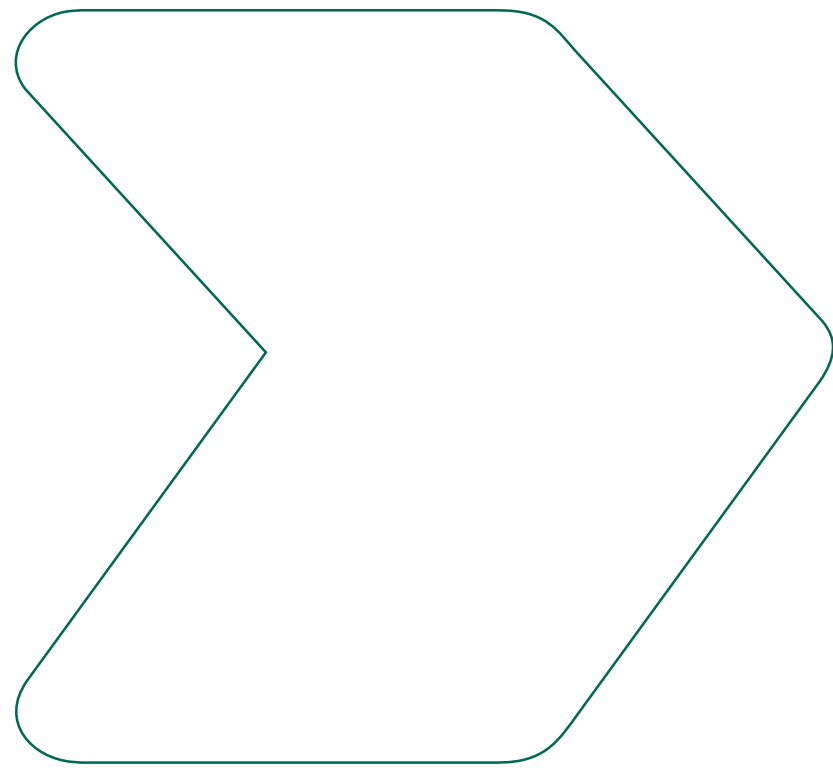
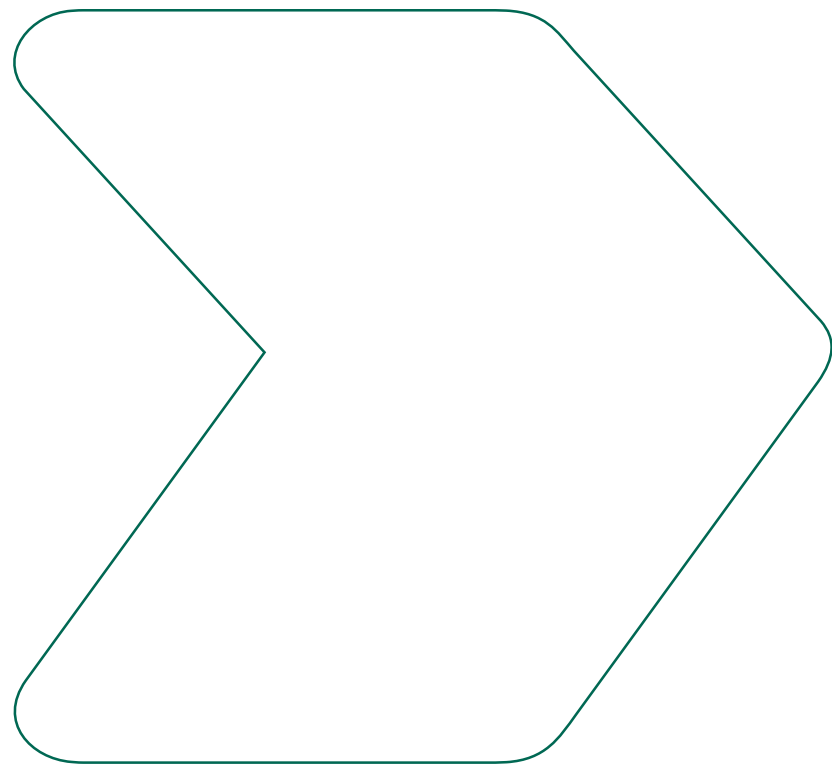
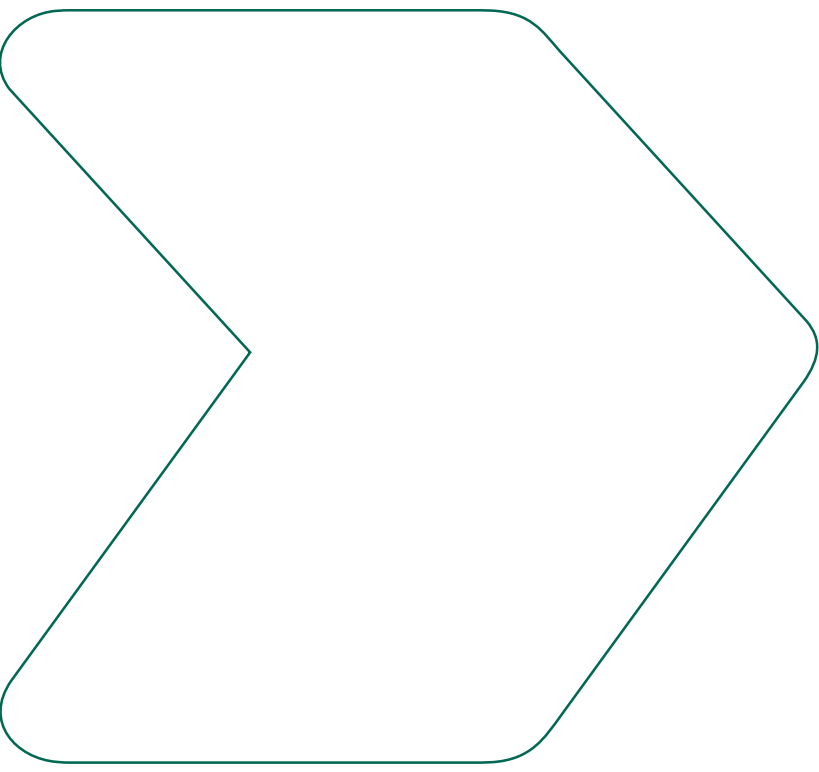
**TXCv2.5:  
VehicleJourney**

**NaPTANv2.5:  
StopPoint**



# Using NeTEx for Stops, Routes and Timetables

## 3. Key Equivalencies





# Key Equivalencies between NPTG/NaPTAN and NeTEx

| UK NPTG / NaPTAN / TXC   | Transmodel / NeTEx                      | Notes                                    |
|--------------------------|---|--|
| <i>Nptg:AdminArea</i>    | ADMINISTRATIVE ZONE + ORGANISATION PART | Link to any element using Responsibility |
| <i>Nptg:NptgLocality</i> | TOPOGRAPHICAL PLACE                     |  |
| <i>Nptg:PlusBusZone</i>  | FARE ZONE                               |  |
| <i>Naptan:StopPoint</i>  | STOP PLACE + QUAY + ACCESSIBILITY       | Assigned to SCHEDULED STOP POINT for TXC |
| <i>Naptan:StopArea</i>   | STOP PLACE                              | Assigned to SCHEDULED STOP POINT for TXC |



# Key Equivalencies between TxC and NeTEx

## 1. Network Elements

| UK NPTG / NaPTAN / TxC                                 | Transmodel / NeTEx  | Notes   |
|--|---|---|
| <i>Txc:StopPoint</i>                                   | SCHEDULED STOP POINT<br>( STOP ASSIGNMENT + STOP PLACE + QUAY)              | Revised representation of logical + Physical stop |
| <i>Txc:StopArea</i>                                    | STOP AREA + STOP PLACE  |   |
| <i>Txc:Operator</i>                                    | OPERATOR / AUTHORITY  | Operator UK licences for Registration             |
| <i>Txc:Line</i>  | LINE  |   |
| <i>Txc:Service (Standard Service, FlexibleService)</i> | TIMETABLE FRAME   |   |
| <i>(Service direction)</i>                             | GROUP OF SERVICES + DIRECTION + DAY TYPE                                    |   |
| <i>Txc:OperatingProfile</i>                            | DAY TYPE + PROPERTY OF DAY SERVICE + SERVICE CALENDAR + DAY TYPE ASSIGNMENT | Revised representation                            |
| <i>Txc:LayoverPoint</i>                                |   |   |
| ...  |   |   |



# Key Equivalencies between TXC and NeTEx

## 2. Journey Patterns

| UK NPTG / NaPTAN / TXC                          | Transmodel / NeTEx                 | Comment                   |
|---|------------------------------------|---------------------------|
| <i>Txc:Track</i>                                | ROUTE LINK                         |                           |
| <i>Txc:Route</i>                                | SERVICE PATTERN                    | Named changed from TM 5.1 |
| <i>Txc:RouteSection</i>                         | GENERAL SECTION                    |                           |
| <i>Txc:RouteLink</i>                            | SERVICE LINK                       |                           |
| <i>Txc:JourneyPattern</i>                       | JOURNEY PATTERN + TIMING PATTERN   |                           |
| <i>Txc:JourneyPatternSection</i>                | GENERAL SECTION                    |                           |
| <i>Txc:JourneyPatternTimingLink + StopUsage</i> | TIMING LINK + RUN TIME + WAIT TIME |                           |
| <i>Txc:JourneyPatternInterchange</i>            | INTERCHANGE                        |                           |



# Key Equivalencies between TXC and NeTEx

## 3. Journeys

| UK NPTG / NaPTAN / TXC                          | Transmodel / NeTEx   | Comment   |
|---|--|---|
| <i>Txc:VehicleJourney</i>                       | SERVICE JOURNEY  | From passenger perspective. For vehicle, operationally, this is VEHICLE JOURNEY |
| <i>Txc:VehicleJourneyTimingLink + StopUsage</i> | PASSING TIMES  | Run times / wait times included in CALL (EPIP extension in UK profile)          |
| <i>Txc:VehicleJourneyStopUsage</i>              | POINT IN JOURNEY PATTERN + PASSING TIME                                | EPIP extension in UK profile to included CALL / ARRIVAL, CALL DEPARTURE         |
| <i>Txc:VariableStopAllocation</i>               | STOP ASSIGNMENT  |   |
| <i>Txc:DefaultStopAllocation</i>                | STOP ASSIGNMENT  |   |
| <i>Txc:Interval</i>                             | JOURNEY FREQUENCY GROUP, HEADWAY FREQUENCY GROUP, RHYTHMICAL FREQUENCY | Use with TEMPLATE vehicle Journey   |
| <i>Txc:VehicleJourneyInterchange</i>            | SERVICE JOURNEY INTERCHANGE  |   |



# Key Equivalencies : NaPTAN vs EPIP vs UK Profile

| Feature                    | NaPTAN / NPTG                                   | European Profile    | UK FXCP Timetable   |
|----------------------------|---|---------------------|---------------------|
| <b>Administrative Zone</b> | Combines with RESPONSIBILITY SET + ORGANISATION | ADMINISTRATIVE ZONE | ADMINISTRATIVE ZONE |
| <b>Responsibility</b>      | Combines with RESPONSIBILITY SET + ORGANISATION | RESPONSIBILITY SET  | RESPONSIBILITY SET  |
| <b>Places</b>              | NPTG Locality                                   | TOPOGRAPHIC PLACE   | TOPOGRAPHIC PLACE   |
| <b>Stops</b>               | Combines STOP PLACE with SCHEDULED STOP POINT   | STOP PLACE / QUAY   | STOP PLACE / QUAY   |
| <b>Stop Area</b>           | STOP AREA (but some stop areas are Stop Places) | STOP AREA           | STOP AREA           |







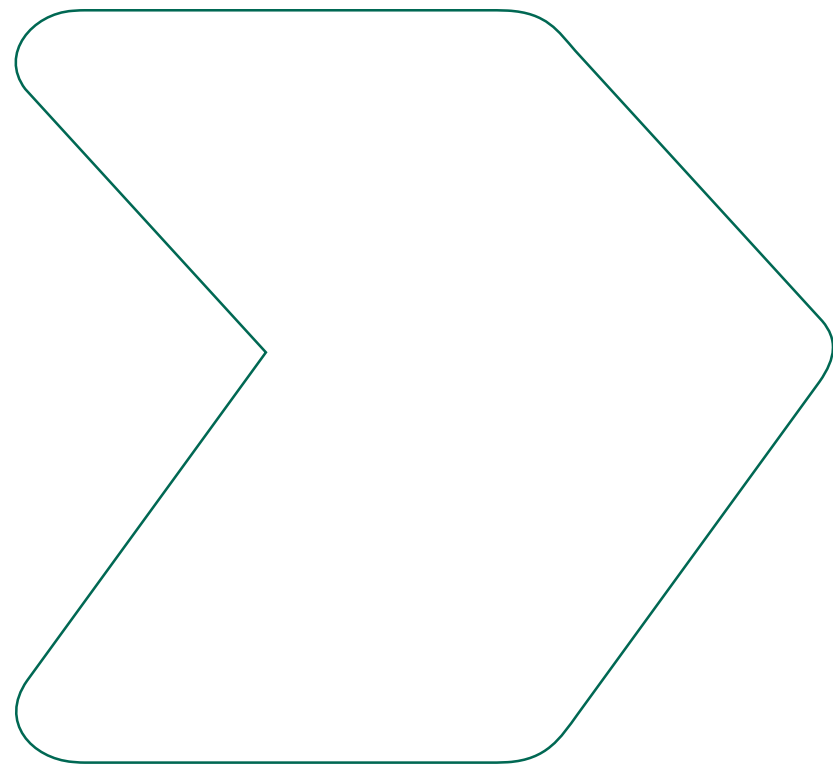
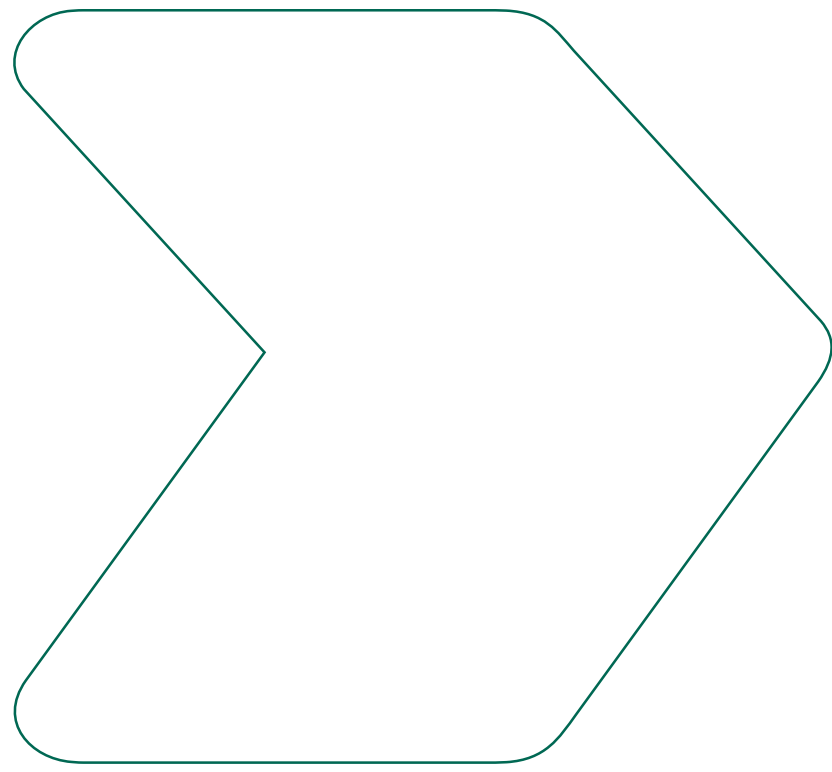
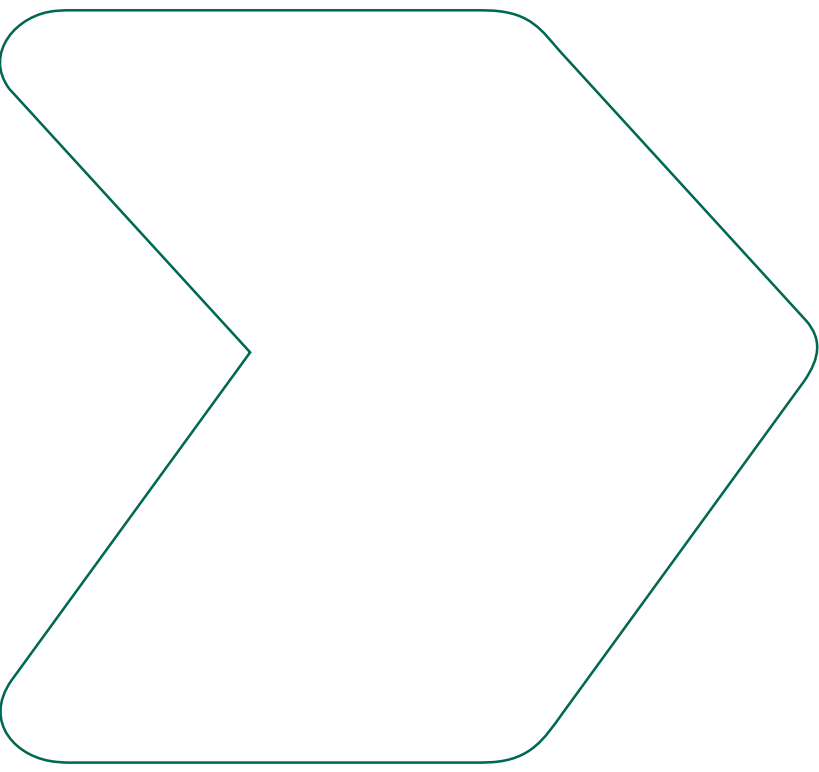
# Key Equivalencies : TXC vs EPIP vs UK Profile

| Feature   | TransXChange   | European Profile   | UK FXCP Timetable  |
|---|--|--|--|
| <b>Stops</b>  | Combines STOP PLACE with SCHEDULED STOP POINT                              | SCHEDULED STOP POINT   | SCHEDULED STOP POINT , Naptan                            |
| <b>Routes, Journey Patterns &amp; ServicePatterns</b> | Sequence of LINKs  | Sequence of POINTs   | Sequence of POINTs + ONWARD SERVICE LINKs                |
| <b>Use of Sections</b>                                | Mandatory use of sections for Route Links and Journey Pattern Timing Links | Not Used   | Optional SECTION   |
| <b>Journeys</b>                                       | VEHICLE JOURNEY<br>Sequence of CALLs                                       | SERVICE JOURNEY<br>Sequence of STOP POINTs IN PATTERN & PASSING TIMEs only | Also allow CALLs for efficiency<br>Annotate with timings |
| <b>Day types</b>                                      | Not shareable, (but inheritance)   | First class objects  | First class objects                                      |
| <b>Timing Information</b>                             | Timing info only, no passing time  | No timing values, passing time only  | Addition of RUN TIMEs and WAIT TIMEs allowed. No Views   |
| <b>Optimisations</b>                                  | TIMING LINK Views & LINK inheritance to reduce size                        | Not used   | Not used   |
| <b>Operational data</b>                               | DEAD RUNs, GARAGEs, LAYOVER points, Route Instructions, etc                | Not used   | Not included – Future implementation                     |
| <b>Registrations</b>                                  | TANs, Nature of change, Stop changes, notice periods, etc                  | Not Supported  | Not supported – Future Proposal                          |



# Using NeTEx for Stops, Routes and Timetables

## 4. Examples





# Example of encoding a timetable in NeTEx

## 1. Operator

```
<Operator created="2003-06-09T14:20:00-05:00" changed="2004-05-09T14:20:00-05:00" modification="revise" version="2" id="noc:SCWW">
  <PublicCode>SCWW</PublicCode>
  <ExternalOperatorRef type="dvsa:LicenceNumber" ref="dvsa:PD0000479"/>
  <Name>Stagecoach</Name>
  <ShortName>Stagecoach</ShortName>
  <LegalName>Midland Red South Ltd</LegalName>
  <TradingName>Stagecoach in Warwickshire</TradingName>
  <ContactDetails>
    <Email>schedules.warwickshire@stagecoachbus.com</Email>
    <Phone>01788 566068</Phone>
  </ContactDetails>
  <typesOfOrganisation>
    <TypeOfOrganisationRef ref="txc:LicenceClassification@StandardNational" modification version="txc:v2.1"/>
  </typesOfOrganisation>
  <Address id="noc:SCCW" version="2">...</Address>
  <PrimaryMode>bus</PrimaryMode>
  <CustomerServiceContactDetails><Phone>0871 2002233</Phone></CustomerServiceContactDetails>
</Operator>
```



# Example of encoding a timetable in NeTEx

## 2a. Lines

```
<Line version="1" id="stg:SCWW@86">
  <Name>86</Name>
  <Description>Stagecoach Rugby Line 86</Description>
  <PublicCode>86</PublicCode>
  <OperatorRef version="2" ref="noc:SCWW"/>
  <TypeOfServiceRef version="txc:v2.1" ref="txc:ServiceClassification@NormalStopping"/>
  <allowedDirections>
    <AllowedLineDirection version="1" id="stg:SCWW@86@outbound">
      <DirectionRef version="1" ref="stg:SCWW@86@outbound"/>
    </AllowedLineDirection>
    <AllowedLineDirection version="1" id="stg:SCWW@86@inbound">
      <DirectionRef version="1" ref="stg:SCWW@86@inbound"/>
    </AllowedLineDirection>
  </allowedDirections>
</Line>
```





# Example of encoding a timetable in NeTEx

## 2b. Lines with same number, different identifiers

```
<Line version="any" id="frst:985654">
```

```
  <Name>86</Name>
```

```
  <Description> First West of England Bristol Line 86</ Description >
```

```
  <PublicCode>86</PublicCode>
```

```
</Line>
```

```
<Line version="any" id="frst:67534">
```

```
  <Name>86</Name>
```

```
  <Description>First York Line 86</ Description >
```

```
  <PublicCode>86</PublicCode>
```

```
</Line>
```

```
<Line version="any" id="mb:York@86">
```

```
  <Name>86</Name>
```

```
  <Description>Metrobus York Line 86</ Description >
```

```
  <PublicCode>86</PublicCode>
```

```
</Line>
```





# Example of encoding a timetable in NeTEx

## 3. Stop References

```
<ScheduledStopPoint version="1" id="naptStop:4200F009301">  
  <Name>Oakdale Road</Name>  
  <NameSuffix>Opp</NameSuffix>  
  <StopType>onstreetBus</StopType>  
  <TopographicPlaceView>  
    <Name>Binley Woods</Name>  
  </TopographicPlaceView>  
</ScheduledStopPoint>
```



# Example of encoding a timetable in NeTEx

## 4a. Service Journey (TXC: VehicleJourney) with passing times

```
<ServiceJourney version="1" id="sta:SCWW@894416">
  <DepartureTime>07:32:00</DepartureTime>
  <dayTypes>
    <DayTypeRef version="any" ref="hde:DT_02-Monday+Sunday_NotHoliday"/>
  </dayTypes>
  <ServiceJourneyPatternRef ref="sta:SCWW@894416@1"/>
  <DirectionType>outbound</DirectionType>
  <groupsOfServices>
    <GroupOfServicesRef version="1" ref="sta:Service@R86@out@monday-to-friday"/>
  </groupsOfServices>
  <passingTimes>
    <TimetabledPassingTime version="any" id="sta:SCWW@894416_01">
      <StopPointInJourneyPatternRef version="any" ref="sta:SCWW@894416@1" order="1"/>
      <DepartureTime>07:32:00Z</DepartureTime>
    </TimetabledPassingTime>
    <TimetabledPassingTime version="any" id="sta:SCWW@894416_02">
      <StopPointInJourneyPatternRef version="any" ref="sta:SCWW@894416@1" order="2"/>
      <DepartureTime>07:40:00.0Z</DepartureTime> </TimetabledPassingTime>
    </passingTimes>
</ServiceJourney>
```



# Example of encoding a timetable in NeTEx

## 4b. Service Journey (TXC: VehicleJourney) with added calls

```
<calls>
  <Call id=" sta:SCCW@894416" version="1" order="1">
    <ScheduledStopPointRef version="1" ref="naptStop:43000001304"/>
    <OnwardTimingLinkView>
      <TimingLinkRef version="1" ref="sta89441:JourneyPatternTimingLink@4"/>
    <RunTime>PT8M0S</RunTime>
    </OnwardTimingLinkView>
    <TimingPointStatus>timingPoint</TimingPointStatus>
    <Arrival><ForAlighting>false</ForAlighting></Arrival>
    <Departure><Time>07:32:00Z </Time></Departure>
  </Call>
  <Call>
    ...
  </Call>
</calls>
</ServiceJourney>
```







# Example of encoding a timetable in NeTEx

## 5. Day Types

```
<ServiceCalendarFrame version="txc:v2.1" id="fxc:UK:DFT:ServiceCalendarFrame_UK_PI_CALENDAR:TXC:txc"  
responsibilitySetRef="txc:TransXChange_metadata" dataSourceRef="txc:dft">
```

```
  <Name>Built in day types for TransXChange</Name>
```

```
  <codespaces>
```

```
    <CodespaceRef ref="txc_metadata"/>
```

```
  </codespaces>
```

```
  <dayTypes>
```

```
    <DayType version="txc:v2.1" id="txc:RegularDayType@monday-to-friday">
```

```
      <Name>Weekdays</Name>
```

```
      <properties>
```

```
        <PropertyOfDay>
```

```
          <DaysOfWeek>Monday Tuesday Wednesday Thursday Friday</DaysOfWeek>
```

```
        </PropertyOfDay>
```

```
      </properties>
```

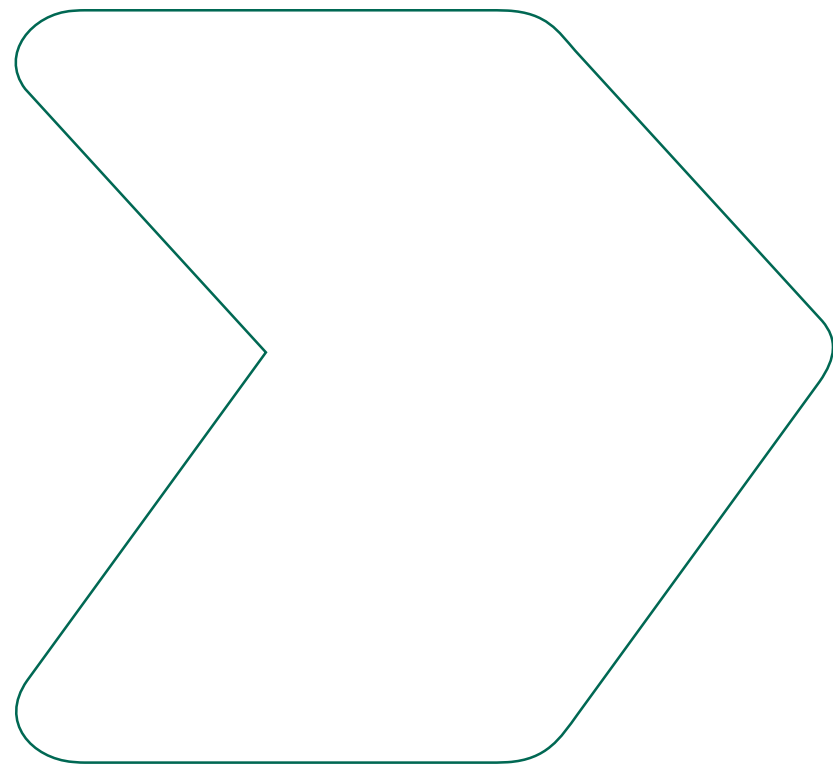
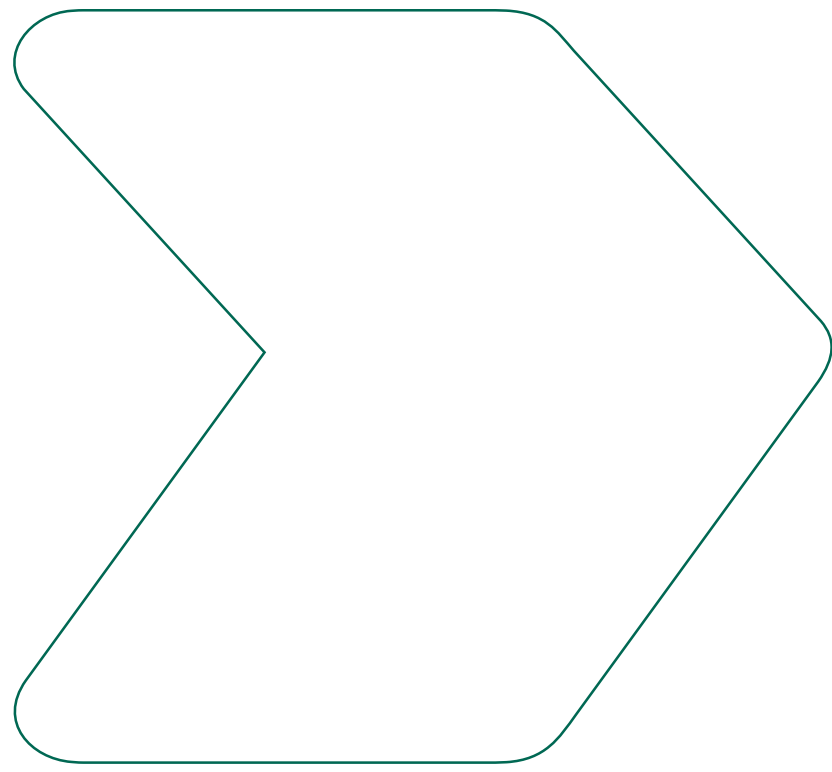
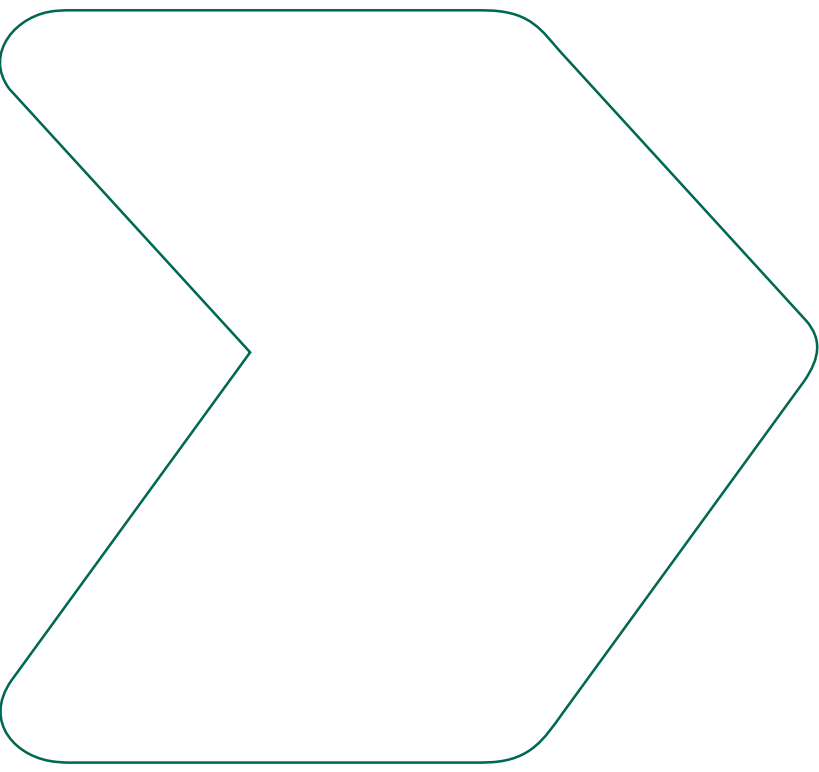
```
    </DayType>
```

```
    ...
```



# Using NeTEx for Stops, Routes and Timetables

## 5. Next Steps



## What does this mean for me?

- At this stage, nothing!
  - BOD will not require NeTEx in short to medium term
    - BOD will legislate for TXC initially for routes and timetables
  - NeTEx is an exchange format – will not affect how systems / UI operate
    - Although, in longer term, some systems may change to better accommodate NeTEx way of doing things
  - Fares referencing to timetables will reference TXC
  - UK “National Access Point” *may* convert your BOD TXC for you
- Although...
  - Get on top of your National Operator Codes!
    - Critical for distinguishing data



## Can I have NeTEx now?

- If you want to!
- But...
  - Remember that BOD will not require NeTEx in short to medium term
  - BOD will legislate for TXC initially for routes and timetables
  - EBSR will continue to use TXC
  - DfT will need to consult on how your NeTEx timetables reach the National Access Point



## Summary and Next Steps

- For UK NeTEx Profile for Stops, Routes and Timetables, the UK will initially adopt an “augmented” EPIP
  - Enhancements for UK usage, while remaining compliant
  - Additional attributes / elements allowed
  - Aid in “round trip” conversions
- NeTEx can use elements / references from NPTG, NaPTAN and TXC
  - No need to move from one standard to another in a “big bang”
  - Standards can co-exist
- UK will need a fuller profile to fully replace NPTG, NaPTAN and TXC
  - Requires more consideration of use cases, ways of encoding
  - Lessons learnt from TXC implementation
  - Simplification?
- Users / Operators should start to assess & correct data e.g. Operator Codes





Department  
for Transport

# THANK YOU

Any questions?

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