Fares and NeTEx Workshop

London 6th November, Manchester 7th November, 20
Objectives

- Discuss use of stops routes and fares for a **Basic** UK timetable NeTEx Profile
- Outline issues for a **Full** UK timetable NeTEx Profile equivalent to current TransXChange function
- Get Feedback from you as to what scope of full UK profile should be,
Using NeTEx for Stop, route & Timetable data

Introduction
Comparing TransModel, NeTEx and NPTG/ NaPTAN / TransXChange

- Transmodel covers many PT functional domains
  - Networks, Scheduling, Operations, Fare Management, Driver management, etc
- NeTEx implements just a **subset** of Transmodel
  - Stops, Timetables, Fares, etc
- EU Basic NeTEx profile covers a **subset** of NeTEx
  - Stops, Timetables, Interchanges, etc
- TransXChange covers timetables
- TransXChange includes some TM NeTEx elements not in EU Basic Profile
  - Data elements for Operations, etc
  - Operations, etc
  - Calls, Sections, etc
- TransXChange includes some UK specific concepts not in Transmodel or NeTEx
  - EBSR registration info, etc
Likely Phasing

1. UK Basic Fares Profile (2018/19)
   - Use of NaPTAN, NPTG & TXC data as needed in a UK NeTEx Timetable profile

2. UK Basic Timetable Profile (2018/19)
   - A basic mapping of NaPTAN & TransXChange into the EU NeTEx Minimum timetable profile

3. UK Strategic Timetable Mapping (2019/20)
   - A full mapping of TransXChange into a UK NeTEx **Timetable profile** as a strategic representation for UK Stop & Timetable data
NeTEx – and UK National Standards

2000

Transmodel v1.0- v5.1

2011

Transmodel v6.0 (P1, P2, P3)

2016

Transmodel v6.0 (P4, P5, P6)

2017

Transmodel v6.0 (P7,P8)

Most used

CEN NeTEx v1.0 Part1 Core + Stops

CEN NeTEx v1.0 Part2 Timetables

CEN NeTEx v1.0 Part3 Fares

EU Nx PROFILE Timetables

CEN NeTEx v1.1 Part1 Core + Stops

CEN NeTEx v1.1 Part2 Timetables

CEN NeTEx v1.1 Part3 Fares

EU Nx PROFILE Fares

UK Nx PROFILE Basic Timetable

UK Nx PROFILE Full Timetable

UK Nx PROFILE Fares

UK NeTEx Publisher??

TransXChange v2.1

NPTG v2.1

NPTG v2.4

NPTG v2.5

NAPTAN v2.1

NAPTAN v2.4

NAPTAN v2.5

TXC v2.1

TXC v2.4

TXC v2.5

FareXChange

CIF.uk

Transmodel v6.0 (P1, P2, P3)

CEN NeTEx v1.0 Part1 Core + Stops

CEN NeTEx v1.0 Part2 Timetables

CEN NeTEx v1.0 Part3 Fares

EU Nx PROFILE Timetables

CEN NeTEx v1.1 Part1 Core + Stops

CEN NeTEx v1.1 Part2 Timetables

CEN NeTEx v1.1 Part3 Fares

EU Nx PROFILE Fares

UK Nx PROFILE Basic Timetable

UK Nx PROFILE Full Timetable

UK Nx PROFILE Fares

UK NeTEx Publisher??

NeTEx UK Profile - Bus Fares with NeTEx
A gradual Transition – can interoperate NaPTAN / TXC & NeTEx, both Upstream and Downstream
Representation of Journeys

- **Use of CALLS**
  - EU NeTEx Timetable Profile is fully normalised – diffuses data over several places
    - Does not use CALLS (Although NeTEx has these
  - TransXChange uses CALLs – a view to combine several data elements together
    - More convenient for consuming applications.
  - Should we completely denormalise (have separate PASSING TIMEs, POINTs IN JOURNEY PATTERN etc)?
    - Should we still use CALLs? Should we exchange routes

- **Use of LINKs IN SEQUENCE vs POINTs IN SEQUENCE**
  - TransXChange represents journeys and patterns as LINKs IN PATTERN; this is more complex to understand than POINTs in PATTERN - should we changeover?
    - Same overall content

- **Use of TIMING INFORMATION**
  - TransXChange mapping is slightly denormalised (e.g. use of combined timing and journey pattern links), so we need separate timing patterns, or just JOURNEY PATTERN

  - TransXChange uses detailed Link Projector references between layers (Mainly to ensure validity conditions are inherited correctly) – not needed?

  - TransXChange uses SECTIONs to reduce volume of JOURNEY PATTERNs
    - Complex - should we drop? (Many users don’t use)
Developing a Full Timetable profile

Technical options

- Technical Considerations
  - All TXC data **can** be represented in NeTEx (except UK EBSR Registrations)
    - But Not all TXC data is covered by EU **Basic** profile
  - Some TXC data structures **need** to be transformed to a revised model in NeTEx
  - Some TXC data structures **could or should** be represented differently in NeTEx

- Practical considerations
  - If we are changing anyway, we should review and simplify TXC overall

- Goals for a full UK profile
  - Where possible, keep close to current TXC
  - Where possible drop unused elements from TXC
  - **Where useful, simplify representation from TXC?**
  - Where required include new function
EU Basic Timetable Profile
EU Basic Timetable Profile

- 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 MANOEVREs, etc
  - Added capability:
    - Accessibility, COUPLED JOURNEYS
EU Basic Timetable Profile - Key Differences from TXC representation

- **Functional**
  - No TIMING PATTERNs, timings, just the resolved passing times
  - No operational data
    - DEAD RUNs, LAYOVER POINTS, BLOCKs, DUTY CREWs, Ticket Machine Codes, etc
  - No EBSR Registration elements
    - Registration, VOA numbers, Licences etc, Service Classifcation, Service Infor, etc

- **Representational**
  - POINT IN PATTERN representation of Service patterns, journey patterns, journeys
    - (No CALLs, POINTs rather than LINKS, etc)
  - 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 ➔ TM TIMETABLE
  - TXC:Route ➔ TM SERVICE PATTERN (And directiona)
EU Profile – 1. Stops

- Similar to NPTG NaPTAN

NPTG: Localities

Naptan: StopArea

Naptan: StopPoint
Moving Britain Ahead

EU Basic Profile – 2. Lines and routes

- Similar to TransXChange
  - POINTs IN PATTERN rather than LINK IN PATTERN

TXC: Operator
TXC: Line
TXC: Route
TXC: RouteLink
TXC: RoutePoint
EU Profile – 3. Service Patterns

- Similar to NPTG NaPTAN
- DESTINATION DISPLAY is a reusable heading

**TXC: Route**

**TXC: VehicleJourney**

**TXC: Call + StopUsage**

**TXC: RoutePoint**

**TXC: RouteLink**

**TXC: StopPoint**
EU Basic Profile – 5. Train Coupling

- Not In TXC
EU Basic Profile – 5. Journeys & Passing times

- Uses POINTs IN JOURNEY PATTERN rather than CALLs
- NeTEx has Generic mechanism for notices

TXC: INTERVAL
TXC: StopPoint
TXC: JourneyPatternInterchange
TXC: VehicleJourneyInterchange
TXC: Call + StopUsage
EU Basic Profile – 6. Day Types & Service Calendar

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

**Diagram:**
- TXC:DaysOfWeek
- TXC:RegularDaytype, TXC:PeriodicDayType
EU Basic Profile – 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?
# Key Equivalences NPTG & NaPTAN to NeTEx TM

<table>
<thead>
<tr>
<th>UK NPTG/Naptan/TXC</th>
<th>Transmodel / NeTEx</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nptg:AdminArea</td>
<td>ADMINISTRATIVE ZONE + ORGANISATION PART</td>
<td>Link to any element using Responsibility</td>
</tr>
<tr>
<td>Nptg:NptgLocality</td>
<td>TOPOGRAPHICAL PLACE</td>
<td></td>
</tr>
<tr>
<td>Nptg:PlusBusZone</td>
<td>FARE ZONE</td>
<td></td>
</tr>
<tr>
<td>Naptan:StopPoint</td>
<td>STOP PLACE + QUAY + ACCESSIBILITY</td>
<td>Assigned to SCHEDULED STOP POINT for TXC</td>
</tr>
<tr>
<td>Naptan:StopArea</td>
<td>STOP PLACE</td>
<td>Assigned to SCHEDULED STOP POINT for TXC</td>
</tr>
</tbody>
</table>
Some Key Equivalences – TXC Network elements to NeTEx/TM Network elements

<table>
<thead>
<tr>
<th>UK NPTG/ Naptan/TXC</th>
<th>Transmodel / NeTEx</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Txc:StopPoint</td>
<td>SCHEDULED STOP POINT (STOP ASSIGNMENT + STOP PLACE + QUAY)</td>
<td>Revised representation of logical + Physical stop</td>
</tr>
<tr>
<td>Txc:StopArea</td>
<td>STOP AREA + STOP PLACE</td>
<td></td>
</tr>
<tr>
<td>Txc:Operator</td>
<td>OPERATOR / AUTHORITY</td>
<td>Operator UK licences for Registration</td>
</tr>
<tr>
<td>Txc:Line</td>
<td>LINE</td>
<td></td>
</tr>
<tr>
<td>Txc:Service (Standard Service, FlexibleService)</td>
<td>TIMETABLE FRAME</td>
<td></td>
</tr>
<tr>
<td>(Service direction)</td>
<td>GROUP OF SERVICES + DIRECTION + DAY TYPE</td>
<td></td>
</tr>
<tr>
<td>Txc:OperatingProfile</td>
<td>DAY TYPE + PROPERTY OF DAY SERVICE + SERVICE CALENDAR + DAY TYPE ASSIGNMENT</td>
<td>Revised representation</td>
</tr>
<tr>
<td>Txc:LavoverPoint</td>
<td>INCOMPLETE - NEEDS FURTHER DETAILS</td>
<td></td>
</tr>
</tbody>
</table>
# Key Equivalences – TXC: Journey Patterns to NeTEx/TM Journey Patterns

<table>
<thead>
<tr>
<th>UK NPTG/ Naptan/TXC</th>
<th>Transmodel / NeTEx</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Txc:Track</td>
<td>ROUTE LINK</td>
<td></td>
</tr>
<tr>
<td>Txc:Route</td>
<td>SERVICE PATTERN</td>
<td>Named changed from TM 5.1</td>
</tr>
<tr>
<td>Txc:RouteSection</td>
<td>GENERAL SECTION</td>
<td>Could Drop Sections?</td>
</tr>
<tr>
<td>Txc:RouteLink</td>
<td>SERVICE LINK</td>
<td></td>
</tr>
<tr>
<td>Txc:JourneyPattern</td>
<td>JOURNEY PATTERN + TIMING PATTERN</td>
<td></td>
</tr>
<tr>
<td>Txc:JourneyPatternSection</td>
<td>GENERAL SECTION</td>
<td>Could Drop Sections?</td>
</tr>
<tr>
<td>Txc:JourneyPatternTimingLink + StopUsage</td>
<td>TIMING LINK + RUN TIME + WAIT TIME</td>
<td></td>
</tr>
<tr>
<td>Txc:JourneyPatternInterchange</td>
<td>INTERCHANGE</td>
<td></td>
</tr>
</tbody>
</table>
## Key Equivalences – TXC:Journeys to NeTEx/TM Journeys

<table>
<thead>
<tr>
<th>UK NPTG/ Naptan/TXC</th>
<th>Transmodel / NeTEx</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Txc:VehicleJourney</td>
<td>VEHICLE JOURNEY</td>
<td></td>
</tr>
<tr>
<td>Txc:VehicleJourneyTimingLink + StopUsage</td>
<td>SERVICE LINK + RUN TIME + WAIT TIME</td>
<td>Or use absolute passing times</td>
</tr>
<tr>
<td>Txc:VehicleJourneyStopUsage</td>
<td>CALL / ARRIVAL, CALL DEPARTURE</td>
<td>Or use POINT IN JOURNEY PATTERN + PASSING TIME</td>
</tr>
<tr>
<td>Txc:VariableStopAllocation</td>
<td>STOP ASSIGNMENT</td>
<td></td>
</tr>
<tr>
<td>Txc:DefaultStopAllocation</td>
<td>STOP ASSIGNMENT</td>
<td></td>
</tr>
<tr>
<td>Txc:Interval</td>
<td>JOURNEY FREQUENCY GROUP, HEADWAY FREQUENCY GROUP, RHYTHMICAL FREQUENCY</td>
<td>Use with TEMPLATE vehicle Journey</td>
</tr>
<tr>
<td>Txc:VehicleJourneyInterchange</td>
<td>SERVICE JOURNEY INTERCHANGE</td>
<td></td>
</tr>
</tbody>
</table>
Technical detail
Mapping of Stops
Classical representation of an interchange is just as Station / Stops – NAPTAN has just STOP POINTs STOP AREA
Timetabled Stop vs Physical Stop

Use Cases
- Scheduling
- Trip Planning

Use Cases
- Physical Orientation
- Passenger Navigation
- Vehicle Positioning
- Trip Planning including detailed transfer times & Accessibility
Use Cases

- Transfer times for planning Timetable
- Navigation microplanning (with accessibility)
- Transfer Times for planning a trip (for given accessibility)
Example XML mapping from NAPTAN to NeTEx – a NaPTAN Stop Point

- Straightforward mapping of stop data
  - Physical data from NaPTAN:StopPoint ➔ NeTEx:QUAY
  - Schedule data from NaPTAN:StopPoint ➔ NeTEx:SCHEDULED STOP POINT
  - Can use STOP ASSIGNMENT to group together
  - Can use same id
  - Use Naptan Namespace
  - Can annotate with legacy NaPTAN Stop type codes to facilitate round trip export
- In NeTEx timetables can just use STOP POINT REF
- In NeTEx Stop definitions - group as all three
NapTan Stop in NeTEx
-XML Code Snippet

```xml
<PassengerStopAssignment version="any" ... order="0">
  <ScheduledStopPoint version="any" created="2004-06-09T14:20:00-05:00" responsibilitySetRef="nptgUkAdministrativeArea:060"
    id="naptStop:260010966">
    <Name>Netherley Road</Name>
    <TimingPointStatus>timingPoint</TimingPointStatus>
    <AllowedForWaitTime>PT0M</AllowedForWaitTime>
    <stopAreas>
      <StopAreaRef version="0" ref="naptArea:060G000001"/>
    </stopAreas>
    <StopPlace version="any" id="naptStop:260010966" responsibilitySetRef="nptgUkAdministrativeArea:060">
      <Name>Netherley Road</Name>
      <TopographicPlaceView>
        <TopographicPlaceRef ref="nptgUkLocality:E0000004"/>
        <Name>Aberdeen</Name>
      </TopographicPlaceView>
      <quays>
        <Quay id="naptStop:260010966" version="1">
          <Centroid><Location><gml:pos srsName="UKOS">442914</gml:pos></Location></Centroid>
          <placeTypes>
            <TypeOfPlaceRef version="napt:v2.1" ref="napt:StopClassification@BCT"/>
            <TypeOfPlaceRef version="napt:v2.1" ref="napt:StopType@MKD"/>
          </placeTypes>
          <RoadAddress version="any" id="naptStop:260010966@address">
            <RoadName>Netherley Road</RoadName>
            <BearingCompass>N</BearingCompass>
          </RoadAddress>
          <TransportMode>bus</TransportMode>
          <QuayType>busStop</QuayType>
        </Quay>
      </quays>
    </StopPlace>
  </ScheduledStopPoint>
</PassengerStopAssignment>
```

41 NeTEx Fares
Mapping of Journey Patterns, Timing Patterns & Journeys
Networks Layers and Patterns

- Transmodel separates concerns into different layers of network, represented using PATTERNs of POINTs & LINKs (“i.e. directed graphs of nodes and edges”)
  - ROUTEs, SERVICE PATTERNs, TIMING PATTERN, JOURNEY PATTERNs, etc
  - Allows rapid, reusable specification, easy propagation of changes, compact description of many journeys, sharing of common reference data

- POINTs Vs LINKs
  - For many purposes, either a sequence of points (POINTs in PATTERN) or a sequence of links (LINKs in PATTERN) is sufficient to describe
  - For some purposes, both are needed,
    - E.g. TIMING PATTERN; to attach RUN TIMEs (on LINK) and WAIT TIMEs (on POINT)

- Exchanging: When designing an exchange format, use only one sequence (To avoid conflicting data)
  - TransXChange: → Series of LINKs
  - GTFS → Series of POINTs
  - NeTEx Either, depending on profile
  - NeTEx EU Profile → Series of Points
A VEHICLE JOURNEY follows a JOURNEY PATTERN, to a TIMING PATTERN, over a SERVICE PATTERN, along a ROUTE.
A VEHICLE JOURNEY follows a JOURNEY PATTERN to a TIMING PATTERN over a SERVICE PATTERN along a ROUTE.

- Separate levels of abstraction for each concept
- Spatial & temporal aspects
- Reuse

UK NeTEx Timetable Profile

2018/01/01 → DT-H
2018/01/02 → DT-W
2018/01/03 → DT-W
2018/01/04 → DT-WE
…..etc
Modelling a transport network layer – Patterns: Sequences of Points / Links

- Functionally equivalent
Patterns as sequences of Points

- Can use Points IN PATTERN to find POINTs; to find LINKs also need to hold onward link.
Patterns as sequences of Links

- TransXChange uses sequence of LINKs for

- Functionally equivalent
Timing Patterns

- Timings for traversing links and waiting at stops/timing points are held separately.
  - RUN TIME, WAIT TIME, for each stop and link
  - May have different sets for different times of day/day types (TIME DEMAND TYPES)
- Timings for a journey may be specified by a start time, then applying timings.
- Allows rapid specification, easy propagation of changes, compact description of many journeys.

<table>
<thead>
<tr>
<th>Run</th>
<th>Link</th>
<th>Wait</th>
<th>Stop</th>
<th>J1</th>
<th>J2</th>
<th>J3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>A</td>
<td>d10:00</td>
<td>d10:30</td>
<td>d11:00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 min</td>
<td>A→B</td>
<td>B</td>
<td>a10:02</td>
<td>a10:32</td>
<td>a11:02</td>
<td></td>
</tr>
<tr>
<td>1 min</td>
<td></td>
<td>d10:03</td>
<td>d10:33</td>
<td>d11:03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 min</td>
<td>B→C</td>
<td>C</td>
<td>a10:07</td>
<td>a10:37</td>
<td>a11:07</td>
<td></td>
</tr>
<tr>
<td>3 min</td>
<td></td>
<td>d10:10</td>
<td>d10:40</td>
<td>d11:10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 min</td>
<td>C→D</td>
<td>D</td>
<td>a10:20</td>
<td>a10:50</td>
<td>a11:20</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>d10:03</td>
<td>d10:33</td>
<td>d11:03</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TransXChange: Transmodel 5.1 Layers / and options were reduced by use of Views

TXC TRACK

TX ROUTE

VEHICLE JOURNEY(s) Following journey pattern & timing pattern

TIME DEMAND TYPE RUN TIMES, WAIT TIMES

SERVICE PATTERN

JOURNEY PATTERN(s)

TXC: TIMING PATTERN MERGED WITH SERVICE PATTERN

TXC TIMINGS MERGED WITH JOURNEY PATTERN LINKS

TX  ROUTE

TXC TRACK

TM: ROUTE

TM: ROUTE
GTFS

A VEHICLE JOURNEY (Gtfs-Trip) is for a LINE

- Only stops are reused
- Timing is absolute and repeated on each journey
- No info on grouping presentation

- \[ 10:0 \]
- \[ 10:1 \]
- \[ 10:2 \]
- \[ 10:3 \]
Representation of a Timetable in NeTEx using POINT IN PATTERN
A Call is a view element assembling data from several normalised components to make timetable descriptions simple – lots of attributes.
TXC Service Journey model
Mapping of Day Types
Temporal conditions in TransXChange vs NeTEx

- TransXChange,
  - Temporal conditions specified on “OperationalProfile”
    - Days of Week and holidays, also specific dates
  - Can be specified on Timetable, Journey Pattern, Vehicle journey level
    - Automatically Combined to specify conditions for each individual journey
    - Optimised for presentation
  - Complex / Error prone to implement. May contradict
- In TXC 2.5 SERVICE CALENDAR calendar allowed for Schools etc

- Simpler to do explicitly (as in NeTEx!) – Same end result
  - Temporal and spatial more clearly separated:
    - Undated Timetables (DAY TYPES) vs Dated Timetables (+ SERVICE CALENDAR)
  - DAY TYPES, PROPERTIES OF DAYS
    - Can have predefined common UK set assigned to UK holidays
  - Each VEHICLE JOURNEY specifies DAY TYPES
  - SERVICE CALENDAR to assign DAY TYPE to dates if desired
Day types and Service Journeys

- Used to determine operational timetable & real time predictions

<table>
<thead>
<tr>
<th>DAY TYPEs</th>
<th>SERVICE CALENDAR</th>
<th>DAY TYPE ASSIGNMENTS</th>
<th>DATED SERVICE JOURNEYS</th>
</tr>
</thead>
</table>

**Service Calendar**

- 2018
- 2019
- 2020

**Journeys (undated)**

<table>
<thead>
<tr>
<th>Journeys</th>
<th>Date</th>
<th>Day Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1: 10:20</td>
<td>2018/01/01</td>
<td>DT-Weekday</td>
</tr>
<tr>
<td>J2: 10:22</td>
<td>2018/01/02</td>
<td>DT-Holiday</td>
</tr>
<tr>
<td>J3: 10:32</td>
<td>2018/01/03</td>
<td>DT-Weekend</td>
</tr>
<tr>
<td>J3: 10:32</td>
<td>2018/01/04</td>
<td>DT-Weekend</td>
</tr>
</tbody>
</table>

**Actual Journeys**

- 2018.01.01-J2: 10:22,
- 2018.01.02-J1: 10:20,
- 2018.01.03-J1: 10:20,
- 2018.01.04-J3: 10:32,

<table>
<thead>
<tr>
<th>Any Year</th>
<th>Date</th>
<th>Day Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journeys</td>
<td>2020</td>
<td>J2: 10:22</td>
</tr>
<tr>
<td>Journeys</td>
<td>2019</td>
<td>J1: 10:20</td>
</tr>
<tr>
<td>Journeys</td>
<td>2018</td>
<td>J1: 10:32</td>
</tr>
</tbody>
</table>

| Journeys | 2018/01/01 | DT-Holiday |
| Journeys | 2018/01/02 | DT-Weekday |
| Journeys | 2018/01/03 | DT-Weekday |
| Journeys | 2018/01/04 | DT-Weekend |

... etc.
Day Types & Validity conditions
Inheritance vs Direct reference

1. PropertiesOfDay
   - DAY TYPE
   - TIMETABLE

2. JOURNEY PATTERNS
   - Txc:OperationalProfile (Service)
   - e.g. Everyday except Public Holidays
   - e.g. Market days

3. VEHICLE JOURNEYS
   - Txc:OperationalProfile (JourneyPattern)
   - e.g. Everyday except Public Holidays and Market days in Winter
   - e.g. Market days in Winter

Better to require specific reference?

NeTEx:Day Type
- e.g. Everyday except Public Holidays and Market days in Winter
Mapping of Sections
Coding similar Journey Patterns

TXC always use of sections
  • More concise if there are variations on a pattern, not otherwise
  • Added complexity

NeTEx supports

Options
  • Always use
  • Drop (Would lose round trip info)
  • Allow optional use
Modelling a network - Sections
SECTIONs: Reusable sequences of points & Links – Used in TransXChange to reduce pattern size

- Often many different route variants, similar but with slight differences
  - Routes can be very long (150 stops+)
- A SECTION allows reuse of sequences of points or links in multiple Patterns
  - Less verbose, because reuse of section definitions

**JOURNEY PATTERNs**

- JP1 = S1 + S2 + S3 = a, b, c, d, e, f, g, h, i, j, k
- JP2 = S4 + S2 + S3 = p, q, e, f, g, h, i, j, k
- JP3 = S4 + S2 + S5 = p, q, e, f, g, h, i, r
Mapping of Journey Groupings
TransXChange allows a subgrouping of journeys within a timetable

- Important for visualisation of timetables for a line: which journeys should be grouped together?
- Needed for EBSR
- Needs to be optimised to avoid “sparse” timetables from dissimilar patterns (artefact of EBSR?)

In TXC 2.1 the grouping is only automatic - inferred by publisher

- Up to six combinations ➔ [Weekdays, Sat, Sun] x [Inbound, Outbound]

In TXC 2.5, arbitrary groupings also allowed

- Still doesn’t handle sparse timetables very well (where there is judgement needed)

Simpler to do explicitly (as in NeTEx!)

- Any arbitrary named grouping
- Create “Built in” groupings corresponding to existing TXC Publisher use
Grouping of Services

TransXChange, (unlike GTFs) allows a subgrouping of journeys within a timetable

- Important for visualisation of timetables for a line: which journeys should be grouped together to present?
  - Outbound Journeys A to B, Monday to Friday, Inbound journeys B to A
- Needed for EBSR manual verification (TXC Publisher uses)
- Needs to be optimised to avoid “sparse” timetable layouts arising from journeys with very from dissimilar patterns
  - This may be an artefact of EBSR licensing costs: Operators incentivised operators to bundle together as many journeys as possible on the same registration

- In TXC 2.1 the grouping is only automatic - inferred by publisher
  - Up to six combinations ➔ [Weekdays, Sat, Sun] x [Inbound, Outbound]

- In TXC 2.5 the grouping arbitrary user defined groupings also allowed
  - Still doesn’t handle sparse timetables very well (where there is

- Simpler to do explicitly (as in NeTEx!)
  - Any arbitrary named grouping can be specified as a GROUP OF SERVICES
A set of timetable data for a given line may include journeys following many different patterns, in different directions and subject to different validity conditions.

To the user this is usually presented in subsets of similar data by direction, etc
- E.g. Weekday outbound, Weekday inbound, Saturday outbound, Sunday outbound, etc
- E.g. Journeys for Patterns A-B-C-E, A-D-C-E, A-B-F, B-C-E, etc

Number of useful sub groupings depends on size & complexity of data set
- If journey patterns are disimilar get verbose “Sparse” timetables
TXC: Assignment of journeys to service groups for presentation

DAY TYPES

UK NeTEx Timetable Profile

Moving Britain Ahead
For optimum readability and use of space, journeys need to be:
- Rows ordered vertically by common journey pattern
- Columns ordered horizontally by time
- Grouped by JOURNEY PATTERN
- Grouped by DAY TYPE
Mapping of EBSR data elements
Registration has elements UK specific to UK processes:

- **Registration**, **Short Notice Registration**,
- **TrafficArea**, **Circulated Authority**
- **Subsidy, Supporting documents** etc

Some of these are in **TxC:Registration**, others are spread around **TxC:Service**, **TxC:Operator**, **TxC:VehicleJourney** and elsewhere

- E.g. VOSA licences, subsidy basis, etc
Summary