UK Fares and NeTEx Profile Workshop – 1b Scope

London 16th July 2019. Sheffield 18th July 2019

|	
13:15 – 14:00	NeTEx Intro & Basic fares profile
14:00 – 14:30	NeTEx routes and timetables – detailed -
14:30	Break
14:40 - 15:30	Complex fares requirement & Fare modelling
15:40 – 16:00	Questions and Next Steps

Scope of UK NeTEx Bus Fare profile

Main UK use case is Fare & Price distribution – i.e. Downstream
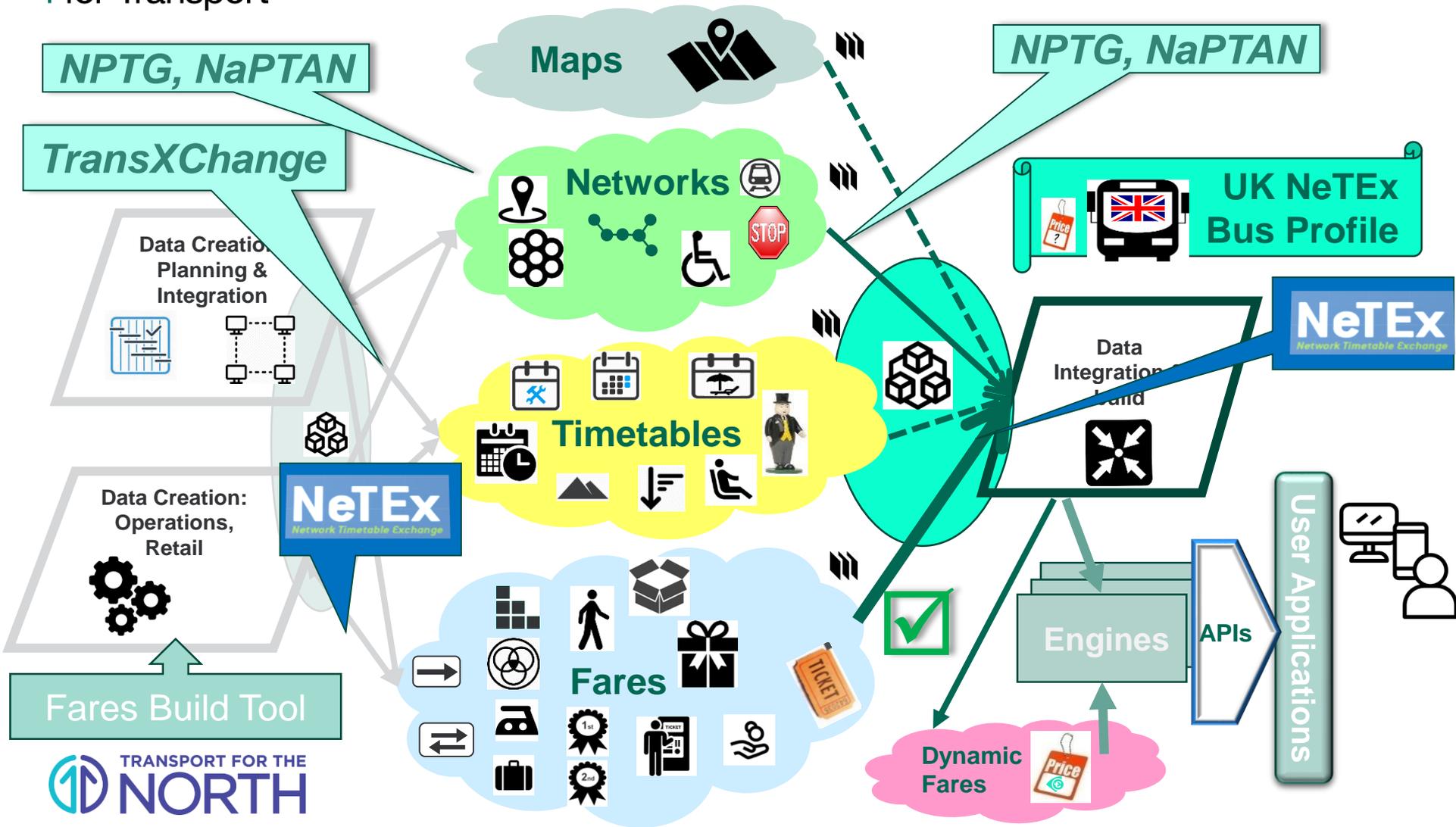
UK NeTEx profile: Aspects & Phasing

Aspect	UK Legacy	Basic UK profile	Advanced UK Fare Profile	Future / Further ?
Common "data plumbing"	(nptg, naptan txc)	• Versioning & Validity • Frames & grouping • Identifiers & references	same	
Localities	NPTG	• Locations & • Plus Bus Zones	same	
Stops	NaPTAN	• Stops , Tariff ones	same	*Accessibility,? POI?*
Timetables	TXC	• Simple EU timetables • (no timings, no op data)	n/a	*Full TXC, Rail features?*
Fares	**new**	• **Basic Bus Fares**	**More Complex Bus Fares**	*Long distance Fares?*

▶ Basic Profile

▶ Advanced Profile

▶ Out of current scope / For Future roadmap?

UK Profile scope - Modes

▶ **Can be covered by Basic Products**

- **Bus**
- **Bus as add-on** to Rail etc (e.g. Plus bus)
- **Ferry**
- **Light Rail**, **Tram**?

▶ **Require additional Advanced Features**

- **Bus supplements to Rail (**PlusBus**)**
- **Metro** / London Underground, PAYG, Capped fares)

▶ **Require additional complex features**

- **Coach**? (Seat Reservations, luggage, Routing?….)
- **Rail** (routing, complex times of trave,, etc)

Profile scope - Interoperability?

▸ **Network & Timetable data**

- NPTG Localities ☑
- NaPTAN ☑
- TransXChange Line / Journey ids ☑
- NOC Operator codes ☑

▸ **A UK Bus CSV representation of Basic Fares**

- Similar to NaPTAN stop csv;
    - ❑ Flat files for core elements
- Basic Tariff Structures:
    - ❑ Origin/Destinations, Zones, Stages
- Products   & Sales Offers
    - ❑ User Types
- Tariff Prices
    - ❑ O/D x product/user type/ x x price

Profile Scope - Workflows
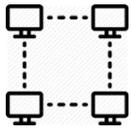
▸ **Data Architectures & Workflows?**

- **Distributed Peer to peer** : Operator places data on website.
- **Managed:** An intermediary aggregates and integrates.

▸ **Granularity of exchange?**

- **Network scope:** Network / Operator / Line / Timetable / Region..
- **Frequency:** (Annual, Monthly, Periodic, when it changes…)
- **Prices:** Exchange separately from Fare Structure?

▸ **How does data become available at a UK National Access Point?**

- Discovery / Directory / Register:

▸ **What needs to be included in the data to enable self describing data & validation of the above?**

  ▸ Operator, validity conditions, code values, etc.

Fare Scope Use Case - Data Distribution

▸ **Provide fare products & fare prices as open data for third party use (in journey planners, etc.)?**

- Describe **available fare products** and their **eligibility** conditions.

- Relate **fare products to network (stops** andtariff**zones**) and services (**journeys & times of travel** if relevant) so trip planners can compute fare products and fare prices for trips, show available products for area, etc.

- Allow products to be **bundled** together as a single **sales offering**, or offered as **different packages** on **different media**.

- Allow the s**eparate exchange of prices** from fare structures & products**.**

- Expose a **justification of the fare** (Distance, discounts etc) Support both **machine readable** & **human readable** representation of validity parameters (**user types**, *media*, etc) and conditions

- Include information about how/where products **can be bought**.

- Include fares valid for **specific** and **multiple operators**.

"Describe available Fare products"

What is the minimum set of products needed for uk bus fares?

Thinking about your Anytime (e.g. peak time) fare products, which of these "trip" (i.e. non-period) ticket types do you offer, and how frequently are they purchased?
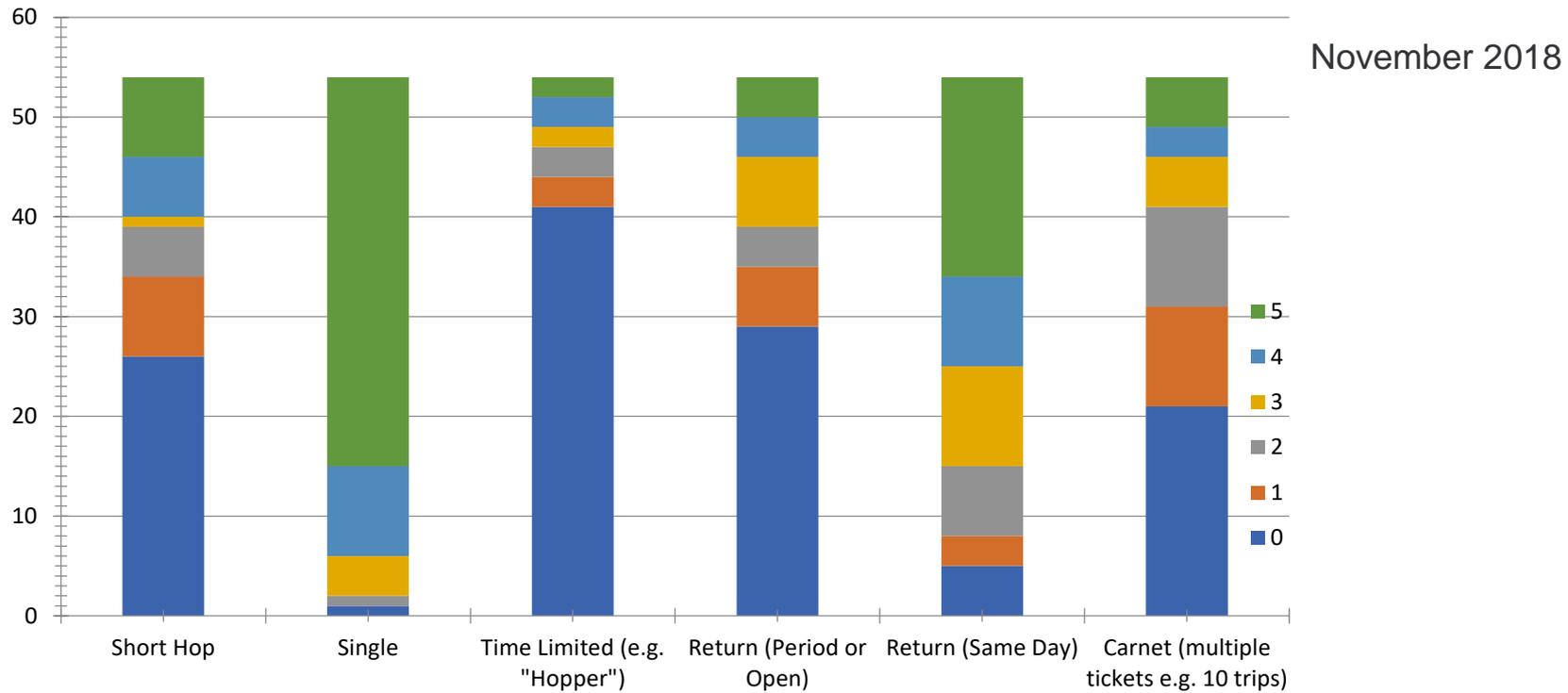
November 2018

Fares Survey Results - Products

And still thinking about Anytime fare products, which of these period passes do you offer, and how frequently are they purchased?

▸

November 2018

Legend:
- 5 (green)
- 4 (blue)
- 3 (yellow)
- 2 (grey)
- 1 (orange)
- 0 (dark blue)
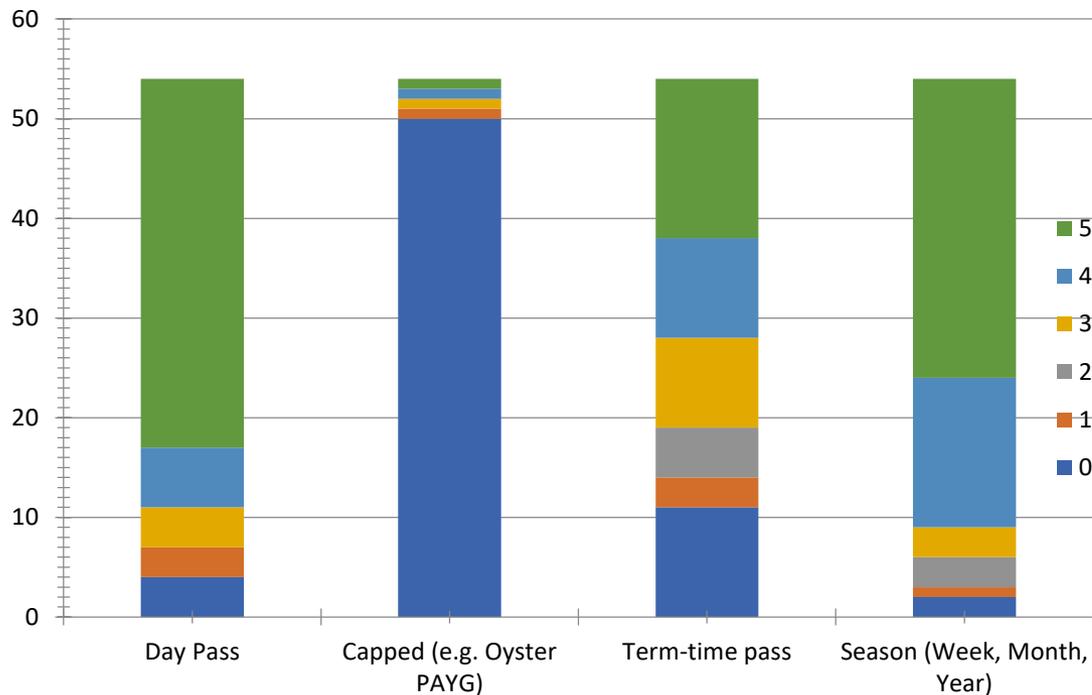
Basic Product Types - terminology
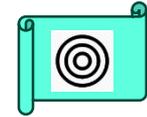
▶ **Trip**

The product gives the right to make a single journey
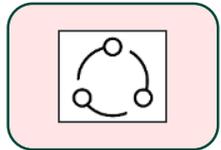
▶ **Pass**

The product combines access rights to make repeated journeys within a time interval (Day, Week, Month etc)

▶ **Carnet**

The product comprises a number of Trips or Passes sold as a bundle at a discount. They must be used within a given period.

Basic UK Bus fare products
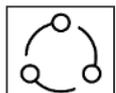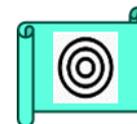
Type of Product	Fare Product	Group Ticket
TRIP ("single ride")	*Short hop*	-
	Single trip	☑
	Time-limited ("Hopper")	☑
	Period Return	☑
	Day return	☑
PASS	*Day pass*	☑
	Termtime	-
	Season pass	(☑)
Carnet	*Trip*	
	Day Pass	

UK ☞ Products must be one of the specified types

"Relate fare products to **network** (**stops** and t**a**riff **zones**) and **services** (**journeys** & times of travel if relevant) so trip planners can compute **fare products** and **fare prices** for trips, show available products for area etc**.**"

➔ Spatial & Temporal aspects of Tariff Structure.

Tariff Structures - Spatial aspects:

▸ **Flat** – There is only one price for the fare or product regardless of distance.
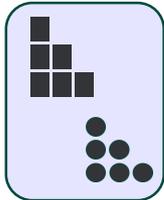
▸ **Point-to-point, Zone–to-Zone.** The fare gives the right to travel between two named stops. A discrete fare price can be given for each origin/destination pair.

- Usually the fare prices increase progressively with increasing distance travelled, but the increase is not necessarily a strict linear function (further may be cheaper, and individual O/D prices may be adjusted arbitrarily to optimize yields, traffic, competitive advantage, etc).

- Both Zone/Stage count and distance fares can be expressed as Z2Z/ P2P.
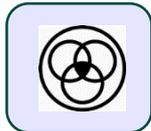
▸ **Named Zone(s):** The fare gives the right to travel in one or more identified zones. A fare price can be given for any allowed combination of zones.

- If the zones are disjoint , then this is in effect "Zone to Zone" If the zones overlap or are nested then the topology is more complex,

- **Stage / Section count**. The fare gives the right to travel a certain **number** of sections or "stages" regardless of which specific sections they are. There is a price per zone used. The resulting fare prices are inherently progressive.

Department for Transport

1
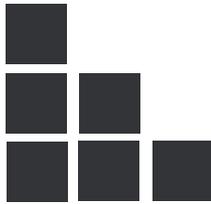
Bewbush West - Crawley - Broadfield/Pease Pottage

Adult Single Fares

Bewbush West (loop)								
160	**Bewbush** Neighbourhood Centre							
240	160	**Gossops Green** Shops						
240	240	160	**West Green** Crawley Hospital/Apple Tree					
240	240	240	160	**Crawley** Town Centre				
240	240	240	240	160	**Southgate Avenue** North			
240	240	240	240	240	160	**Southgate** Wensleydale		
240	240	240	240	240	240	160	**Broadfield** (all stops)	
240	240	240	240	240	240	240	160	**Pease Pottage** Black Swan

Fares are shown in pence. Eg. 170 = £1.70

To calculate your fare, find your location, and your destination, where the row and the column cross is your fare.

Return Fares

Not available on this service.

Child Fares

Child Fares are available on this route at half the adult fare on single journeys.

Crawley Area Metrorider
Metrovoyager
Discovery Ticket
Gatwick Travelcard

Accepted throughout.

PlusBus

Crawley, Three Bridges, Gatwick Airport, Ifield and Horley PlusBus tickets are valid throughout. Please see www.plusbus.info for further information.

Concessionary Passes

Concessionary passes are valid throughout from 0930-2300 Mon-Fri, and anytime at weekends and public holidays.

24.01.17   Metrobus Ltd, Wheatstone Close, Crawley, West Sussex, RH10 9UA.   Tel: 01293 449191

METROBUS

© Metrobus 2018   https://www.metrobus.co.uk/route-information/1

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DISTANCE MATRIX ELEMENT

FARE PRICEs

TARIFF

TARIFF ZONEs

class XSD NeTEx Lite - Distance Matrix Intro

DataManagedObject
Tariff

Zone
TariffZone

defined by 0..*

start of 1 / end of 1 / composed of / 0..*

included in 1..*

TimingPoint
ScheduledStopPoint

start of 1 / end of 1

used to define 0..* / from 0..* / to 0..* / from 0..* / to 0..*

PriceableObject
DistanceMatrixElement

related to

given for 0..*

FarePrice
DistanceMatrixElementPrice
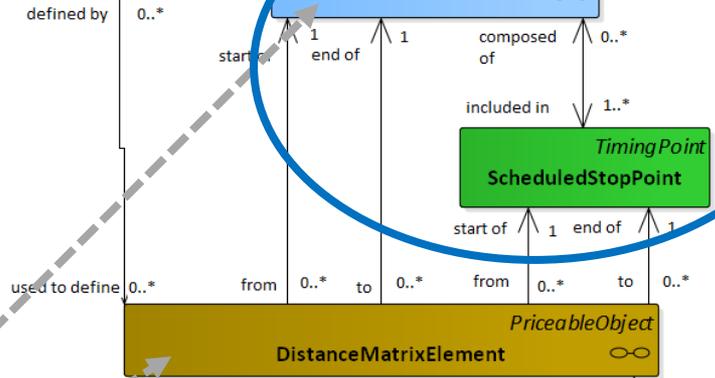
Name: XSD NeTEx Lite - Distance Matrix Intro
Author: Nick
Version: 1.0
Created: 25/11/2011 09:24:55
Updated: 31/10/2018 15:08:34

1

Bewbush West - Crawle

Adult Single Fares

Bewbush West (loop)
160 **Bewbush** Neighbourhood Centre
240 160 **Gossops Green** Shops
240 240 160 **West Green** Crawley Hospital Apple Tree
240 240 240 160 **Crawley** Town Centre
240 240 240 240 160 **Southgate Avenue** North
240 240 240 240 240 160 **Southgate** Wensleydale
240 240 240 240 240 240 160 **Broadfield** (all stops)
240 240 240 240 240 240 240 160 **Pease Pottage** Black Swan

Zonal Fare

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Zone topologies – Disjoint, nested, overlapping, doughnut etc…
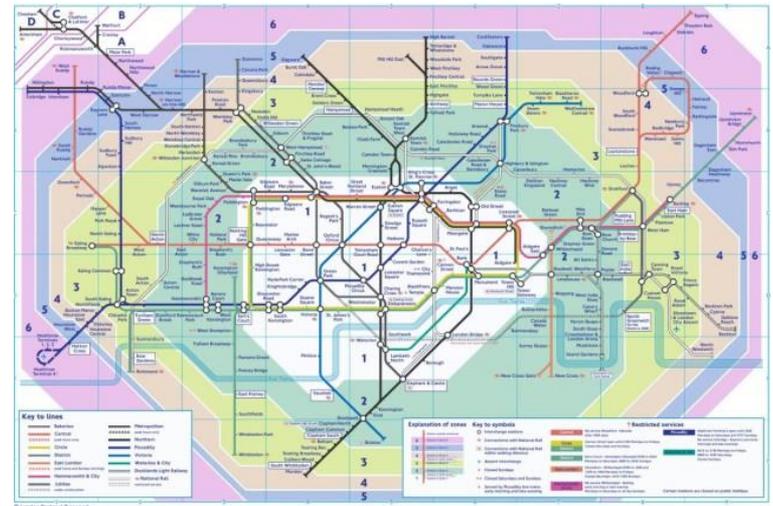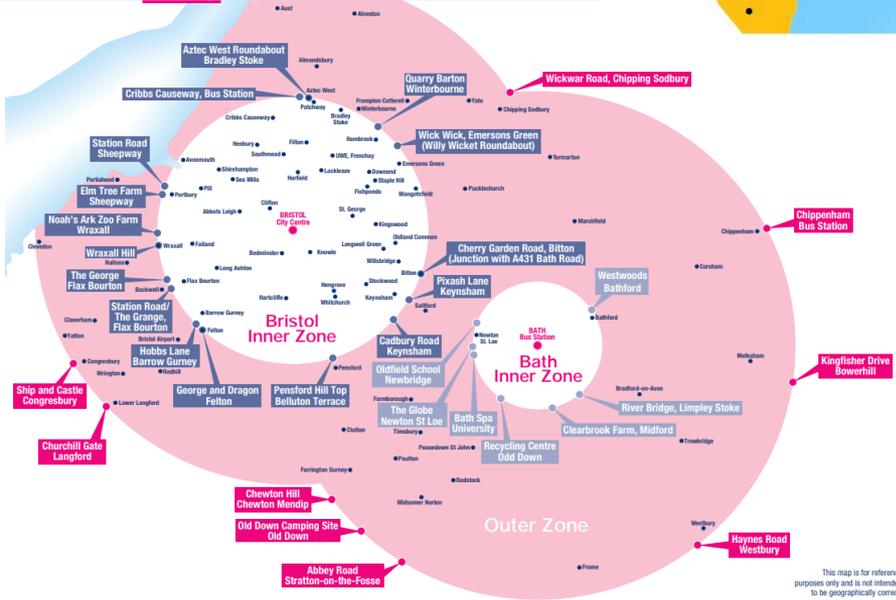
Stage /Section Count Fares

➤ Does not matter which section, just the number of sections.

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Single tickets

The cost of single tickets within the West of England will be based on the route distance you travel, with five single fares available:

Up to three miles
- Adult — from £2
- 16-21 year old/student — from £1.40
- Child aged 5-15 — from £1

Three to six miles
- Adult — from £3
- 16-21 year old/student — from £2.10
- Child aged 5-15 — from £1.50

Six to nine miles
- Adult — from £4
- 16-21 year old/student — from £2.80
- Child aged 5-15 — from £2

Nine to twelve miles
- Adult — from £5
- 16-21 year old/student — from £3.50
- Child aged 5-15 — from £2.50

Over twelve miles
- Adult — from £6
- 16-21 year old/student — from £4.20
- Child aged 5-15 — from £3

How is your single fare calculated?

Distance-based fares for the West of England

In the West of England (excluding Bath Inner and Weston-super-Mare Town Zones – see pages 6 and 14) your single fare is worked out based on the route distance you are travelling.

Distances are calculated using fare stage sections rather than individual bus stops, with each section being approximately one mile long*.

If you travel in 1-3 mile long sections it'll be £1.50, 4-6 mile long sections will be £2.50 and so on.

Here is an example of one route and some of the fares along it:

Emersons Green, Sainsbury's to Long Close would be £1.50 as you are travelling in three sections (numbers 1, 2 and 3, Long Close is classed as section 3 in this example as it's where you are getting off the bus).

Long Close to Narroways Road would be £2.50 as you are travelling in four sections (4, 5, 6, 7, Long Close is counted as section 4 in this example as it's your boarding point).

Blackberry Hospital to Downend, The Leap would be £2.50 as you are travelling in four sections (5, 4, 3, 2).

Emersons Green, Sainsbury's
Church Farm Road
Betts Green
Bromfield Walk — **1**
Meadgate
Blackhorse Lane
Downend, The Leap
Leap Bridge — **2**
Four Acre Road
Queensholm Crescent
Wedgewood Road
Quakers Road
Bromley Heath Avenue
Cleeve Hill
Long Close — **3**
Selbrooke Crescent
Ettricke Drive
Vassal Road
Straits Parade
New Station Road — **4**
Fishponds, Channon's Hill
Channons Hill
Snowdon Road
Blackberry Hospital
Tanglewood Park
Small Lane — **5**
River View
Brinkworthy Road
The Chine
Stapleton Church
Glenfrome Road
Stapleton Road — **6**
Eastville, Eastgate Centre
Eastgate Road
Narroways Road — **7**
Stafford Road
Sevier Street
Ashley Road, Brook Road
Denbigh Street — **8**
Brigstocke Road
Stokes Croft
The Haymarket
Centre, Rupert Street — **9**

Key
1 Numbered sections
Bold name stops - Section boundary stop (can be counted in either section)
Non-bold names - All other bus stops

Stage Fares

Department for Transport

First

GEOGRAPHIC UNIT
1-Section

GEOGRAPHIC INTERVALS

❶ ❷ ❸

01-03	= £1.50
04-06	= £2.50
07-09	= £4.50
10+	= £5.50

FARE PRICEs

Price

© First Group 2018

How is your single fare calculated?

Distance-based fares for the West of England

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Here is an example of one route and some of the fares along it:

Emersons Green, Sainsbury's to Long Close would be £1.50 as you are travelling in three se... [text obscured] ...g Close is cl... [text obscured] ...le as it's whe... [text obscured]

Long Clos... [text obscured] be £2.50 a... [text obscured] four sections (4, 5, 6, 7, Long Close is counted as section 4 in this example as it's your boarding point).

Blackberry Hospital to Downend, The Leap would be £2.50 as you are travelling in four sections (5, 4, 3, 2).

POINTs IN FARE PATTERN

FARE SECTIONs

Emersons Green, Sainsbury's
Church Farm Road
Bett's Green
Bromleed Walk
❶
Meadgate
Blackhorse Lane
Downend, The Leap
❷
Leap Bridge
Four Acre Road
Queensholm Crescent
Wedgewood Road
Quakers Road
Bromley Heath Avenue
Cleeve Hill
❸
Long Close
Selbrooke Crescent
Ettricke Drive
Vassal Road
Straits Parade
❹
New Station Road
Fishponds, Channon's Hill
Channons Hill
Snowdon Road
Blackberry Hospital
Templewood Park
Small Lane
❺
River View
Brinkworthy Road
The Chine
Stapleton Church
Glenfrome Road
Stapleton Road
❻
Eastville, Eastgate Centre
Eastgate Road
Narroways Road
Stafford Road
Sevier Street
Ashley Road, Brook Road
Denbigh Street
❼
Brigstocke Road
Stokes Croft
The Haymarket
Centre, Rupert Street
❽
❾

Key
❶ Numbered sections
Bold name stops - Section boundary stop (can be counted in either section)
Non-bold names - All other bus stops

SCHEDULED STOP POINTs

❶ ❷ ❸

July 19
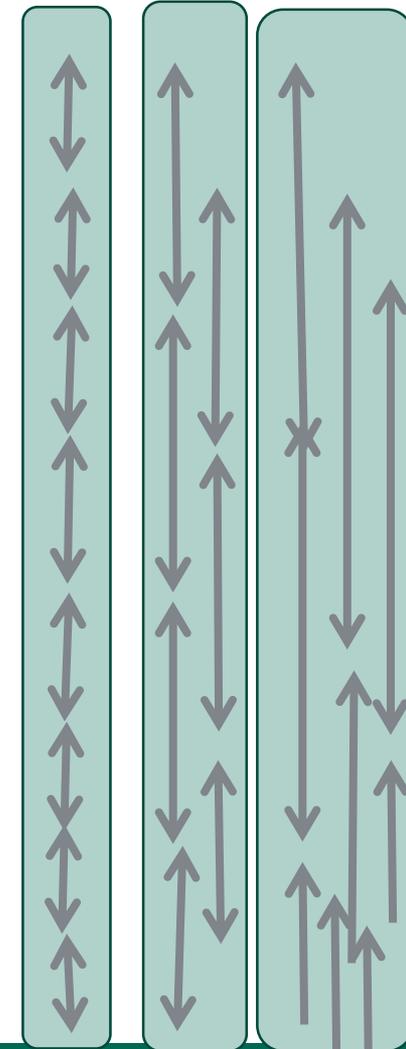
Flat Fare

- ▶ Does not vary according to distance of travel.
    - ▶ May still have different prices for adult, child, etc

e.g. TfL bus fare £1.50, 1 hour

Temporal aspects (Season pass, multiple media)

© Metrobus 2018

TIME INTERVALs

FARE ZONE

FARE PRICE

bought on bus with cash

stored on your mobile phone as m-tickets

loaded onto our smartcard the key

Crawley Metrorider

Unlimited travel in the Crawley Metrorider area.

* All day travel for up to 5 people (minimum of 1 adult & maximum of 2 adults travelling at any one time.)
** Available from 1800 and valid until 0359 on the following day.
*** For 2 adults, travelling together.

	1 day	1 week	Evening **	60 minute	1 day	2 day#	3 day#	1 week	4 week	Duo ***	Evening **	1 day	1 week	4 week	13 week	Annual	Evening **
Adult	£4.90	£20	£4	£2.20	£4.20	£7.90	£11.50	£18	£59	£7.90	£3.70	£4.20	£18	£59	£154	£520	£3.70
Child	£2.70	£11	-	£1.10	£2.35	£4.45	£6.45	£9.75	£32.50	-	-	£2.35	£9.75	£32.50	£79	£290	-
Student	-	-	-	-	-	-	-	-	-	-	-	£3.15	£13.50	£44.25	£115.50	£390	-
Family*	£9	-	-	-	£9	-	-	-	-	-	-	-	-	-	-	-	-

Peak and Offpeak – Fares

▸ E.g. Concessionary Pass product has use restrictions

Crawley Area Metrorider Metrovoyager Discovery Ticket Gatwick Travelcard

Accepted throughout.

PlusBus

Crawley, Three Bridges, Gatwick Airport, Ifield and Horley PlusBus tickets are valid throughout. Please see www.plusbus.info for further information.

Concessionary Passes

Concessionary passes are valid throughout from 0930-2300 Mon-Fri, and anytime at weekends and public holidays.

FARE DEMAND FACTOR

Peak: DT-Weekdays *0:00-09:30, 23:00-00:00*
Off-Peak: DT-Weekdays *09:30-23:00, + DT-Weekend*

DAY TYPEs

TIMEBANDs

SERVICE CALENDAR

2020
2019
2018

Date →**Day Type**
2018/01/01 → DT-Holiday
2018/01/02 → DT-Weekday
2018/01/03 → DT-Weekday
2018/01/04 → DT-Weekend

…..etc

DAY TYPE ASSIGNMENTs

2020
2019
2018

Fare Validity *,*
2018/01/01;
    00:00-24:00 Off-Peak
2018/01/02;
- *00:00-08:30 Off-Peak*
- *08:30-09:30 Peak*
- *09:30-17:00 Off-Peak*
ETC, ETC

Basic UK Bus fare products
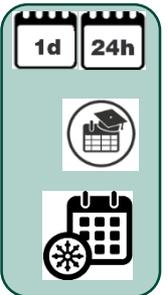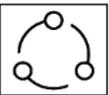
Access rights		Tariff Structure						
Type of Product	PREASSIGNED FARE PRODUCT	Flat	Point to point	Named Zones	Zone/ Stage Count	Peak / Off Peak	Group Ticket	Temporal Conditions
TRIP ("single ride")	**Short hop**	☑	☑	☑	☑	-	-	No journey break
	Single trip	☑	☑	☑	☑	☑	☑	Has use by date?
	Time-limited ("Hopper")	-	-	☑	-	☑	☑	Max trip duration, Can interchange
	Period Return	☑	☑	☑	☑	☑	☑	Has use by date?
	Day return	☑	☑	☑	☑	☑	☑	Must use same day
PASS	**Day pass**	-	-	☑	-	☑	☑	1Day(elapsed or calendar)
	Termtime	-	?	☑	-	-	-	Use during term 1Y
	Season pass	☑	☑	☑	-	-	☑	n x D,W,M, 1Y

Carnets: Multi-trip / Multi-pass offers

Access rights		Tariff Structures		
Type of Product	**FARE PRODUCT (AMOUNT OF PRICE UNIT)**	**Quantity**	**Related tariff structure**	**Temporal Conditions**
CARNET	*Multi-trip*	☑	Any individual Trip	Trips have use-by date Trips can be time limited
	Multi-Day pass	☑	Day Pass	Passes have specified duration Passes have use-by date
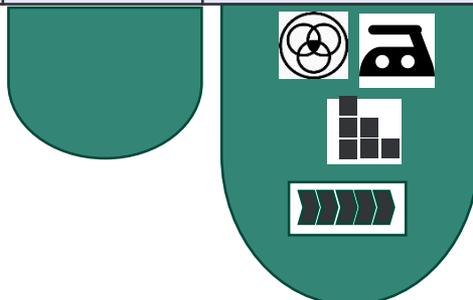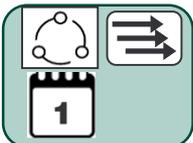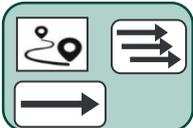
Relating the Tariff structure to the network:
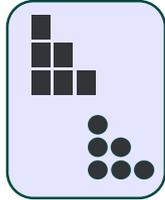
▶ **Point-to-point, Zone–to-Zone.**
  ▪ What are the allowed Origin/Destination pairs?

▶ **Named Tariff Zone(s):**
  ▪ Which stops are in which tariff zone?

▶ **Stage / Section count.**
  ▪ Which stops in the journey pattern are the fare stages?
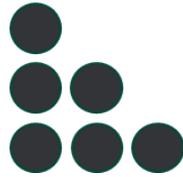
A Distance Matrix

DISTANCE MATRIX ELEMENT

FARE PRICEs

TARIFF

TARIFF ZONEs

Nested Fare Zones - Metrorider & Metrovoyager

TOPOGRAPHICAL PLACEs

FARE ZONEs

▸ ZONE topologies e.g
  - **NESTED**,
  - DISJOINT
  - HONEYCOMB
  - OVERLAPPING
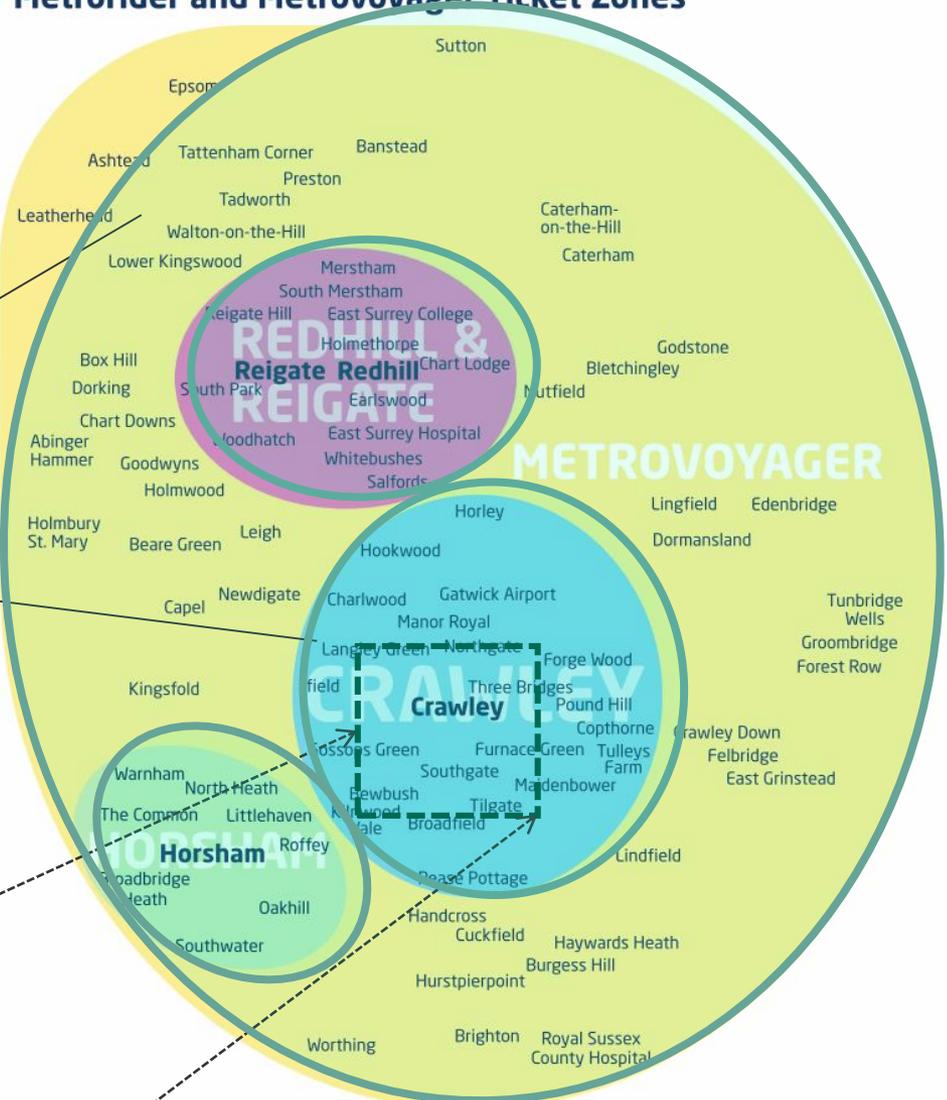
SCHEDULED STOP POINTs

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Metrorider and Metrovoyager Ticket Zones

Membership of Tariff Zones by Stops is explicit.

- ▸ **The model specifies which stops are in which** tariff **zone:** a stop may be in more than one zone, zones maybe specific to an operator or shared.

- ▸ **Both stops and zones have a spatial projection.** However *spatial containment of a stop within a zone's extent does not invariably imply semantic membership of the zone*. In many cases the coordinates can be used to compute which stops are in a given tariff zone so as to populate the membership links.

- ▸ A Tariff zone may also **have presentation properties** such as colour.

Moving Britain Ahead

▶ **TARIFF ZONEs can reference existing NaPTAN STOP POINTS**

- NPTG already has PlusBus Zones with Polygons

```xml
<fareZones>
    <FareZone version="1.0" id="mb:fewbush_West">
        <Name>Bewbush West (loop)</Name>
        <members>
            <ScheduledStopPointRef ref="naptan:4400CY0037" version="any">Brettingham Close, Bewbush</ScheduledStopPointRef>
            <ScheduledStopPointRef ref="naptan:4400CY0038" version="any">Neptune Close, Bewbush</ScheduledStopPointRef>
            <ScheduledStopPointRef ref="naptan:4400CY0039" version="any">Mercury Close, Bewbush</ScheduledStopPointRef>
            <ScheduledStopPointRef ref="naptan:4400CY0040" version="any">Sullivan Drive, Bewbush</ScheduledStopPointRef>
            <ScheduledStopPointRef ref="naptan:4400CY0042" version="any">Bewbush Roundabout, Bewbush</ScheduledStopPointRef>
        </members>
    </FareZone>

            ……..
```

"Describe available fare products... and their **eligibility** conditions"

Who can use specific products

Types of user

For which of these user types do you provide distinct fares, and how frequently are they purchased?

User Types

USER PROFILEs

GROUP TICKET *(family)*

FARE ZONE

1

Bewbush West - Crawley - Broadfield/Pease P

Adult Single Fares

Bewbush West (loop)							
160 **Bewbush** Neighbourhood Centre							
240 160 **Gossops Green** Shops							
240 240 160 **West Green** Crawley Hospital/Apple Tree							
240 240 240 160 **Crawley** Town Centre							
240 240 240 240 160 **Southgate Avenue** North							
240 240 240 240 240 160 **Southgate** Wensleydale							
240 240 240 240 240 240 160 **Broadfield** (all stops)							
240 240 240 240 240 240 240 160 **Pease Pottage** Black Swan							

Fares are shown in pence. Eg. 170 = £1.70

To calculate your fare, find your location, and your destination, where the r
the column cross is your fare.

Return Fares
Not available on this service.

Child Fares
Child Fares are available on this route at half the adult fare on single journeys.

		bought on bus with **cash**			stored on your mobile phone as **m-tickets**							loaded onto our smartcard **the key**					
Crawley Metrorider		1 day	1 week	Evening **	60 minute	1 day	2 day#	3 day#	1 week	4 week	Duo ***	Evening **	1 day	1 week	4 week	13 week	Annual	Evening **
Unlimited travel in the Crawley Metrorider area.	Adult	£4.90	£20	£4	£2.20	£4.20	£7.90	£11.50	£18	£59	£7.90	£3.70	£4.20	£18	£59	£154	£520	£3.70
* All day travel for up to 5 people (minimum of 1 adult & maximum of 2 adults travelling at any one time.)	Child	£2.70	£11	-	£1.10	£2.35	£4.45	£6.45	£9.75	£32.50	-	-	£2.35	£9.75	£32.50	£79	£290	-
** Available from 1800 and valid until 0359 on the following day.	Student	-	-	-	-	-	-	-	-	-	-	-	£3.15	£13.50	£44.25	£115.50	£390	-
*** For 2 adults, travelling together.	Family*	£9	-	-	-	£9	-	-	-	-	-	-	-	-	-	-	-	-

Department for Transport

Moving Britain Ahead

UK Bus Fares – Example User Types

USER PROFILE	Personal	Discounted	Note
Adult	x	x	Over 16
Infant	x	✓	Babes in arms free
Child	x	✓	c5 – c16 years
Youth	x	✓	c16-18 years
School Pupil	x	✓	At School
Student / Trainee	✓	✓	University, Apprentice
Senior	✓	✓	Resident, >60 years
Disabled	✓	✓	Registered disabled
Disabled Companion	✓	✓	With disabled
Job seeker	✓	✓	Registered unemployed
Armed Forces	✓	✓	Registered
Employee Scheme	✓	✓	E.g. Gatwick Airport Staff

Fare Structure – Usage Parameter– XML Code Snippet

▶ Define the element to be priced

- USER PROFILE

```xml
<FareStructureElement id="atc:eligibilities" version="01">

    <Name>Rail card eligible user types</Name>

    <validityParameterAssignments>

        <GenericParameterAssignment order="1" id="atc@eligibilities" >

            <                <limitations>

                <UserProfile version="any" id="atc:pass_profile@16to25">
                    <Name lang="en">16 to 25</Name>

                    <Url>https://www.16-25railcard.co.uk/</Url>

                    <DiscountingRuleRef ref="atc:rate@student" version="any"/>

                    <MinimumAge>16</MinimumAge>

                    <MaximumAge>25</MaximumAge>

                    <ProofRequired>passport</ProofRequired>

                </UserProfile>
```

Group Ticket Types

Which of these Group ticket types do you offer, and how frequently are they purchased?
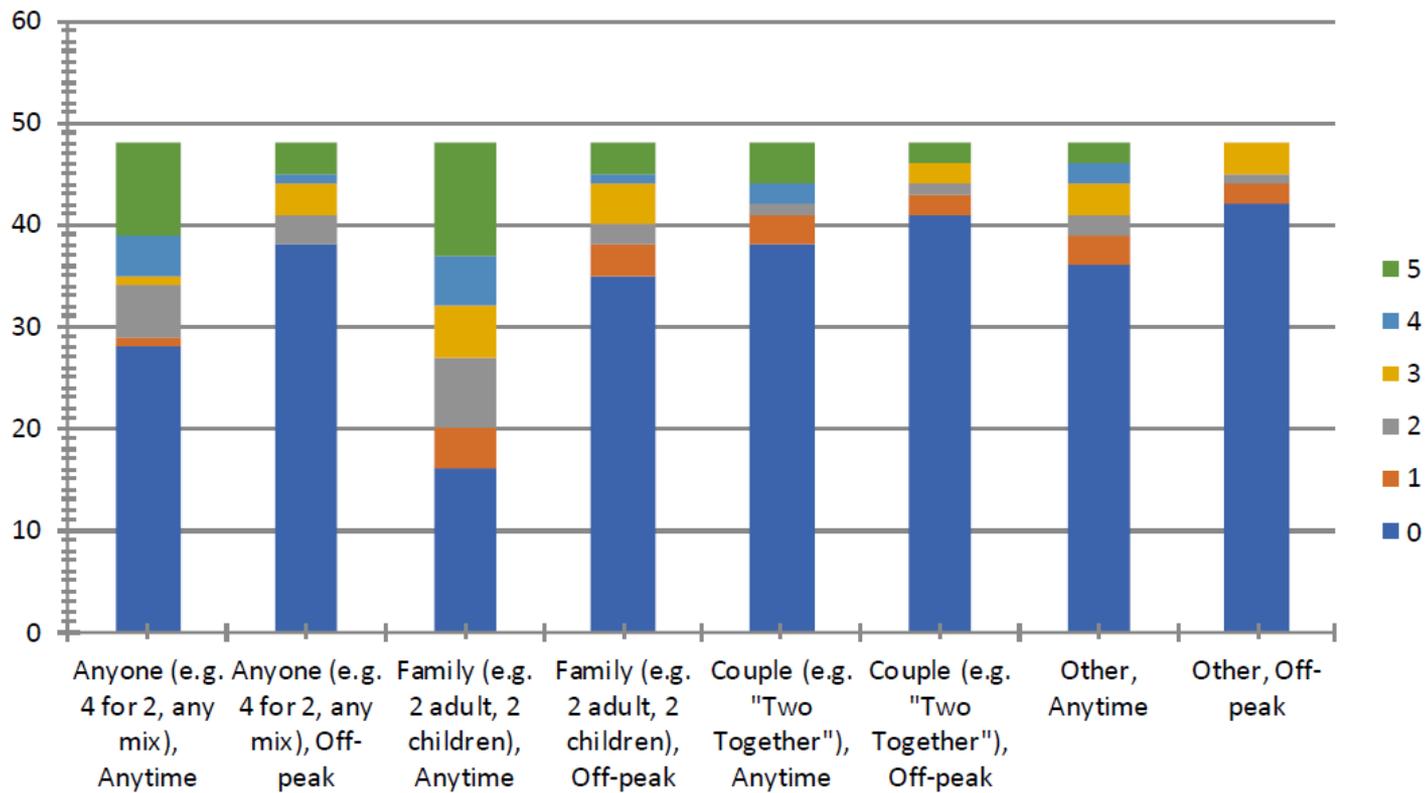
#6.3: UK Bus Profile – Group Ticket Types
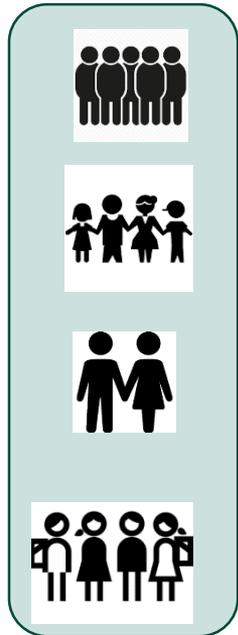
GROUP TICKET	Note
Anyone	2-N Anyone
Family	1-2 Adults + 1-N, Children
Couple / Duo	2 Adults
School Pupils	1-N Adults + 2-N Pupils
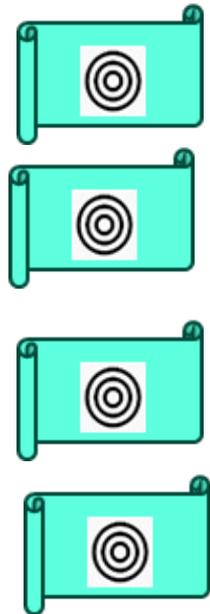
Eligibility parameters

▸ A product may be restricted to one or more profile, and have different prices associated with each profile

▸ Basic Fare Profile

  ▸ USER PROFILE, which describes the social profile of a customer. It is generally used to allow discounts based on age groups (e.g. under 18), gender, profession, social status (e.g. student, retired, unemployed), etc. Can have quantitatve rules

  ▸ COMPANION PROFILE, indicating the number and characteristics of persons entitled to travel in a group or as companions to another USER PROFILE.

  ▸ GROUP TICKET describes the number and characteristics of persons possibly entitled to travel in addition to the holder of an access right.

▸ Advanced Fare Profile

  ▸ RESIDENTIAL QUALIFICATION, categorising the users depending on place of residence, sometimes used for allowing discounts.

  ▸ COMMERCIAL PROFILE, which is used to describe customer categories depending on their commercial relations with the operator (frequent traveller, amount of purchase by a company, etc.). Normal used to allow discounts.

- ■ "Allow products that are bundled as a single offering, or offered as different packages on different media. "

➔ Spatial & Temporal aspects of Tariff Structure

Fares Survey Results

What types of Travel Document (e.g. printed ticket, self-print, smartcard, mobile device, etc.) do you offer, and how frequently are they used?

November 2018

Department for Transport

TYPE OF TRAVEL DOCUMENTs

SALES PACKAGEs

FARE ZONE

FARE PRICE

bought on bus with cash

	1 day	1 week	Evening**
Adult	£4.90	£20	£4
Child	£2.70	£11	-
Student	-	-	-
Family	£9	-	-

stored on your mobile phone as m-tickets

	60 minute	1 day	2 day#	3 day#	1 week	4 week	Duo***	Evening**
Adult	£2.20	£4.20	£7.90	£11.50	£18	£59	£7.90	£3.70
Child	£1.10	£2.35	£4.45	£6.45	£9.75	£32.50	-	-
Student	-	-	-	-	-	-	-	-
Family	-	£9	-	-	-	-	-	-

loaded onto our smartcard the key

	1 day	1 week	4 week	13 week	Annual	Evening**
Adult	£4.20	£18	£59	£154	£520	£3.70
Child	£2.35	£9.75	£32.50	£79	£290	-
Student	£3.15	£13.50	£44.25	£115.50	£390	-

Crawley Metrorider

Unlimited travel in the Crawley Metrorider area.

* All day travel for up to 5 people (minimum of 1 adult & maximum of 2 adults travelling at any one time.)
** Available from 1800 and valid until 0359 on the following day.
*** For 2 adults, travelling together.

	TYPE OF TRAVEL DOCUMENT	Machine Readable	Human Readable	Note
VISUAL	**Paper**	Barcode, OCR, ShotCode, etc	✓	From machine or conductor
	E-document/pdf	Barcode, OCR, ShotCode, etc	✓	Self print / store on mobile device
	SMS /MMS	Barcode, OCR, ShotCode, etc	✓	
	Card	OCR	✓	e.g. Travel card
E-PASSIVE	**Magstripe**	Contact	✓	Ticket Machine / Counter only
	EMV	Contact, NFC	X	Account Based Ticketing has id but no app
E-ACTIVE	**SmartCard**	Contact, NFC	X	(ABT) Has travel app chip
	Mobile App	NFC, (bluetooth)	✓	ABT Downloadable to smart device

■ "Support both **machine readable** & **human readable** representation of validity parameters (**user types**, *media*, etc) "

➜ Pre & Post Sales conditions

UK BUS Product parameters – Travel Conditions

Condition	Condition	Relevance			Note	USAGE PARAMETER
		Local Trip	Coach Trip	Season Ticket		
TRAVEL HOW	**Right to Interchange**	✓	✓	X	Trips only	INTERCHANGING
	Right to Break Journey	✓	✓	X	Trips only	INTERCHANGING
	Routing Restrictions	X	?	X		ROUTING
	Round Trip	✓	✓	X	Single, Period Return, Day Trip	ROUND TRIP
TRAVEL WHEN	**Usage Validity Period**	✓	✓	✓	See discussion of temporal factors	USAGE VALIDITY PERIOD
	Frequency of Use	X	X	✓	e.g. 2 per day, vs unlimited use vs single use	FREQUENCY
	Minimum Stay	x	?	x	Excursion products only?	MINIMUM STAY
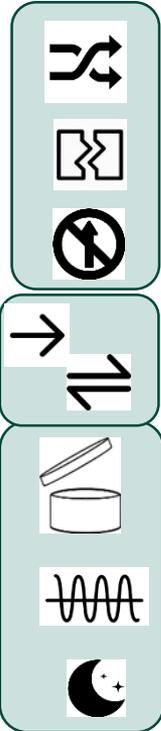
UK BUS Product Parameters – Sales & After-Sales Conditions

Condition	Condition	Relevance			USAGE PARAMETERs
		Local Trip	**Coach Trip**	**Season Ticket**	
Presales	Period in which a ticket can be bought.	?	✓	✓	PURCHASE WINDOW
	Period and conditions for reserving a ticket.	X	✓	X	RESERVING
	Can ticket be given to another to use?	✓	✓	✓	TRANSFERABILITY
After Sales	Can reservation be cancelled?	X	✓	X	CANCELLING
	Can you modify travel times or change journey details?	X	✓	X	EXCHANGING
	Can you get all or some money back?	?	✓	✓	REFUNDING
	Can you get a replacement for a lost ticket?	X	✓	✓	REPLACING
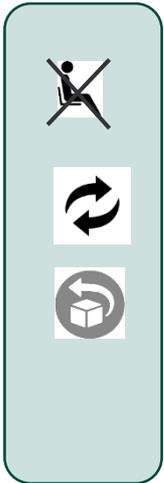
UK BUS Product parameters – Luggage allowances

▶ For bus, Passenger information only? No pricing implications

Condition	LUGgAGE ALLOWANCE	Relevance			Note
		Local Trip	**Coach Trip**	**Season Ticket**	
	Pram	✓	✓	X	Trips only
	Wheelchair	✓	✓	X	Trips only
Suitcase	**Suitcase**	✓	✓	X	Trips only. Might be cahrgable for coach
Animal	**Guide dog**	✓	✓	✓	See discussion of temporal factors
	Pet	X	X	✓	e.g. 2 per day, vs unlimited use

Prerequisites & Dependencies between products

▸ How may products and sales offers depend on each other?
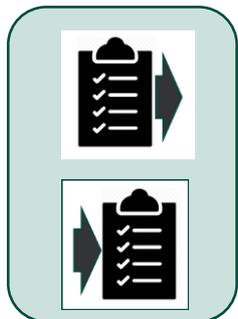
Condition ☑	Note
Entitlement Required	Specifies a prerequisite product
Entitlement Given	Specifies rights to another products

Moving Britain Ahead

■ "Allow the **separate exchange of prices** from fare structures & products "

➔ Fare Prices

Profile Scope - Prices

▶ **What Prices are needed?**

1. **Final Prices** for every parameter combination

1. **Base prices** + **Derivation parameters**
   - PRICING RULE as percentage of another price
   - Need rounding steps and any minimum/maximum limits

2. **Dynamic Prices?**
   - No actual price values are exchanged, instead where to fetch an online price for a given product and choice of options is indicated.

3. **Price Groups?**
   - Where price is common to several elements
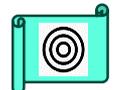
Trade-offs for exchanging prices

More prices, simpler rules to calculate

Fewer prices, more complex rules & parameters to calculate
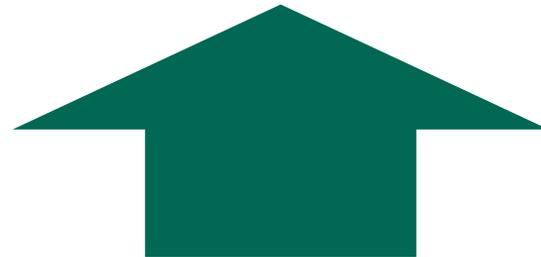
Price dimensions set the Fare Profile scope
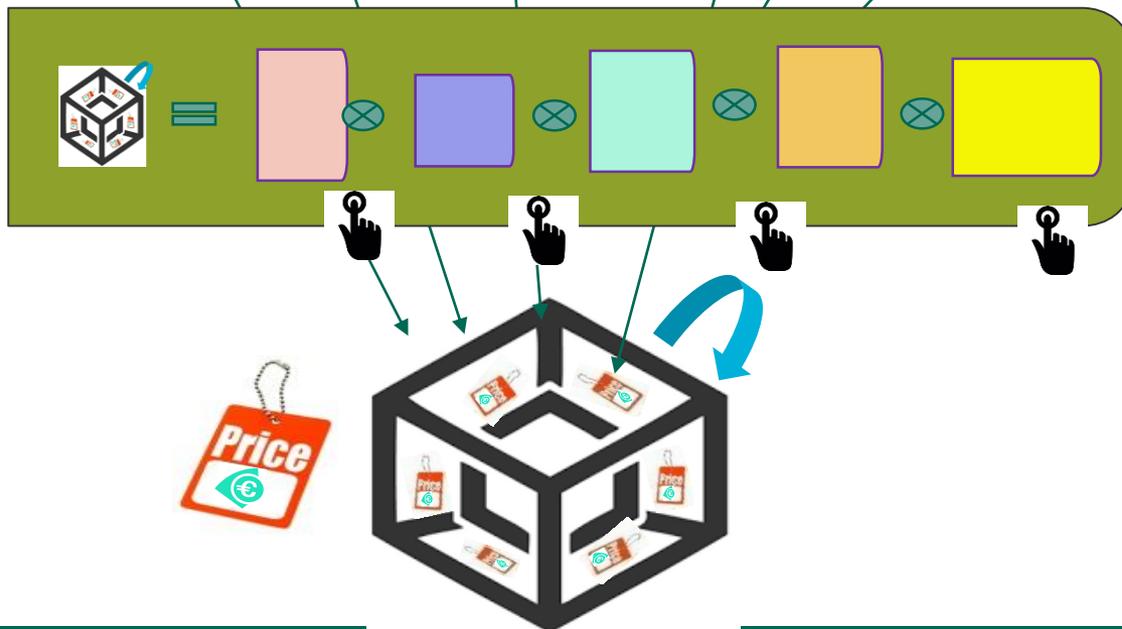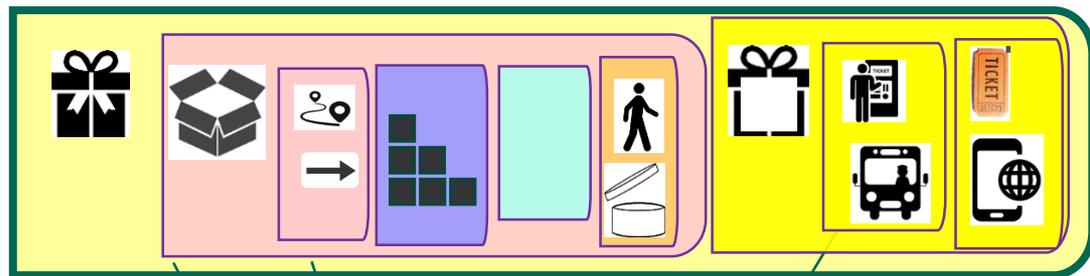
- ▸ Anything which is a price dimension for a UK Bus Fare needs to be represented by a model element in the profile
  - ▪ E.g. O/Ds, zones, user types, channels, media types, etc

- ▸ Anything else is optional –
  - ▪ E.g. rules for ages of a use type such as child or senior
  - ▪ E.g. Locations to buy tickets

Moving Britain Ahead

Pricing Dimensions

Pricing
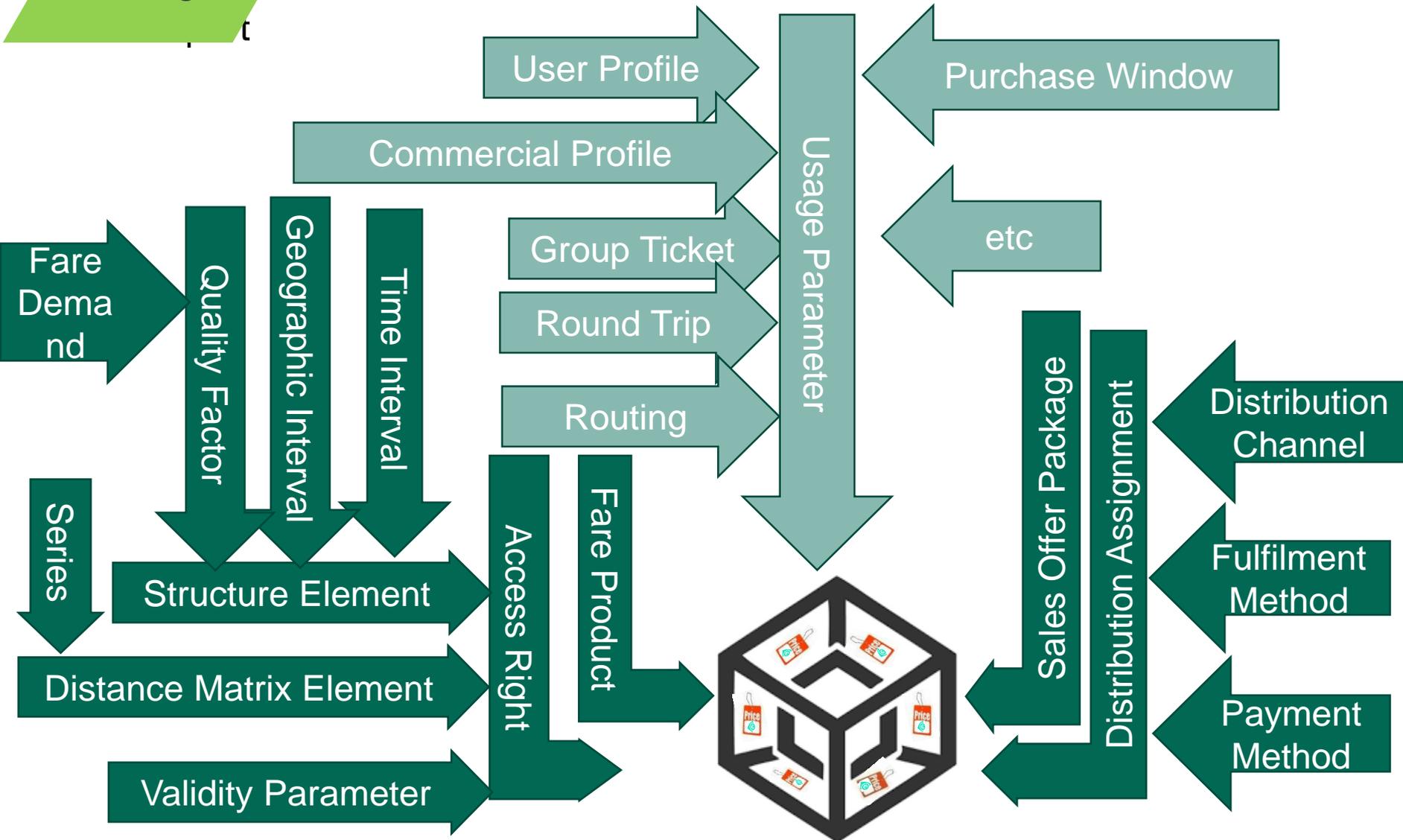
Common Bus Tariff Structures

▶ **Point-to-point Trip**

  ▶ **DISTANCE MATRIX ELEMENTs** x USER PROFILEs x (SALES OFFER PACKAGEs).

  ❑ $(N^2-N)/2.$: 50-1000 stops → 1200- 500,000 OD Pairs

▶ **Stage fare trip**

  ▶ **GEOGRAPHICAL INTERVAL** x USER PROFILEs x (SALES OFFER s).

  ❑ ~1-10 intervals

▶ **Zonal Fare, trip or pass**

  ▶ **FARE ZONEs x TIME INTERVALs** x USER PROFILEs x (SALES OFFER).

  ❑ 3-50 zones

■ Include information about how/where products **can be bought**.

➔ Distribution Channels and Fulfillment methods

Distribution channels

What types of distribution channels (on board, at stop, online, distributor, etc.) do you offer, and how frequently are they used?

Moving Britain Ahead
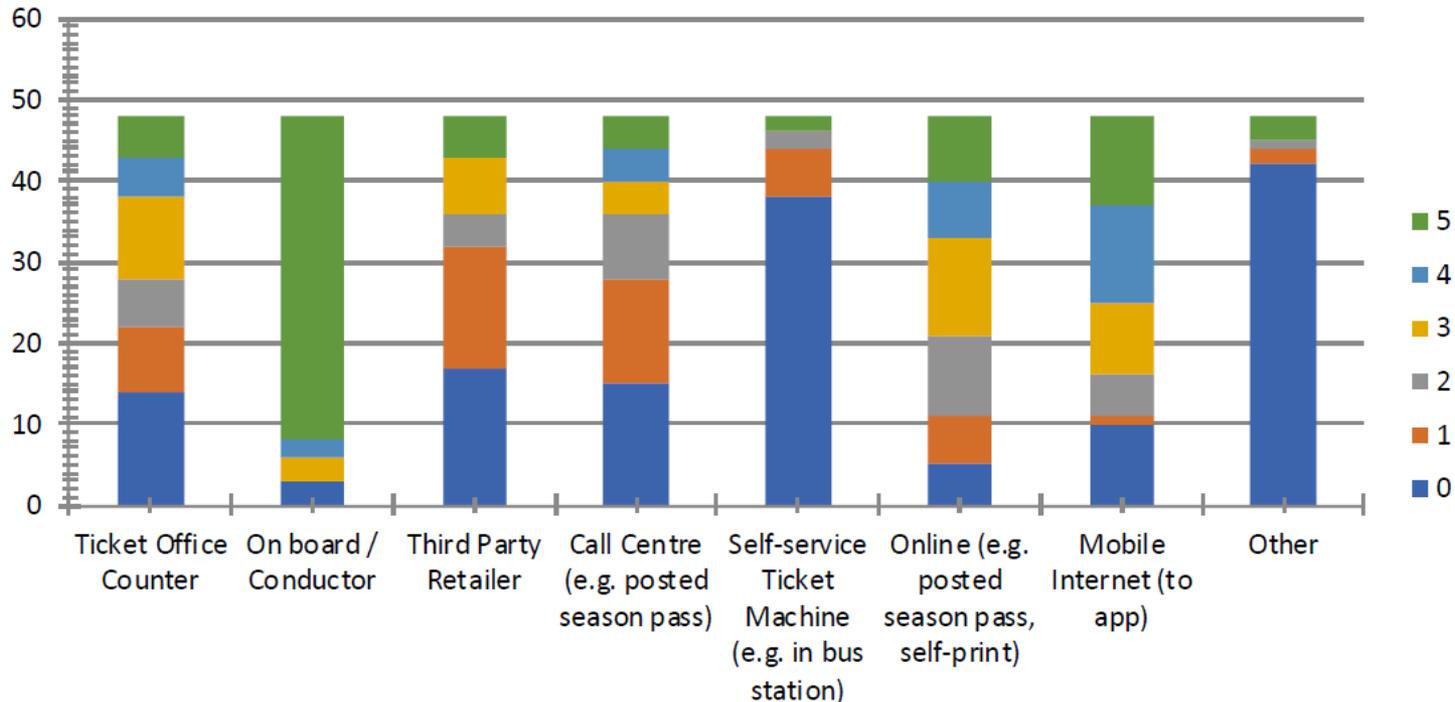
	DISTRIBUTION CHANNEL	Fulfilment	Payment	Charging Moment	Note
Staffed	**Ticket Office Counter**	Immediate (or despatch)	Cash, Card, ePay	Prepaid	All
	On board / Conductor	Immediate	**Cash**, Card, ePay	Prepaid	Trips, day passes
	Retailer	Despatch	Card, ePay, (bank)	Prepaid	
	Call Centre	Despatch	Card, ePay, (bank)	Prepaid	Travel cards, season passes
Self Service	**Ticket Machine**	Immediate	**Cash**, Card, (ePay)	Prepaid	At Stop Also On board
	Online, mobile	Immediate or despatch	Card, ePay	Prepaid	Anywhere
	Electronic	Immediate (or on travel)	Card, ePay	Pre & Post Pay (Pay as you go)	Acquire, top up / purchase etc
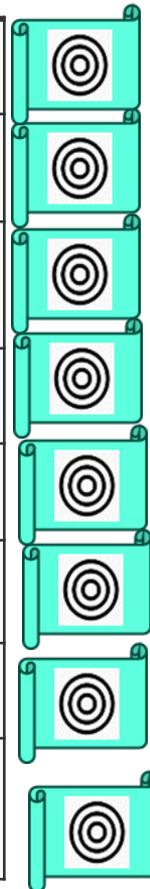
Payment Methods

What types of payment methods do you offer, and how frequently are they used?
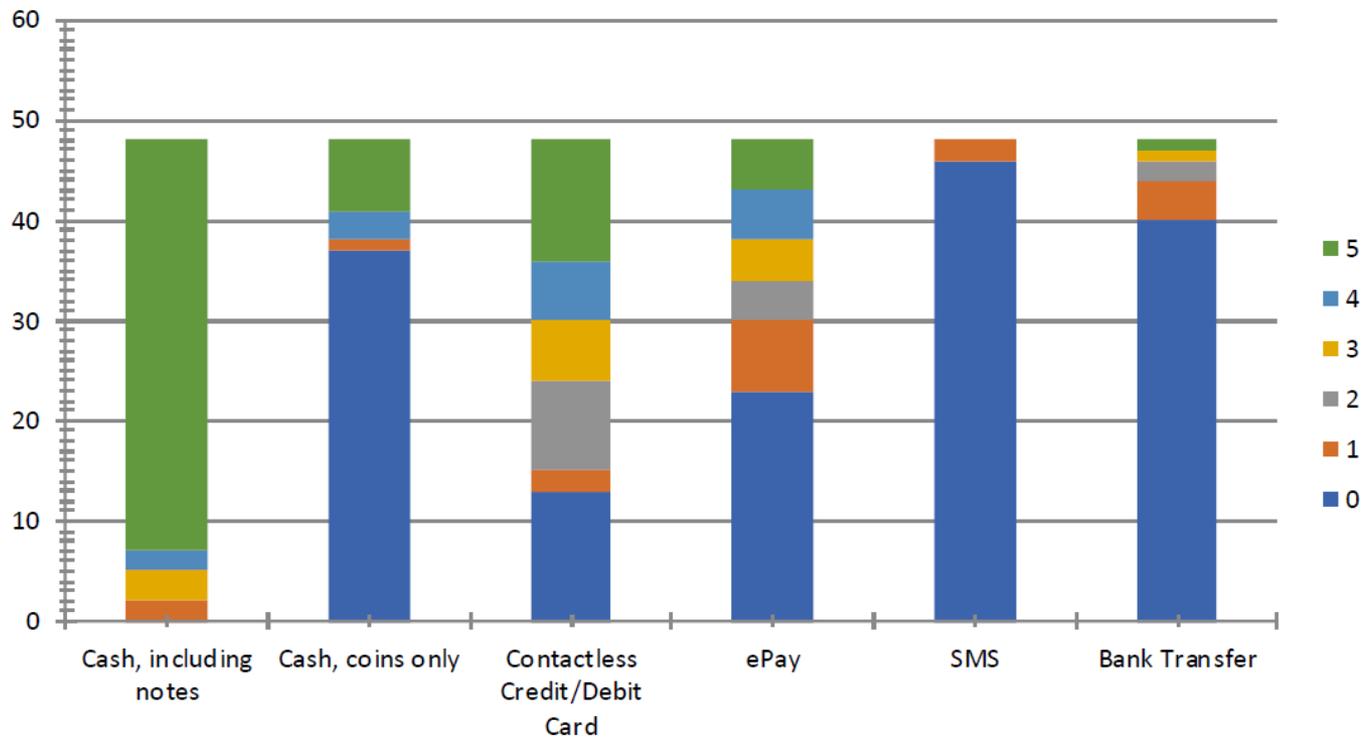
#7.1: UK Bus – Payment Methods

	TYPE OF TRAVEL DOCUMENT	Machine Readable	Human Readable	Note
VISUAL	**Paper**	Barcode, OCR, ShotCode, etc	✓	From machine or conductor
	E-document/pdf	Barcode, OCR, ShotCode, etc	✓	Self print / store on mobile device
	SMS /MMS	Barcode, OCR, ShotCode, etc	✓	
	Card	OCR	✓	e.g. Travel card
E-PASSIVE	**Magstripe**	Contact	✓	Ticket Machine / Counter only
	EMV	Contact, NFC	X	Account Based Ticketing has id but no app
E-ACTIVE	**SmartCard**	Contact, NFC	X	(ABT) Has travel app chip
	Mobile App	NFC, (bluetooth)	✓	ABT Downloadable to smart device

Bus – Offer: Fulfilment Methods

Type of method	FULFILMENT METHOD	Note
COLLECT	Collect from driver or conductor	Basic products
	Collect at counter	E.g. for Season passes,
	Collect at Machine	Not all products
	Collect at shop	Basic products
REMOTE DOWNLOAD	Download to device	App or pdf eticket
	Self print	Self print to paper – Coach only?
	email	Online & call centre purchases
	SMS	Online purchases
DESPATCH	Post	E.g. For Season Passes
	Courier	E.g. Online - Extra fee

Moving Britain Ahead

- Allow the same products to be offered in different ways

➔ Product vs Sales offer

Department for Transport

FARE PRODUCT
Season Pass

TYPEs OF TRAVEL DOCUMENTs
paper, app, smartcard

SALES PACKAGEs
"cash, m-ticket, the key"

TIME INTERVALs
(1day, 1 week, Evening, 1 month, Annual, etc)
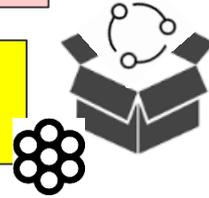
FARE ZONEs
(Horsham, Crawley, Redhill, All)

FARE PRICEs

bought on bus with **cash**

stored on your mobile phone as **m-tickets**

loaded onto our smartcard **the key**

Multi Trip single journeys grouped onto the key to use one at a time

Crawley Metrorider

Unlimited travel in the Crawley Metrorider area.

* All day travel for up to 5 people (minimum of 1 adult & maximum of 2 adults travelling at any one time.)
** Available from 1800 and valid until 0359 on the following day.
*** For 2 adults, travelling together.

	1 day	1 week	Evening	60 minute	1 day	2 day	3 day	1 week	4 week	Duo	1 day	1 week	4 week	13 week	Annual		5 journeys	10 journeys	25 journeys
Adult	£4.90	£20	£4	£2.20	£4.20	£7.90	£11.50	£18	£59	£7.90	£3.70	£4.20	£18	£59	£154	£520	£3.70	£11	£21	£50
Child	£2.70	£11	-	£1.10	£2.35	£4.45	£6.45	£9.75	£32.50			£2.35	£9.75	£32.50	£79	£290		£5.50	£10.50	£25
Student	-	-	-	-	-	-	-	-	-			£3.15	£13.50	£44.25	£115.50	£390		-	-	-
Family*	£9				£9															

Horsham Metrorider

Unlimited travel in the Horsham Metrorider area.

Consecutive days.
* All day travel for up to 5 people (minimum of 1 adult & maximum of 2 adults travelling at any one time.)
*** For 2 adults, travelling together.

	1 day	1 week	60 minute	1 day	2 day#	3 day#	1 week	4 week	Duo	1 day	1 week	4 week	13 week	Annual	5 journeys	10 journeys	25 journeys
Adult	£4.90	£20	£2.20	£4.20	£7.90	£11.50	£18	£59	£7.90	£4.20	£18	£59	£154	£520	£11	£21	£50
Child	£2.70	£11	£1.10	£2.35	£4.45	£6.45	£9.75	£32.50	-	£2.35	£9.75	£32.50	£79	£290	£5.50	£10.50	£25
Student	-	-	-	-	-	-	-	-		£3.15	£13.50	£44.25	£115.50	£390	-	-	-
Family*	£9			£9													

Redhill & Reigate Metrorider

Unlimited travel in the Redhill & Reigate Metrorider area.

Consecutive days.
c Surrey Student card holders can purchase Child rate tickets for cash on the bus, or students can purchase a Child Metrovoyager (on the key only) for longer validity tickets. **See below** for prices.
* All day travel for up to 5 people (minimum of 1 adult & maximum of 2 adults travelling at any one time.)
*** For 2 adults, travelling together.

	1 day	1 week	60 minute	1 day	2 day#	3 day#	1 week	4 week	Duo	1 day	1 week	4 week	13 week	Annual	5 journeys	10 journeys	25 journeys
Adult	£4.90	£20	£2.20	£4.20	£7.90	£11.50	£18	£59	£7.90	£4.20	£18	£59	£154	£520	£11	£21	£50
Child	£2.70c	£11c	£1.10	£2.35	£4.45	£6.45	£9.75	£32.50	-	£2.35	£9.75	£32.50	£79	£290	£5.50	£10.50	£25
Family*	£9	-	-	£9													

cash　　**m-tickets**　　**key**

Metrovoyager

This ticket bought on the bus gives you unlimited travel on all of our services across our entire network, including both the Crawley, Horsham, and Redhill & Reigate areas. Also valid on all Brighton & Hove bus services.

Consecutive days.
* All day travel for up to 5 people (minimum of 1 adult & maximum of 2 adults travelling at any one time.)

	1 day	1 week	1 day	2 day#	3 day#	1 week	4 week	1 day	1 week	4 week	13 week	Annual
Adult	£7.40	£26	£6.70	£12.50	£18.20	£24	£85	£6.70	£24	£85	£250	£870
Child	£4.20	£16.50	£3.80	£6.90	£10.10	£15.75	£52	£3.80	£15.75	£52	£153	£610
Student	-	-	-	-	-	-	-	£5.05	£18	£63.75	£187.50	£652.50
Family*	£12.50	-	£12.50									

Multi Trip is available in the separate Metrorider areas only.

For further fares information including Gatwick Travelcard on the key, and the Haywards Heath Day Saver, and Burgess Hill Day Saver, please see the fares page on our website.

NeTEx
Network Timetable Exchange

METROBUS
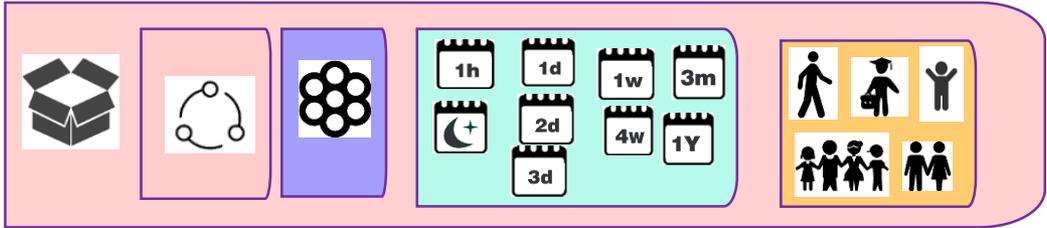
FARE PRODUCTs

Period Pass Product

SALES OFFER PACKAGEs

Paper "Cash Ticket"

Mobile App (*m-ticket*)

Smartcard(*the-key*)
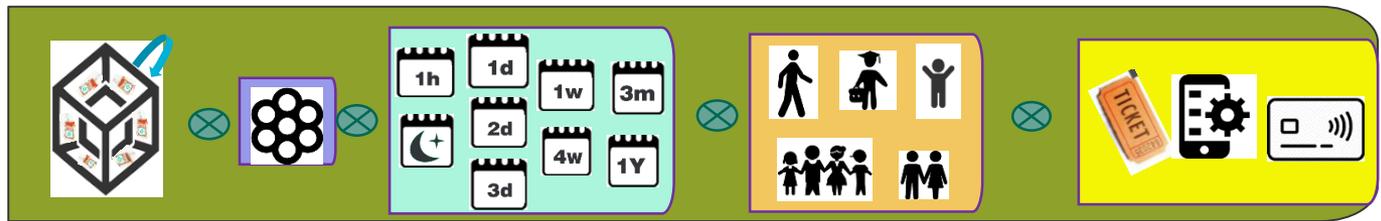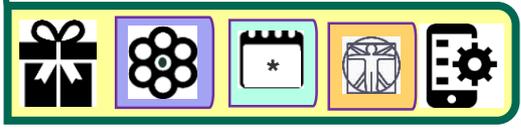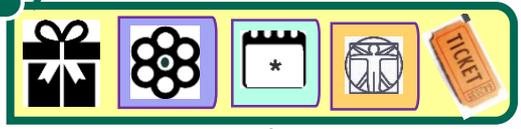
PRICE TABLE

Example – Period Pass Product: Cash Ticket

GROUP OF SALES OFFER PACKAGEs

FARE PRODUCTs

FARE STRUCTURE ELEMENTs

USAGE PARAMETERs

DISTRIBUTION ASSIGNMENT

FARE PRICEs

Zonal Pass: Cash Ticket

METROBUS

SALES OFFER PACKAGEs

Pass: Crawley — Cash Ticket — Metrorider (Crawley)

Pass: Horsham — Cash Ticket — Metrorider (Horsham)

Pass: Redhill — Cash Ticket — Metrorider (Redhill)

Pass: All Zones — Cash Ticket — Metro Voyager
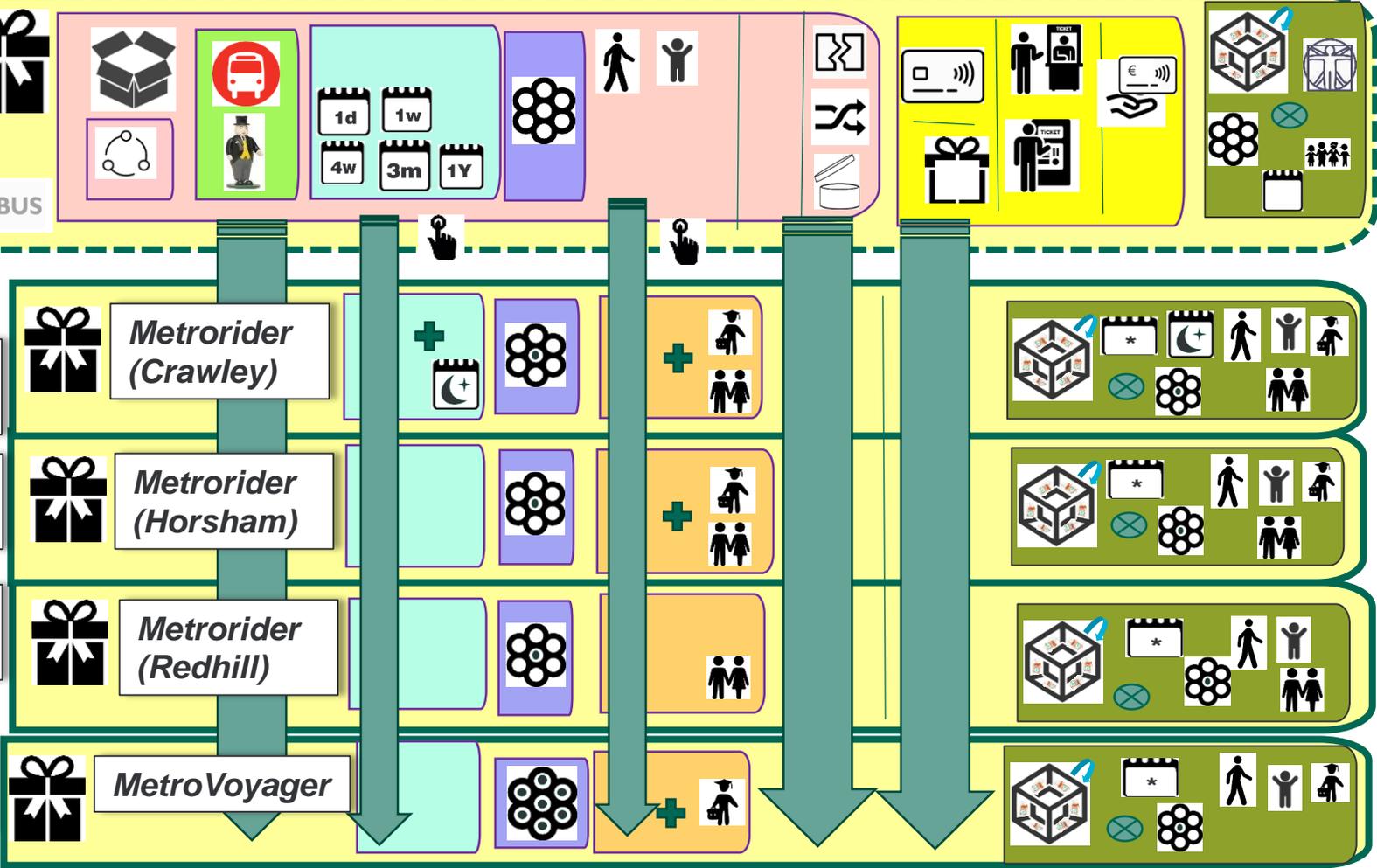
UK Profile General Issues

#8.1 : Data Identifiers

▶ **Persistent Unique Identifiers for all components**
  ▪ Allow for distributed allocation of ids by Operator.
  ▪ Operator defines namespace as W3C URI
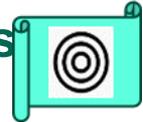
▶ **Use existing where available**
  ▶ Topographic localities
    ▪ NPTG
  ▶ Stops
    NaPTAN,
  ▶ Tariff Zones / Fare Stages
    ▪ PlusBus : (NPTG Already has)
    ▪ Operator Defined Zones : Within NOC?
   ▪ Local Authority Defined Zones : Within NPTG Admin code?
  ▶ Operators
    ▪ NOC: Clarify process etc

▶ **Most components must be unique within Operator:**
  ▶ Lines, Timetables/Services, Tariffs, etc

#8.3 : Data Management
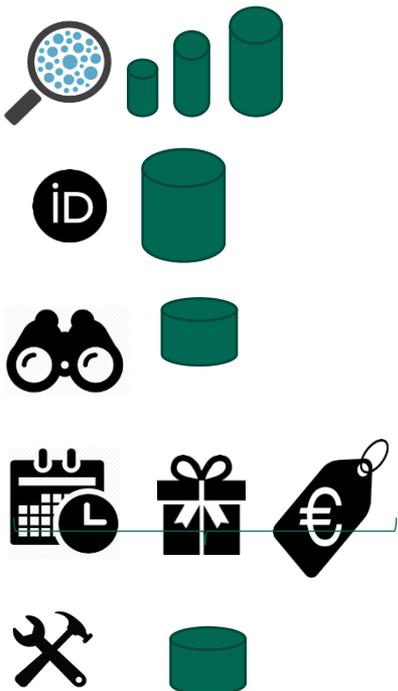
▸ Granularity
  ▸ Service, Line, Operator, Region, etc
  ▸ Common Tariff Zones, Products, Prices

▸ Allocating systematic File names?
  ▸ E.g. Operator_Service_Line_ StartValidityDate….

▸ Discovery Processes?
  ▸ Active registration / Passive Indexing

▸ Synchronising Timetable & Tariff updates
  ▸ Prerequisite versions

▸ Validation tools
  ▸ Schema,
 ▸ Additional Program?, Fare "publisher"? +

▸ Etc
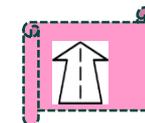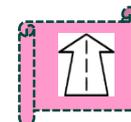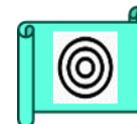
Granularity
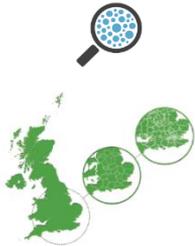
Type Of Composite Frame	Stops	Timetables	Fares
Stop Offer	Stops for Area		Stops & Tariff Zones for Area
Line_Offer	Stops for Line	Timetable for Line	Fares for Line
Network_Offer	Stops for Network	(Timetables for Network)	Fares for Network

Example file names:
FX-PI-01_UK_METR_LINE-FARE _L01_20160302.xml
FX-PI-01_UK_FEBR_NETWORK-FARE_WOE-060+086+110_20230909.xml
FX-PI-01_UK_DFT_STOP-FARE_NPTG-Plusbus-UK_20150705.xml
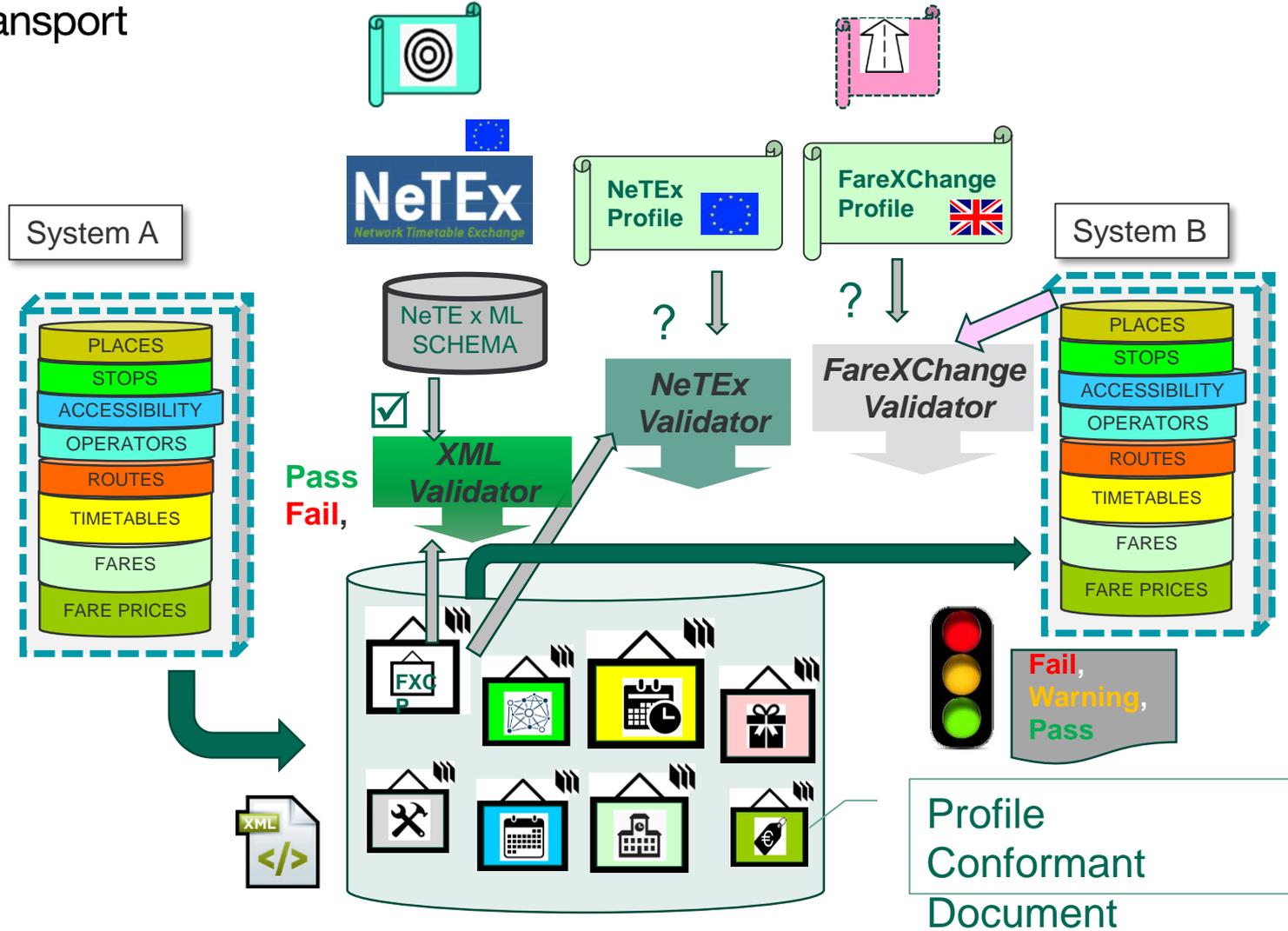
Validation

- **Validation Mechanisms**
  - Schema integrity rules

  - Code lists: UK official code sets

  - Additional business rules, applied by a validator program "NeTEx Publisher"?
- **How do we check all of the above are met?**
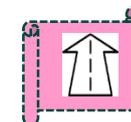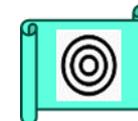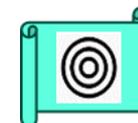
Summary

COMPONENT BASED FARES
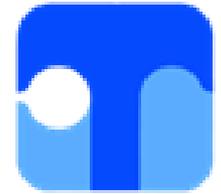
We can describe any fare / tariff structure/ price if we break it down into separate concerns:

▸ TARIFF STRUCTUREs
  - Spatial (Point to Point, Zone)
  - Temporal (Intervals)

▸ ACCESS RIGHTS
  - Tariff, Mode, Class of Use, Service, etc

▸ PRODUCTs
  - Parameters, *User Types, Travel, After Sales,* etc

▸ SALES OFFER PACKAGEs
  - Type of Ticket, Media, Distribution,

▸ PRICEs
  - Base & Derived

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Component Based Fares

Network **+** TARIFF + FARE STRUCTURE ELEMENTs **+** *Access Rights* / VALIDABLE ELEMENT **+** FARE PRODUCTs **×** SALES OFFER PACKAGEs

FARE PRICEs **×**

TRAVEL SPECIFI-CATION
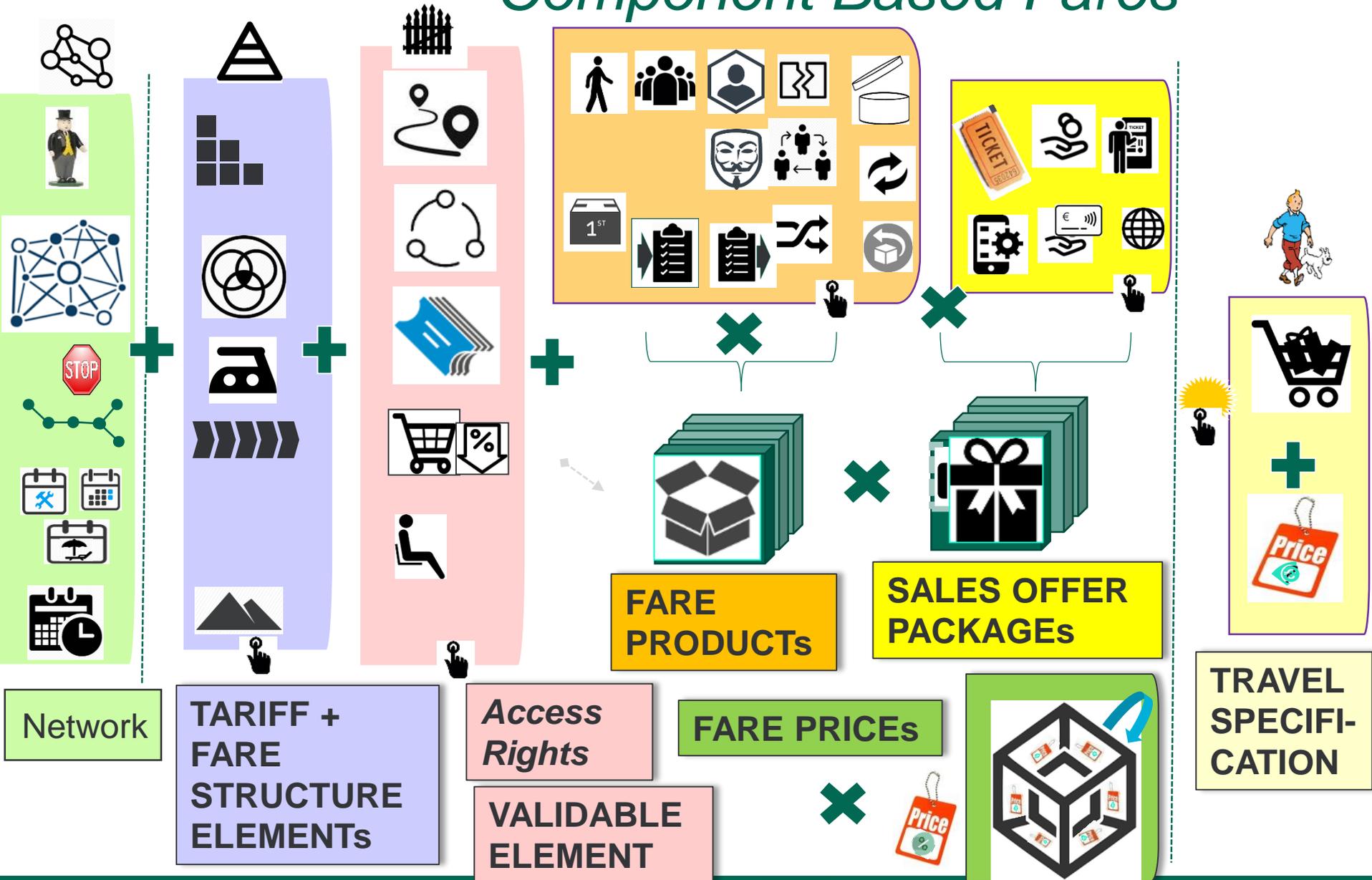
Key Points: Fares are complex, but not that complex!

▸ **We can represent any fare using a set of reusable components**

- Tariffs can be related to the network using the concept of "Access Rights"

▸ **For UK basic Bus fares there are four main Tariff Structures**

- (a) **P2P / Z2Z**, (b) **Zonal**, (c) **Stage / Section,** (d) **Flat**

- We reference Stops, Zones and fare stages to define thess

▸ **For UK basic Bus fares there are two fundamental product groups**

- (a) **Trip**, (b) **Period Pass** (Day, Week, Season etc)

▸ **For UK basic Bus fares there are a limited number of other parameters needed, many of which can be restricted**

- E.g. User Types, Group Tickets, Validity Periods, etc.

- E.g. Type of Travel Document, Distribution Channels, Payment Methods, etc.

Describing Fares with NeTEx

Pricing

Prices attached to elements
Pricing rules
Adult flexible single costs £30
Child = 50% Adult price

Fulfilment & Payment
Control & Validation
Billing & Clearing

Network Basis

Tariff Structure

Access Rights

Fare Products

Sales Offer Packages

Travel Specification

Network
- stops, tariff zones, line, operator
- *Zone 1 contains 8 stops….,Line 1 runs…*

Fare policy / tariff structure:
- space-, time-based…access rights
- *P2p fare, Stage fare, Flat fare*

Rights to access & consume services:
- scope and order of use
- validity and usage rules
- *bus trip stop X to stop Y, metro trip 3 zones*

Marketable combinations of access rights
- validity & usage limiting parameters
- & charging moments
- *off peak metro trip 3 zones followed by bus trip 2 zones ,no interchange, Child reduction*

Sales Offer Description:
- media & travel document types
- distribution channels & contracts
- *Paper ticket at ATM, carnet of 10, smartcard*

Travel Specification
- Specific set of choices to purchase
- *Adult single A to B on a smartcard*

Describing Fares with NeTEx

Common Framework

Pricing

Network Basis

Tariff Structure

Access Rights

Fare Products

Sales Offer Packages

Travel Specifications & Sales
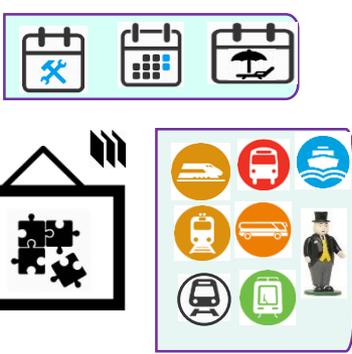
A Fare Product is a <u>set</u> of options

▶ A single FARE PRODUCT may includes <u>all</u> the alternate choices (with different prices for the combinations):

- *E.g. All permitted Origin & Destination pairs*

- *E.g. Single or Return trip*

- *E.g. 1st & 2nd Class accommodation*

- *E.g. Adult & Child & Student users*

- *E.g. Valid for a period: for 7 or 30, 180 days*

- *E.g. One, or many travellers*

- *E.g. Refundable / Not Refundable*

- *E.g. With Luggage allowance*