Department for Transport

traveline

Transmodel, NeTEx & UK Transport data

London 13th May, , 2019

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What is NeTEx?

- **A CEN standard format for the exchange of PT data for Passenger Information**
  - Networks, Timetables, Fares
- **Based on CEN Transmodel conceptual model for PT data** (NeTEx is a subset)
  - Concepts evolved over 20 years from real PT systems across Europe. (Now on Version 6.0)
  - Now mandated for widespread EU use
- **Uses a modular XML schema**
  - Model driven design from conceptual model in UML
  - Free to use under a GPL License

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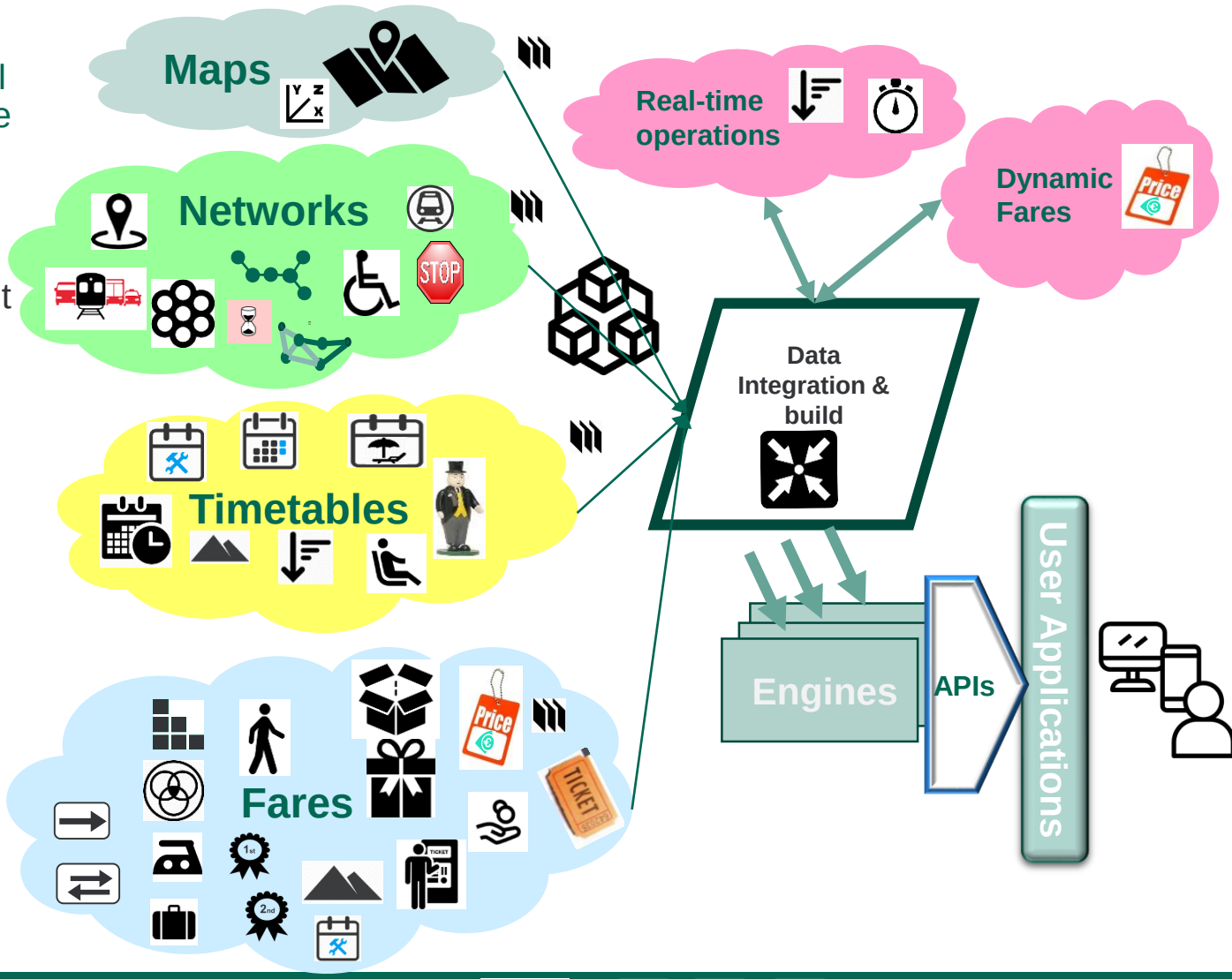
Why? - Integrating data for Passenger Information services

- In order to create useful information services, we need to integrate data
  - of many different types…
  - from many different providers…
  - that changes constantly – some of it in real-time
- This needs to be done
  - **Precisely**…
  - **Repeatedly**..
  - **Cheaply**…
  - **Scaleably**



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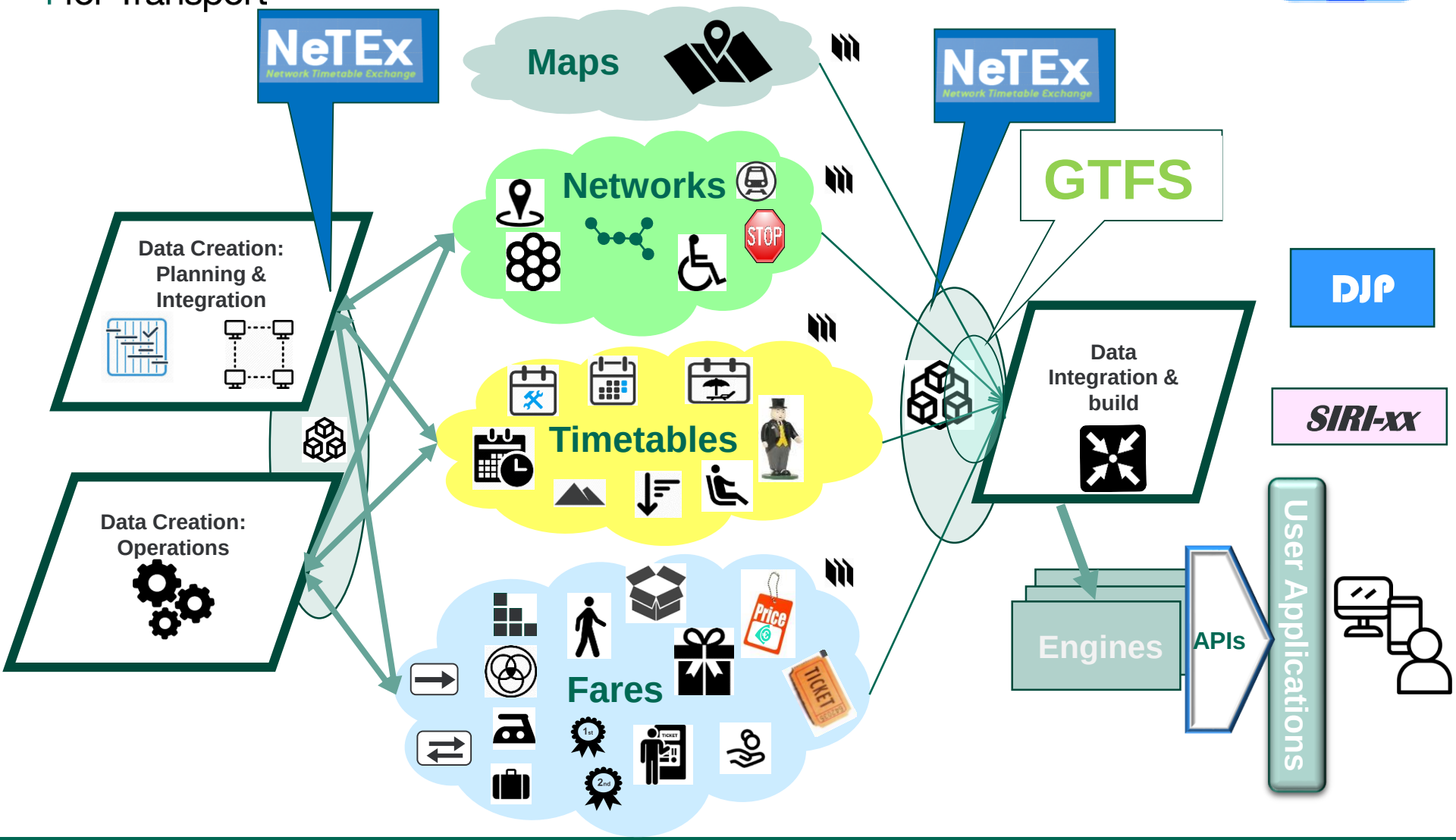
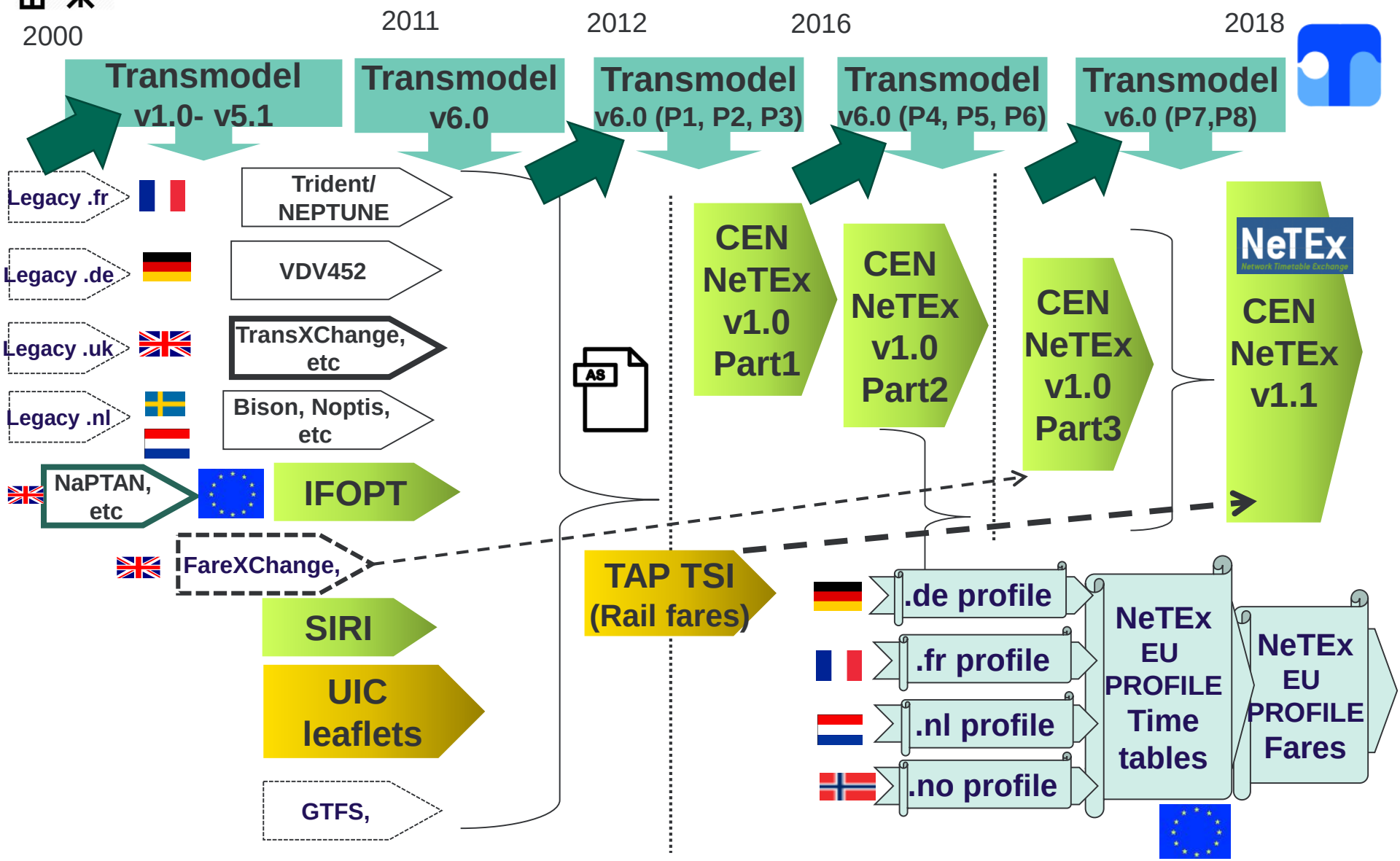
Upstream vs Downstream
(NB GTFS & NeTEx are complementary!)



NeTEx – Evolution from National Standards

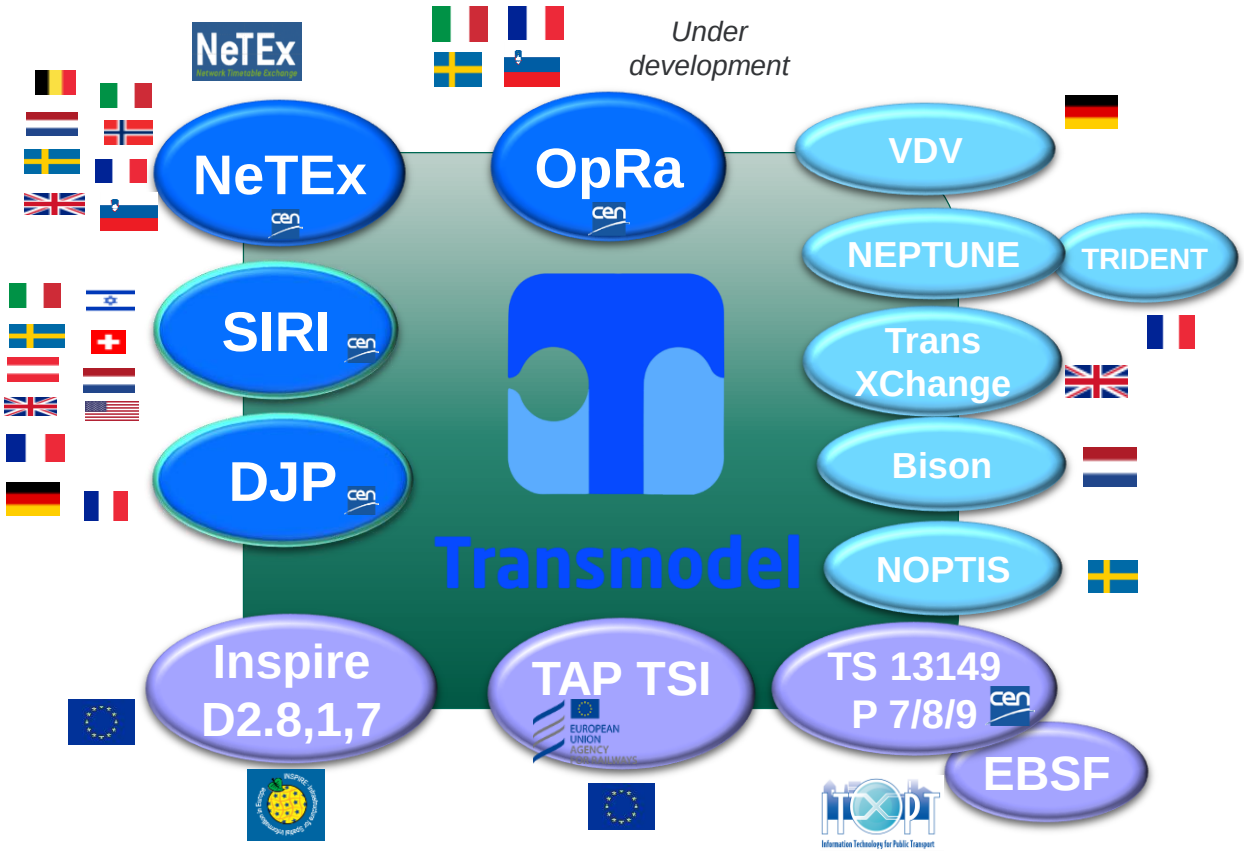


Coherent standards give Interoperability - The “Transmodel ecosystem”

- Complementary formats & protocols:
  - Bulk exchange of static data (NeTEx)
  - Dynamic APIs for data (SIRI, DJP)
- Flexibility: adaptations to local needs
  - National Standards & profiles
- Coherent “Bridges” to standards for other domains

  GIS – eg Inspire

  Road – Eg DATEx



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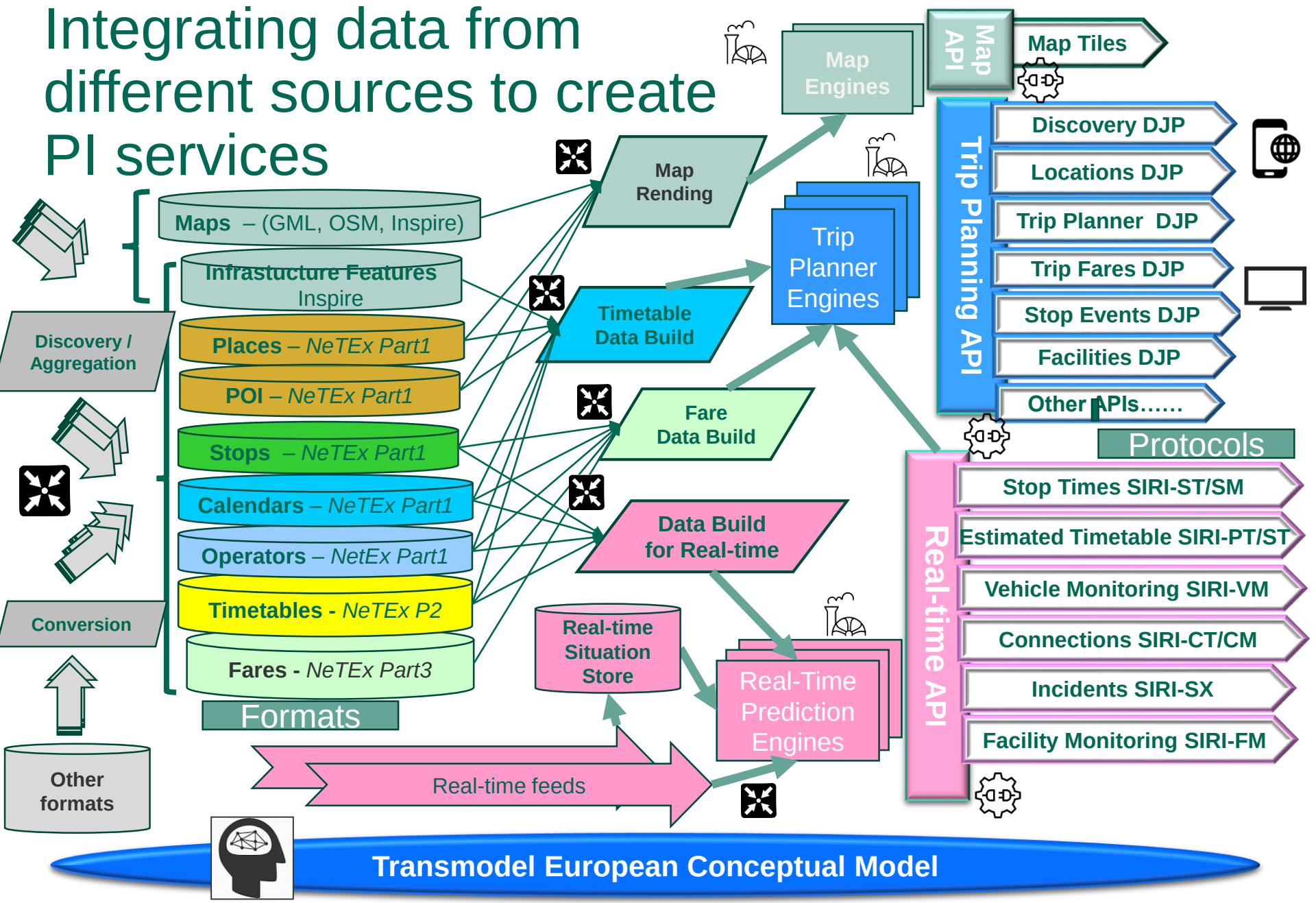
Transmodel as a unifying tool

- Transmodel gives us a conceptual too for comparing, integrating, harmonising and evolving PT data standards

Transmodel

Integrating data from different sources to create PI services



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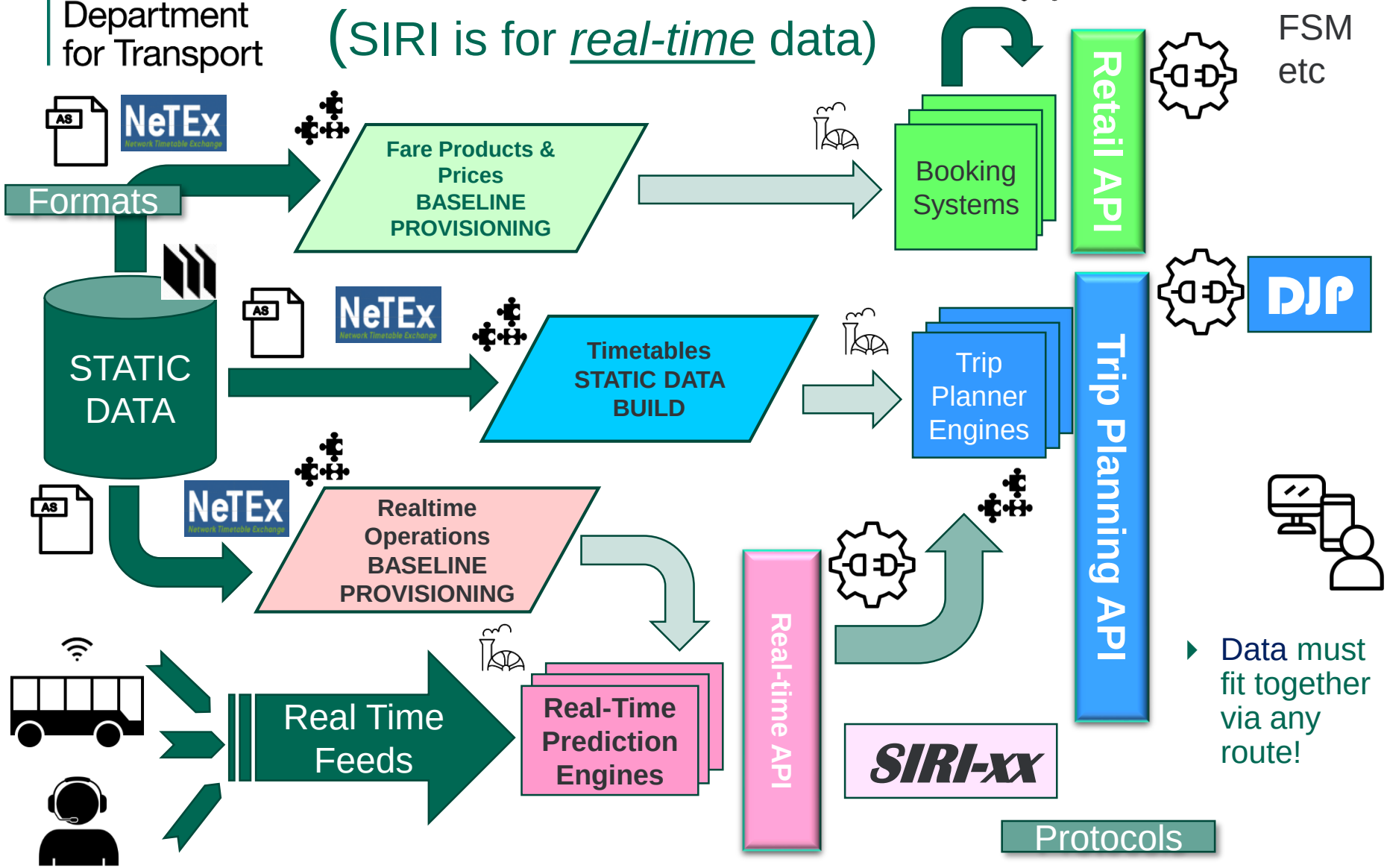
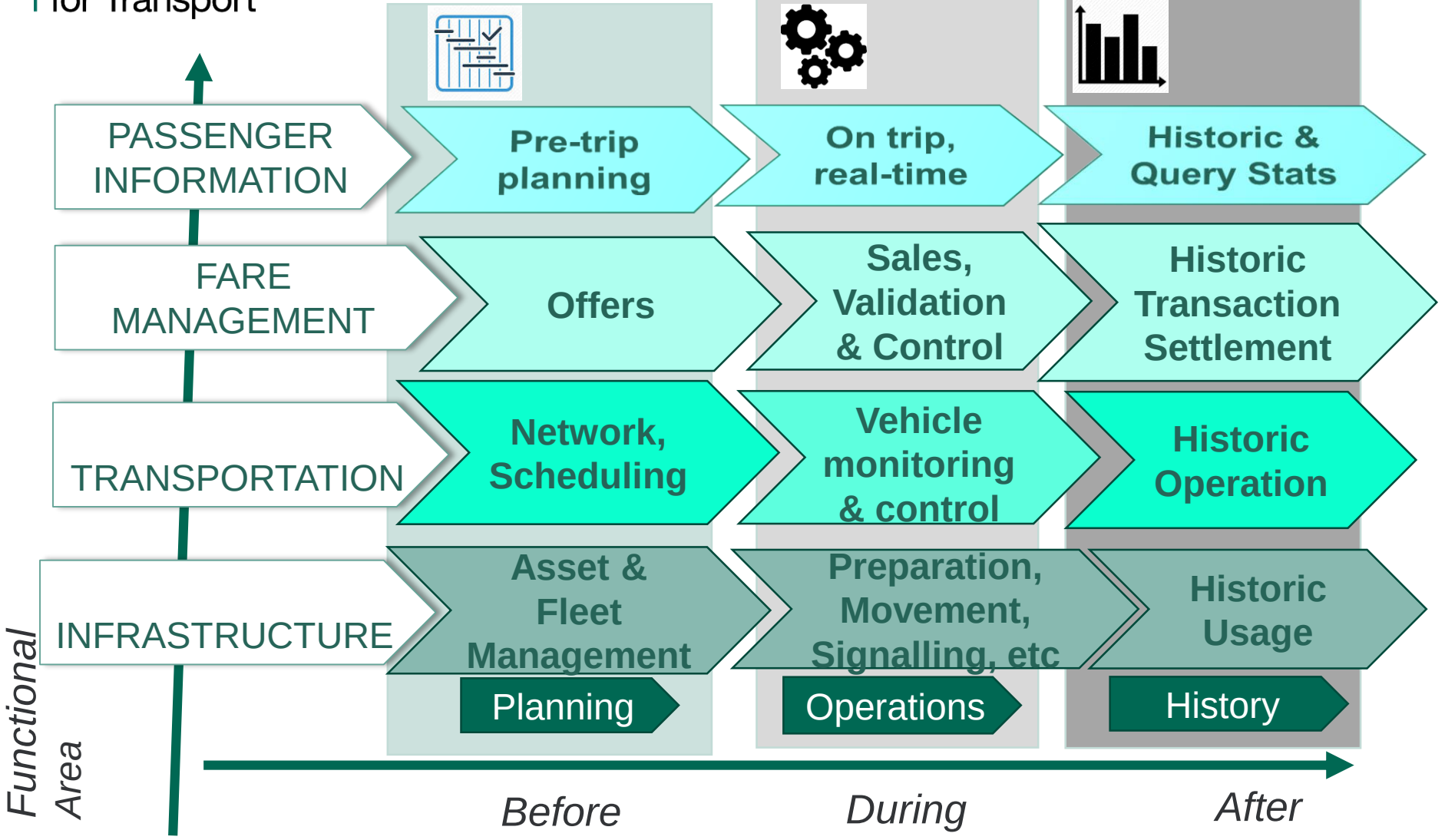
NeTEx is for *static* data

(SIRI is for *real-time* data)

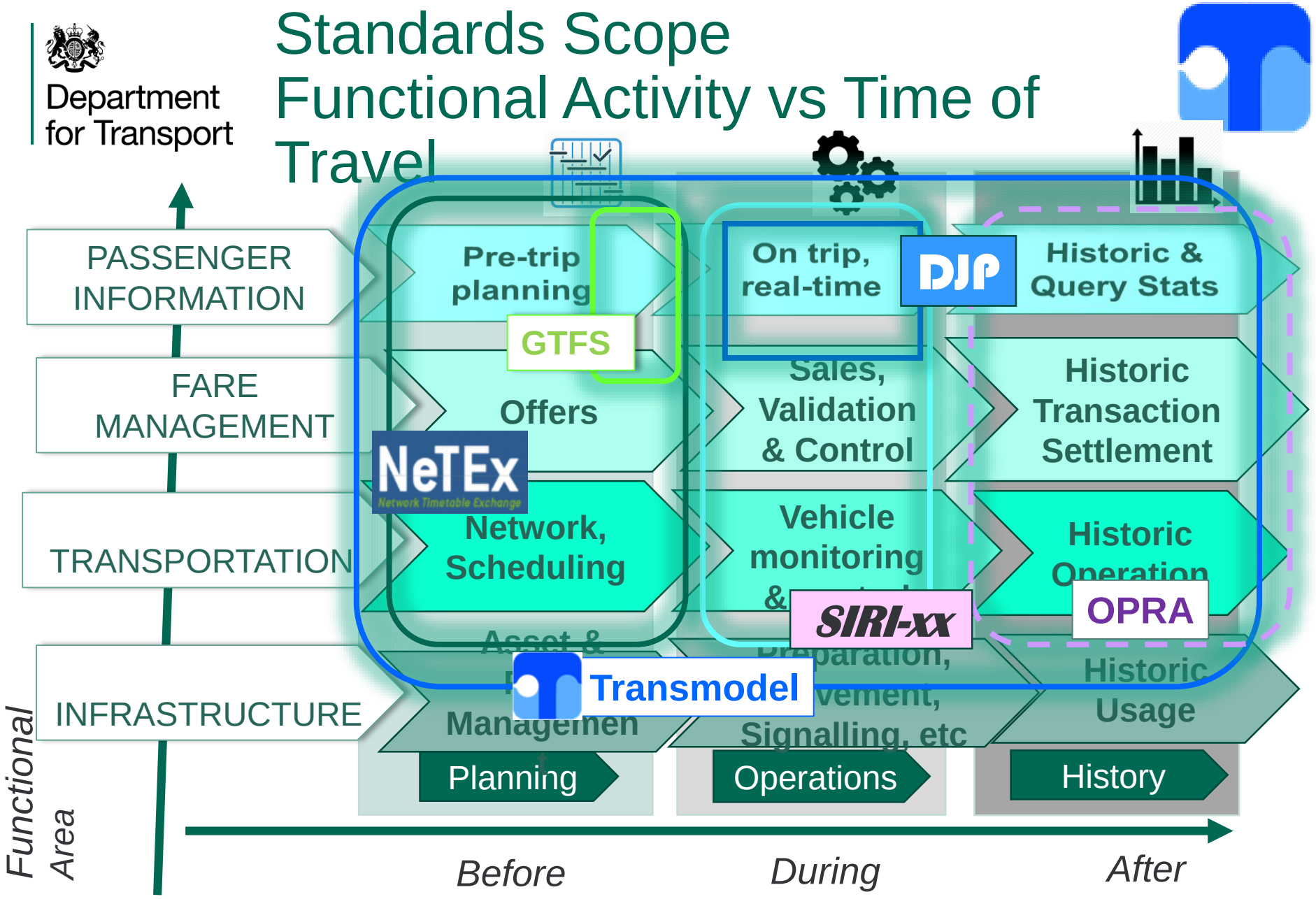


- Data must fit together via any route!

Public Transport data - Functional Activity *vs* Time of Travel



Standards Scope
Functional Activity vs Time of Travel



NeTEx Profiles

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NeTEx Network Timetable Exchange

CEN Transmodel
A high level Conceptual Model for PT data:
implementation independent

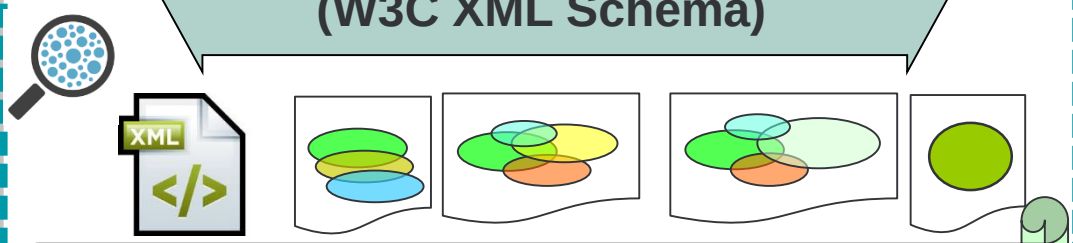
System A

- PLACES
- STOPS
- ACCESSIBILITY
- OPERATORS
- ROUTES
- TIMETABLES
- FARES
- FARE PRICES

NaPTAN, NPTG, TXC

NeTEx CEN NeTEx

An Exchange Format for PT data:
a concrete implementation
(W3C XML Schema)



NeTEx Profile:

Local agreement for using NeTEx in a national or international context

for a specific business purpose

System B

- PLACES
- STOPS
- ACCESSIBILITY
- OPERATORS
- ROUTES
- TIMETABLES
- FARES
- FARE PRICES

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Aspects of a NeTEx Profile

NeTEx Network Timetable Exchange

- **Profile - Scope?**
  - Relevant subset of NeTEx data elements for specific local business requirements.
  - Mapping of legacy data elements to NeTEx.
- **Profile - Local Technical Details?**
  - Use of identifiers & codespaces.
  - Use of coordinate systems (O/S, WGS85..), Time zones, etc.
- **Profile - Use in National Context**
  - Granularity of NeTEx data files
  - Participants & Workflow of data exchange
  - Validation & Verification processes
- **Profile Management**
  - Stakeholders?
  - Governance processes for future evolution

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CEN Standardisation

- Open review and voting process
  - Need 5 countries to create a new Work Item

- Multi-country review organised through National Standards Bodies
  - British Standards Institute + Mirror bodies (e.g., PTIC)
  - **BREXIT: "The British Standards Institution (BSI) will still be a voting member of CEN, like other European Free Trade Association (EFTA) members, and there is no suggestion this will change".**

- Attention to existing Standards
  - Where available, reuse

- Lifecycle management
  - Standards must be completed and reviewed to set timescales

- Different tracks for new / mature areas:
  - Technical Specification➔ Full Specification

Standards Governance
CEN 278 WG3 - Subgroups for PT Info

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CEN / TC278 / WG 3
Public Transport
Plenary Chair:

SG1
Data Communication on Vehicles

SG 3
Passenger Information

SG 4
Datamodel – Transmodel

SG 5
Interoperable Fare Management

SG 6
Identification of fixed Objects in PT

SG 7
Service Interface for Real Time Information

SG 8
Distributed Journey Planning

SG 9

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NeTEx Deliverables & IPR

NeTEx Network Timetable Exchange

- CEN specification documents (Modular)
  - P1: *Network*, P2: *Timetables*, P3: *Fares*
  - Available from BSI £ Buy, Copyright CEN
- UML Models (Modular). £ Free, GPL
  - Conceptual, Physical
- NeTEx XML schema (Modular). £ Free, GPL
  - Uniform grouping & versioning mechanisms to support large scale integration
- XML Examples (Modular). £ Free, GPL
  - By Topic and Subject
- Website, white papers. £ Free, GPL
  - http://netex-cen.eu/

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UK NeTEx Deliverables & IPR

- UK Profile(s)
  - Basic Timetable, Basic Fares:
  - *Additional Fares*
  - *Full Timetable,*
- UML Models of Profile. £ Free, GPL
  - Conceptual, Physical
- XML Examples (Modular). £ Free, GPL
  - Fares

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Key Strategic Issues

- Keeping a UK presence in the relevant TC 278 WGs
  - WG3 SG4 – Transmodel (Also SG6 IFOPT)
  - WG3 SG9 – NeTEx
  - WG3 SG7 – Siri (Tim Rivett)
- Participation in NeTEx support program PT.

- Building UK IT/PT skills in NeTEx

- Developing a joined up strategy for UK open PT data with key stakeholders
  - Operators, Authorities, traveline, DFT, etc, data consumers

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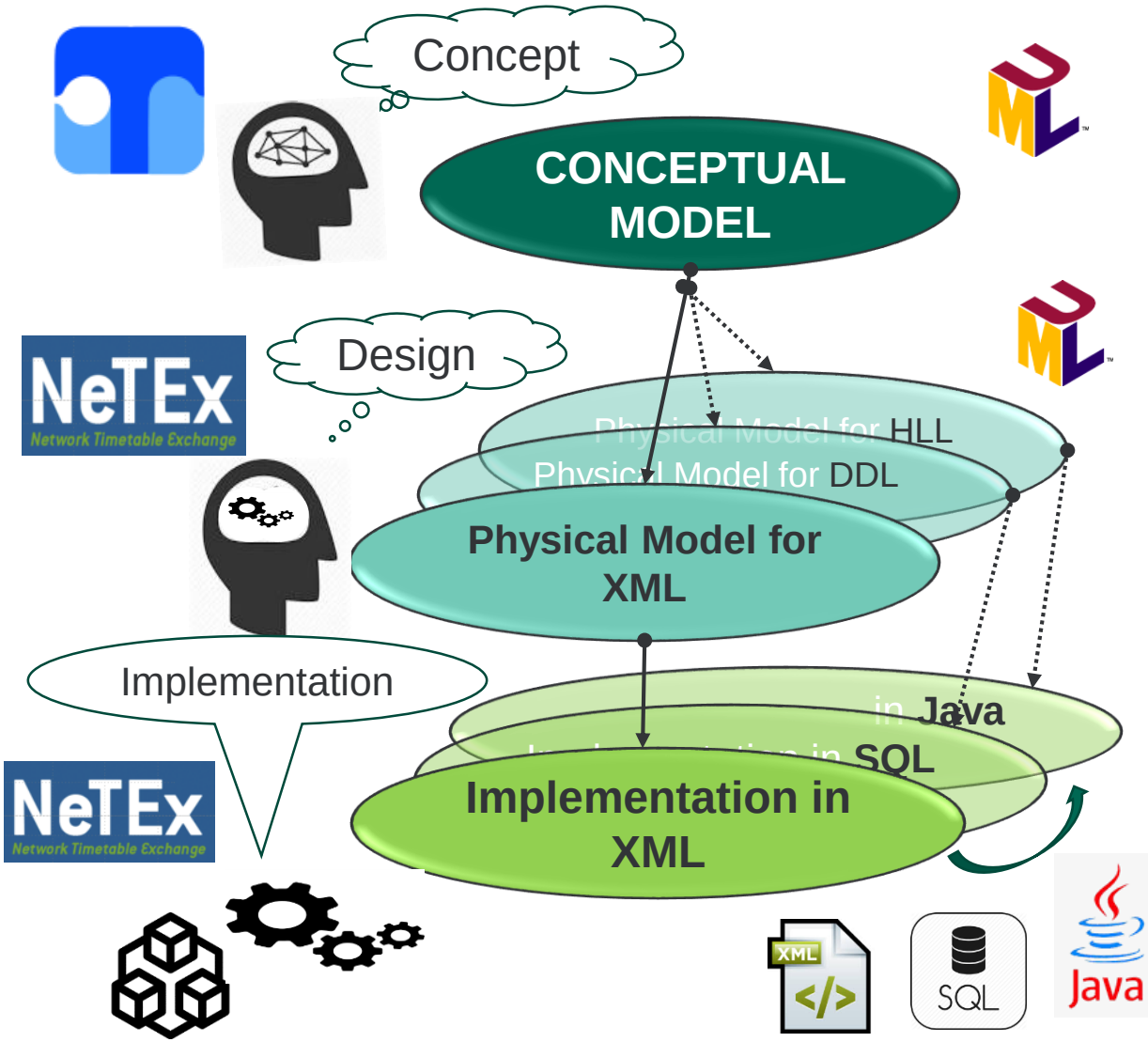
The Transmodel / NeTEx approach

Model Driven Design

Software engineering for robust standards

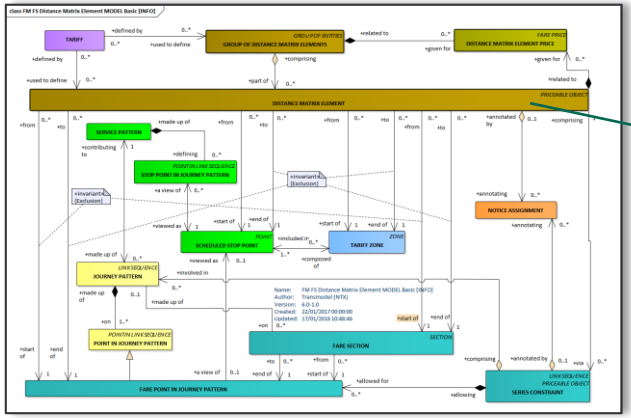
MODEL DRIVEN DESIGN

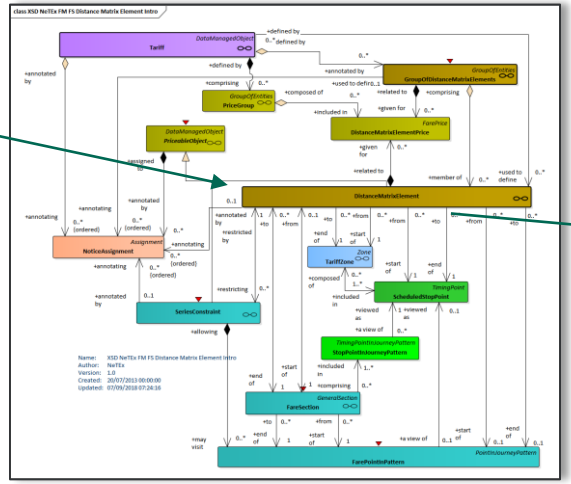
- **Conceptual Model is implementation independent**
  - Use to design
  - Described in UML
- **May have alternative Physical Models for different target implementations**
  - XML Physical design as UML
- **Implementation is derived from physical model.**
  - NeTEx XML Schema

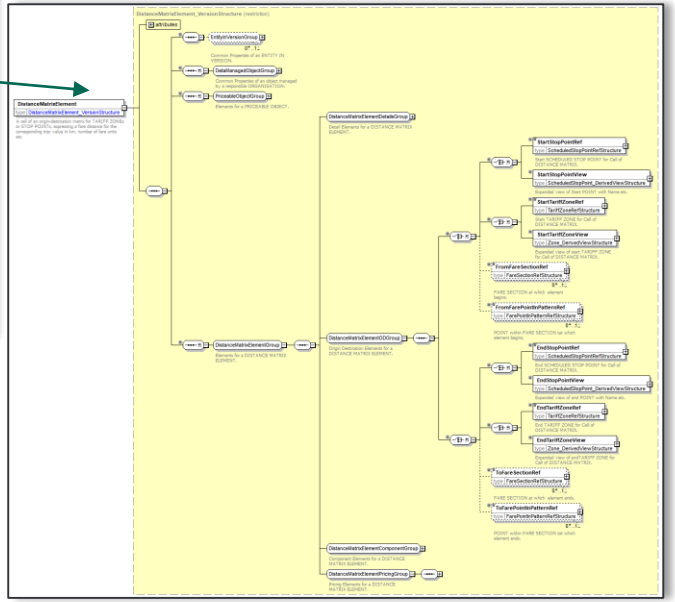


Designing a CEN Exchange format - Package & Element level traceability

Conceptual → Physical → Schema



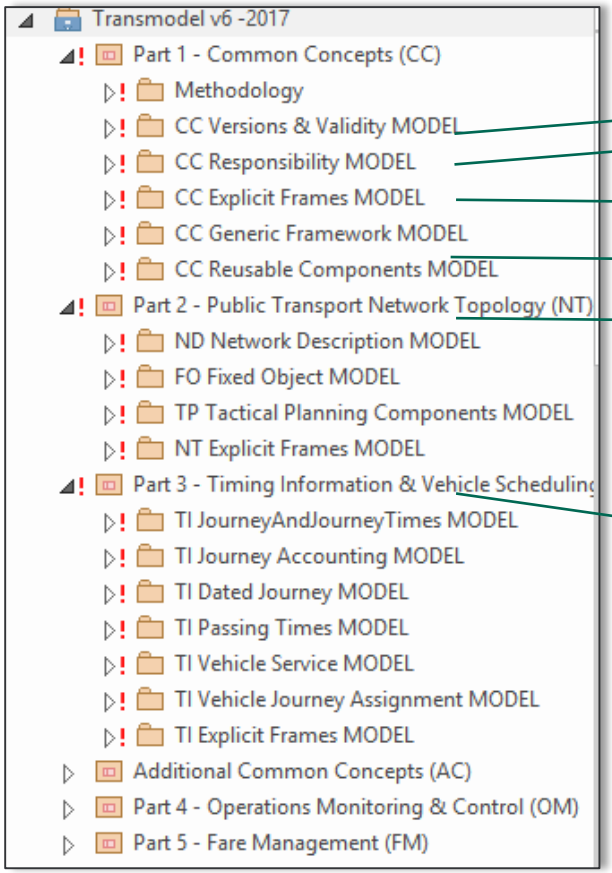




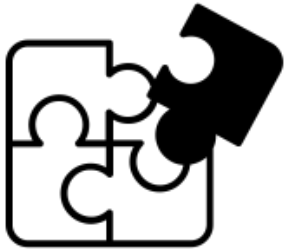
- **Traceability**
  - Equivalent elements can be found at each level
  - Physical design and Implementation each add further detail and constraints
- **Tool support (EA, XML SPY, OXYGEN, etc)**

Designing a CEN Exchange format - Package & Element level traceability

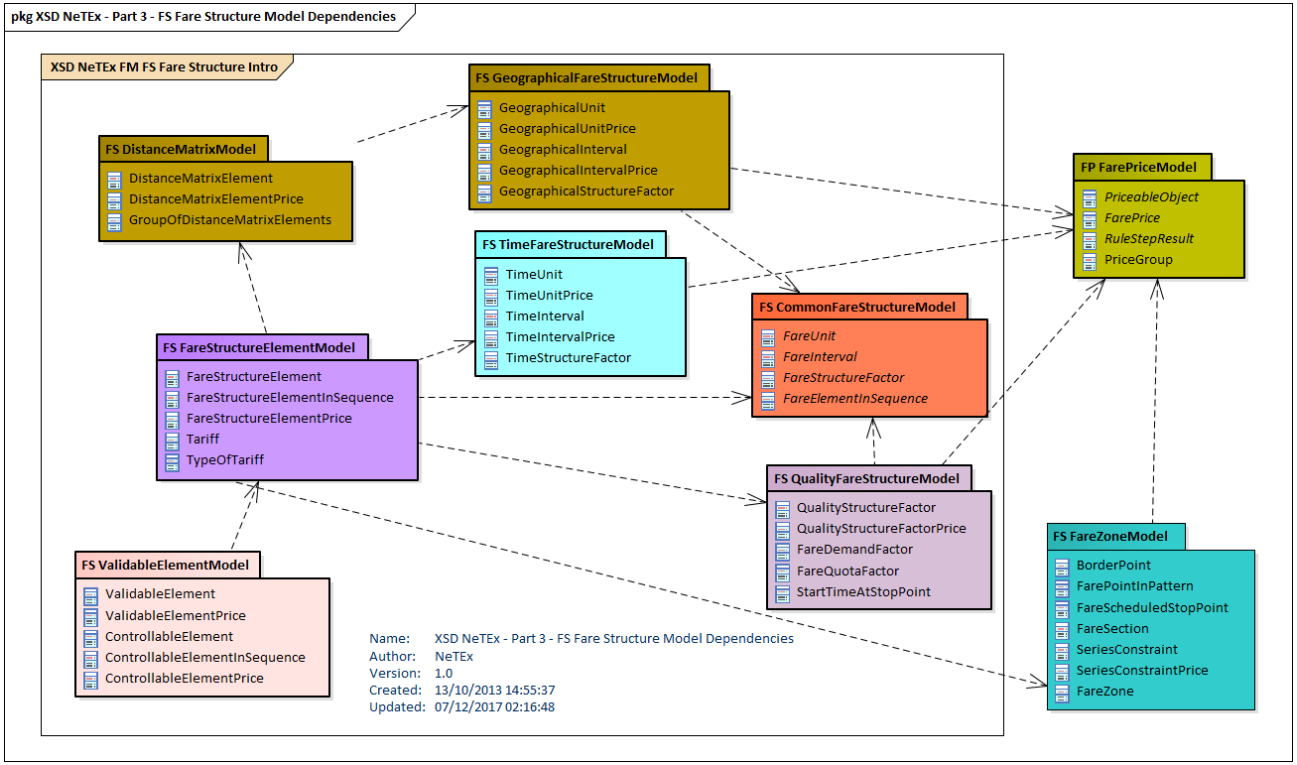
Conceptual → Physical → Schema



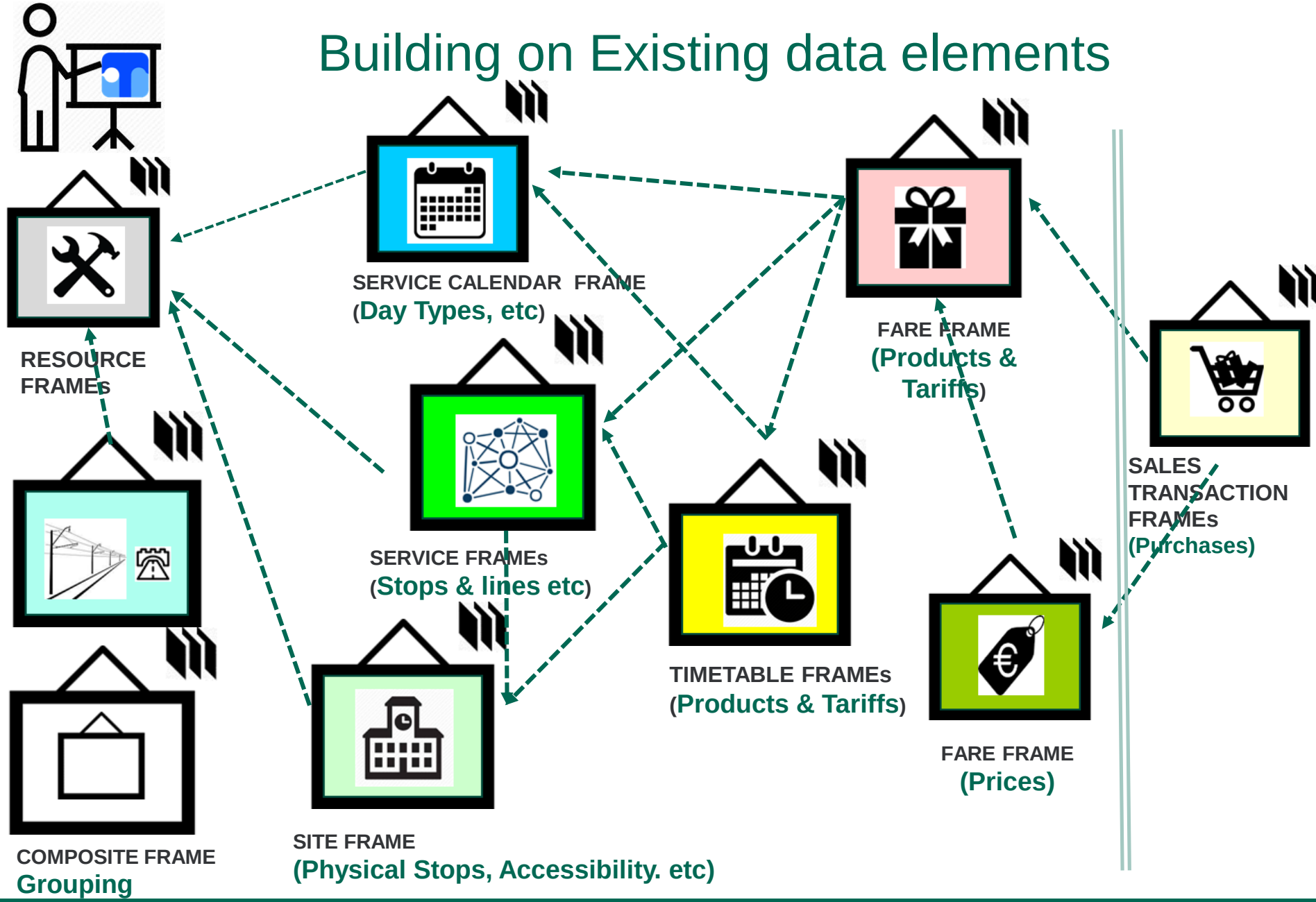
Modularisation & Package dependencies



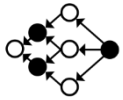
- You only need use the elements you require for your use cases
- UML model identifies dependencies -

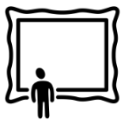


Building on Existing data elements

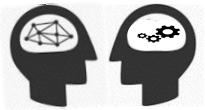


Model Driven Design



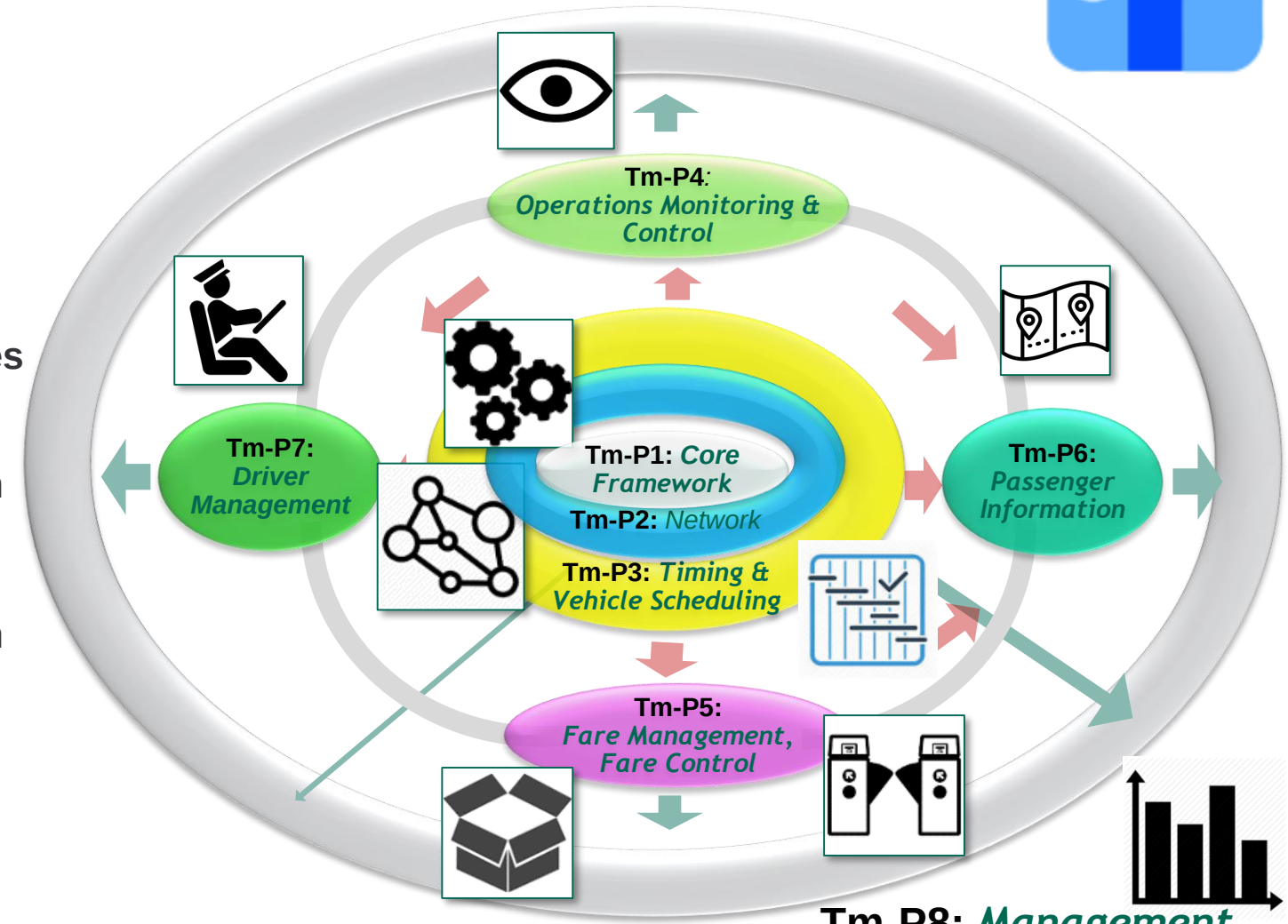


- **Conceptual model**
  - Uniform vocabulary of atomic, orthogonal, concepts
  - Clear separation of concerns,
  - Well defined relationships
  - Modularised to satisfy specific use cases
  - Joined up thinking!
- **Physical Model**
  - Uniform Mapping from Conceptual to XML
  - Systematically Engineered
  - Traceability across design levels



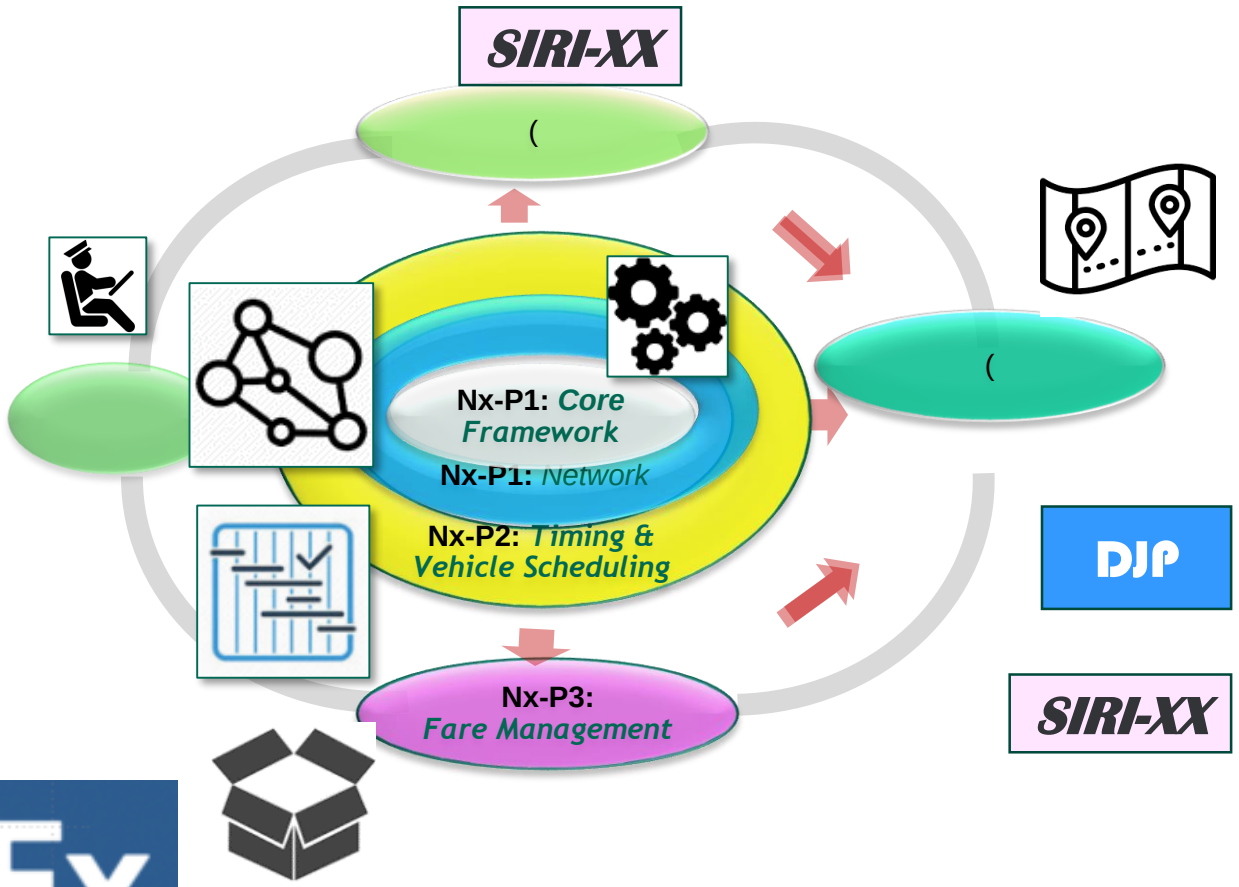
Transmodel 6.0 Functional Areas

- Modular;
  - May be used **selectively**
  - Linear **dependencies**
- Models, not APIs
  - Use to design **exchange. formats**
  - Use to design **API payload**
  - Use to **reconcile** different formats



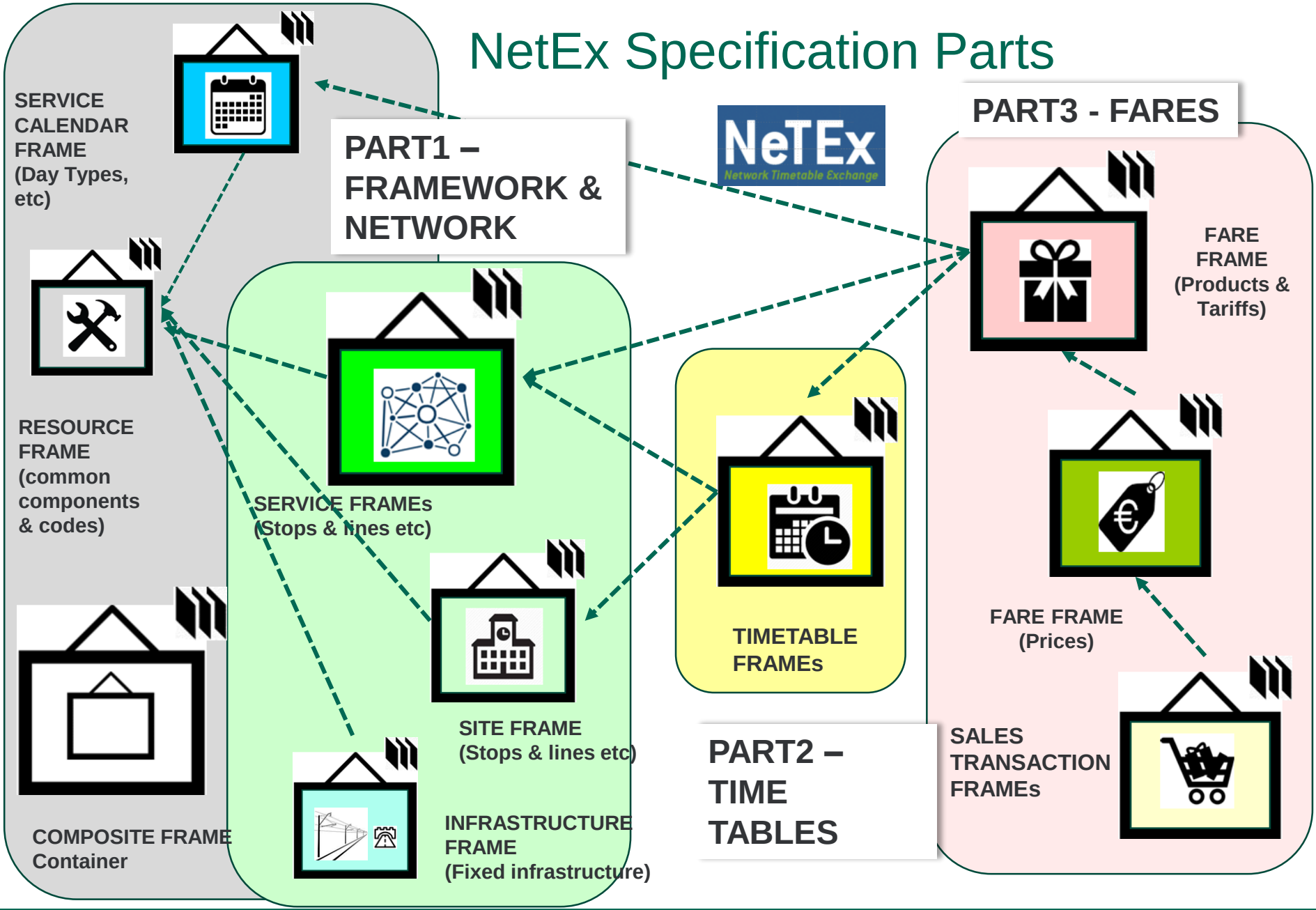
NeTEx 1.1 Functional Areas

- **NeTEx implements only a subset of Transmodel**
  - Stops, Routes, Timetables, Fares, etc
  - Fare Management has structures & prices, but not Sales Fare Validation & Control
  - Some Operations and control APIs found in SIRI
- **NB NeTEx Specification parts are numbered differently to TM**
  - Nx-P1=Tm-P1 + P2
  - Nx-P2=Tm-P3
  - Nx-P3=Tm-P5 A SUBSET



NeTEx
Network Timetable Exchange

NetEx Specification Parts



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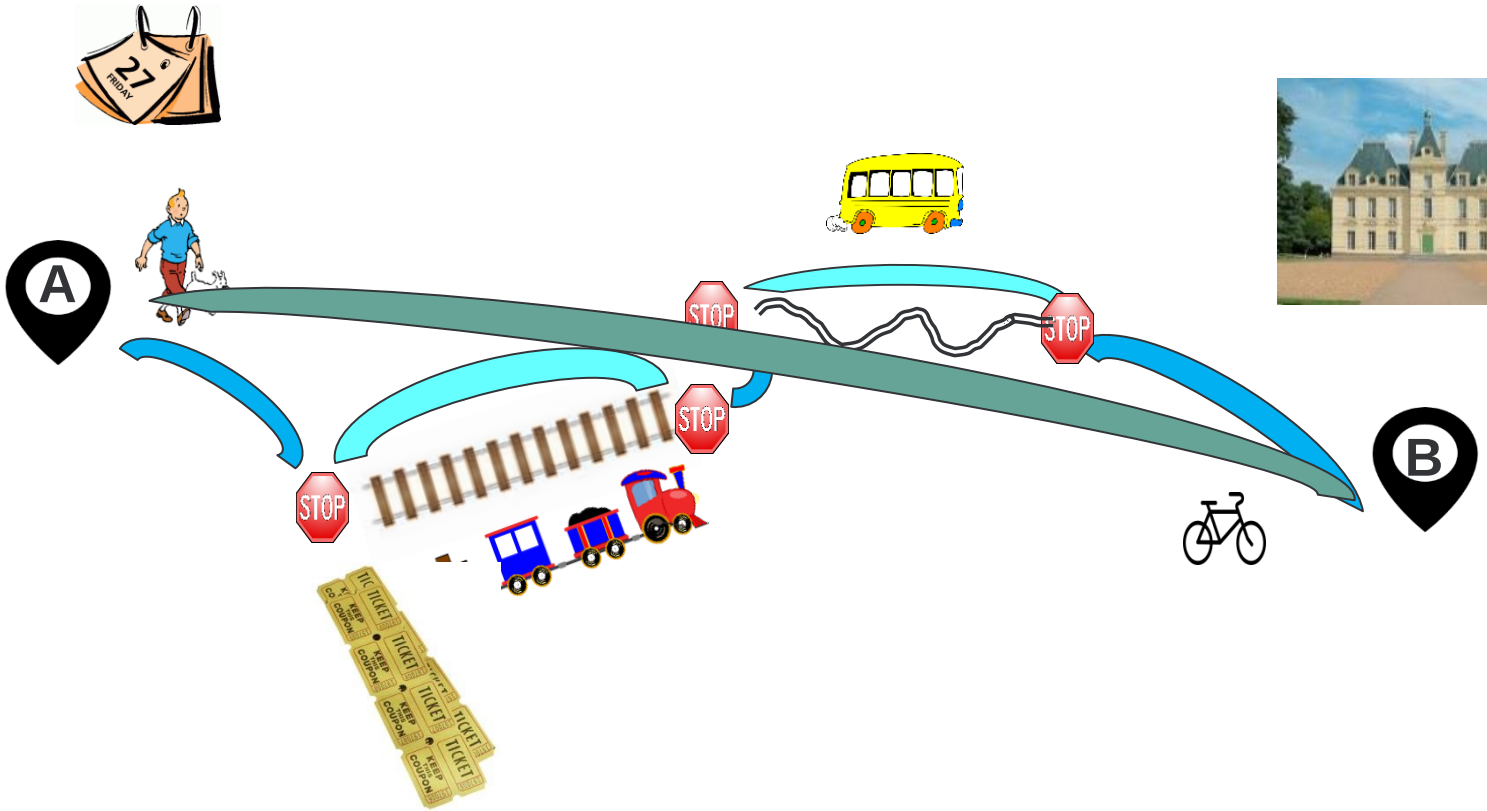
Conceptual Modelling of Transport Systems




Describing a simple journey from A to B – e.g. for a trip planner



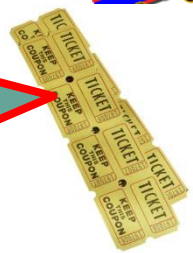
DEFINE YOUR TERMS!

Stop ?
Station? Halt? Platform?
Interchange? Connection
Boarding Point

Journey? Trip?
Ride? Leg?

Passenger?
Customer?
User?

Bus, Coach,
Train, Vehicle,
Transport?

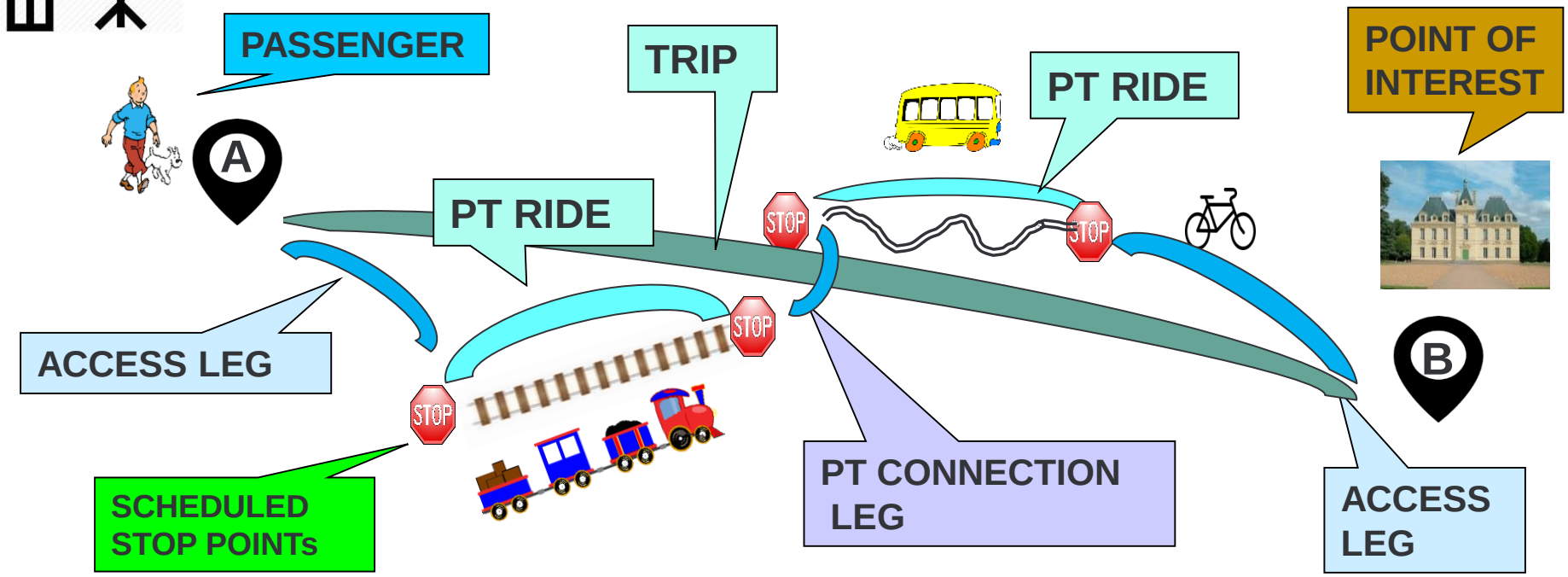


Ticket? Fare?
Fare Product? Offer?
Tariff? Fare Price?
Travel Document?

Rail? Train?
Railway? Railroad?

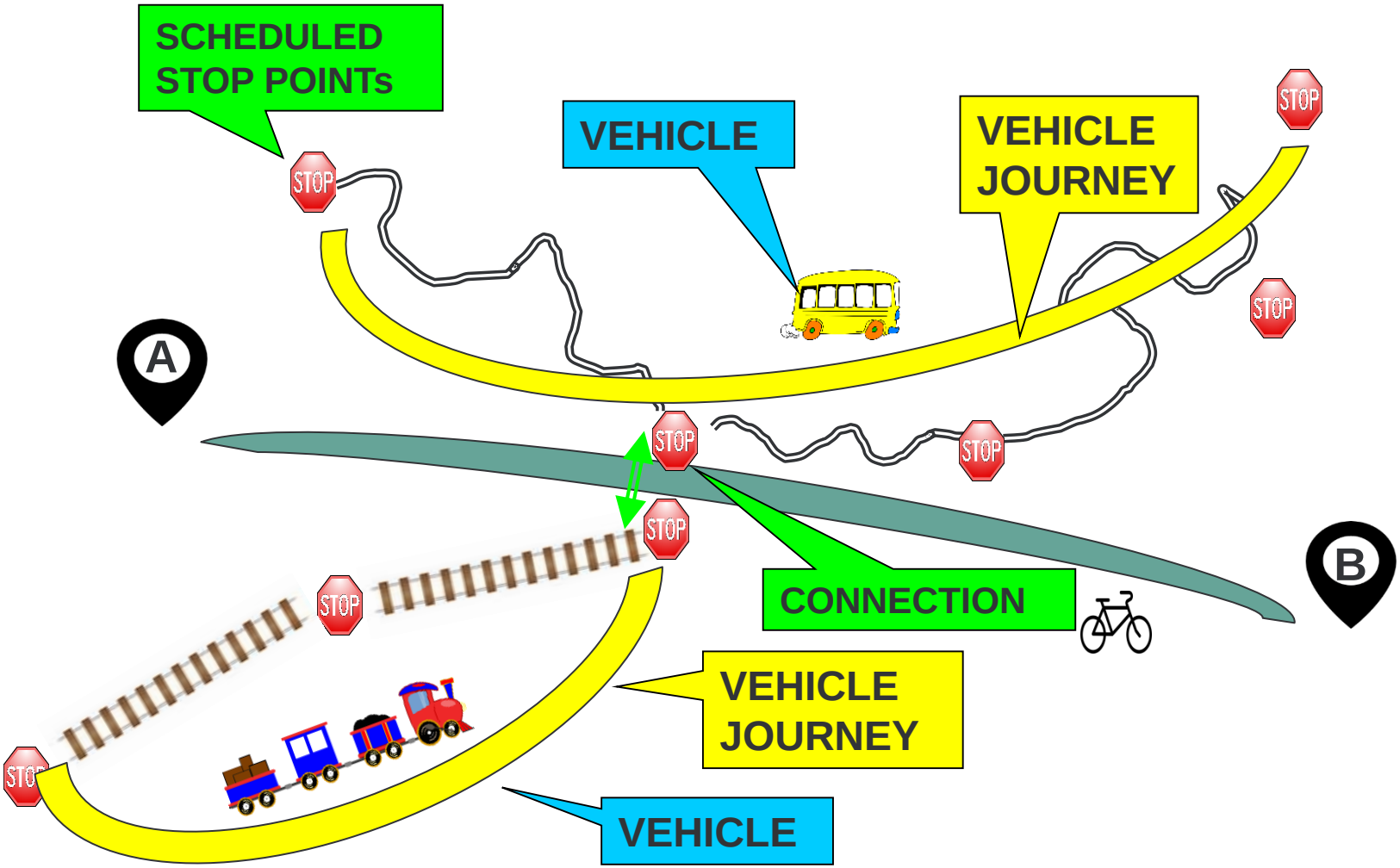
Route? Line? Track?
Service?

A PASSENGER makes a TRIP….

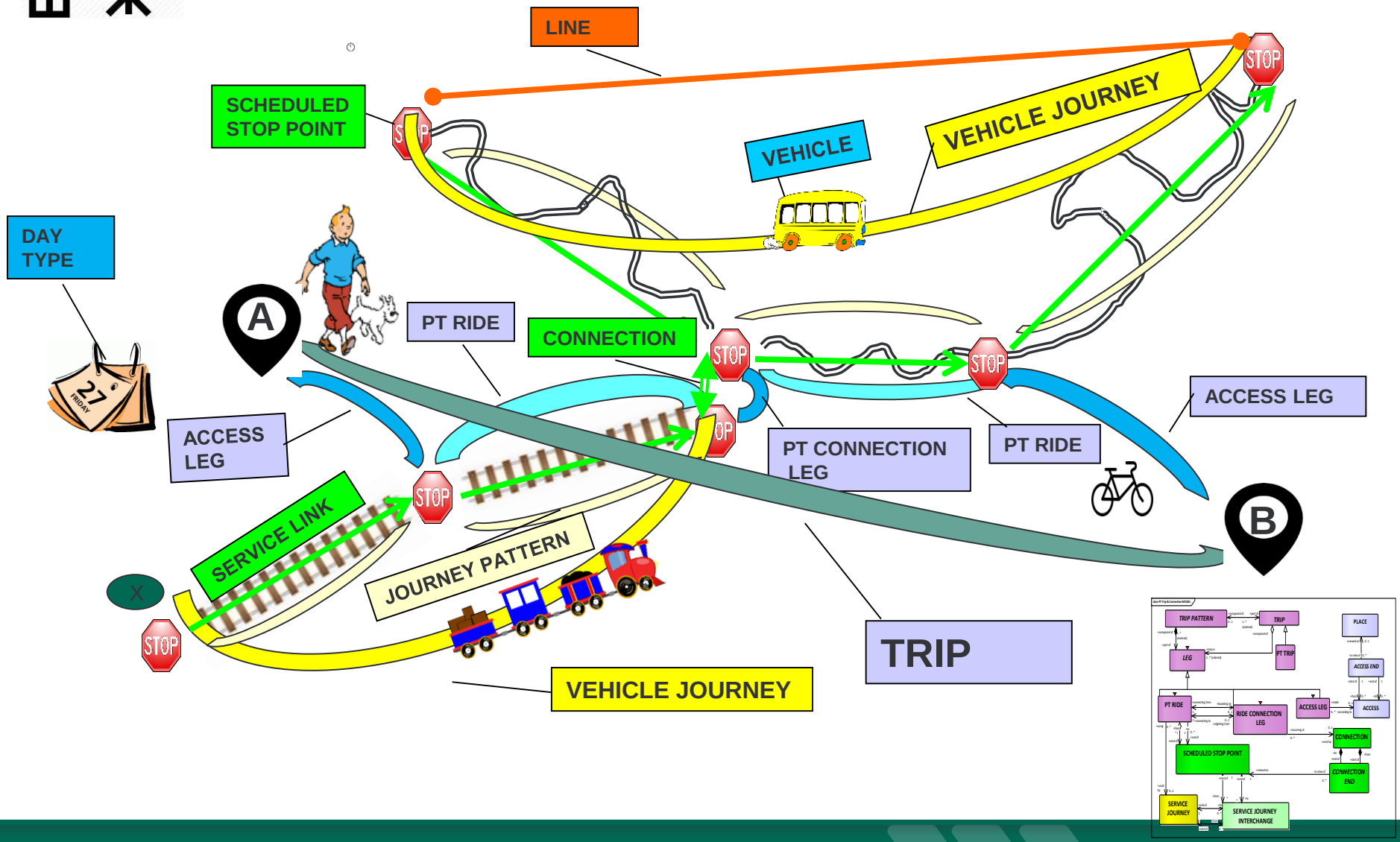


The passenger's TRIP is made up of one or more PT RIDEs, may start or end by an ACCESS LEG and may be interspersed with PT CONNECTION LEGs

A VEHICLE makes a JOURNEY

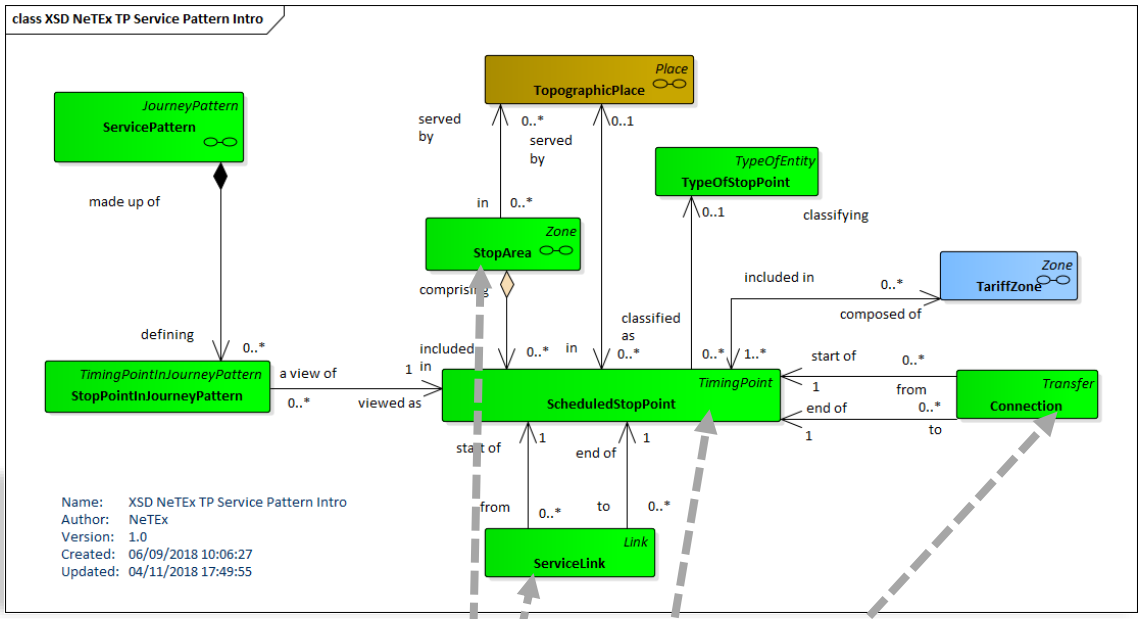


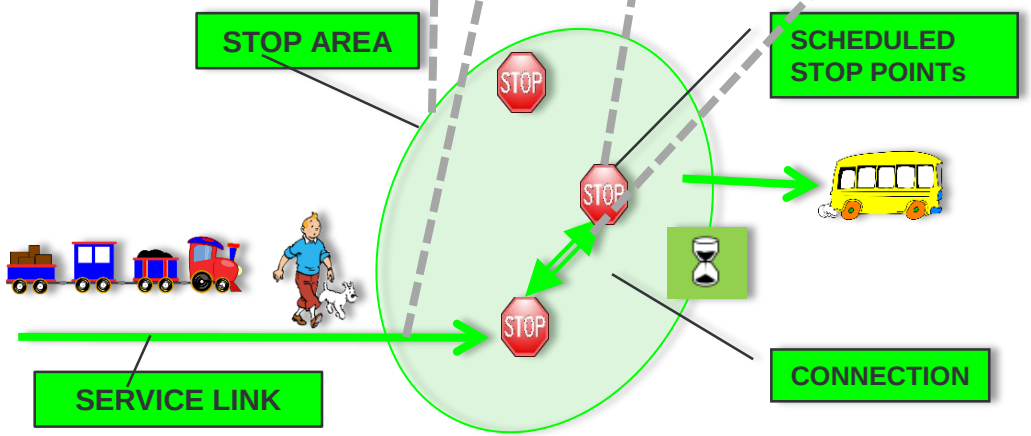
A Common PT data Model: Atomic Components, Consistent Names



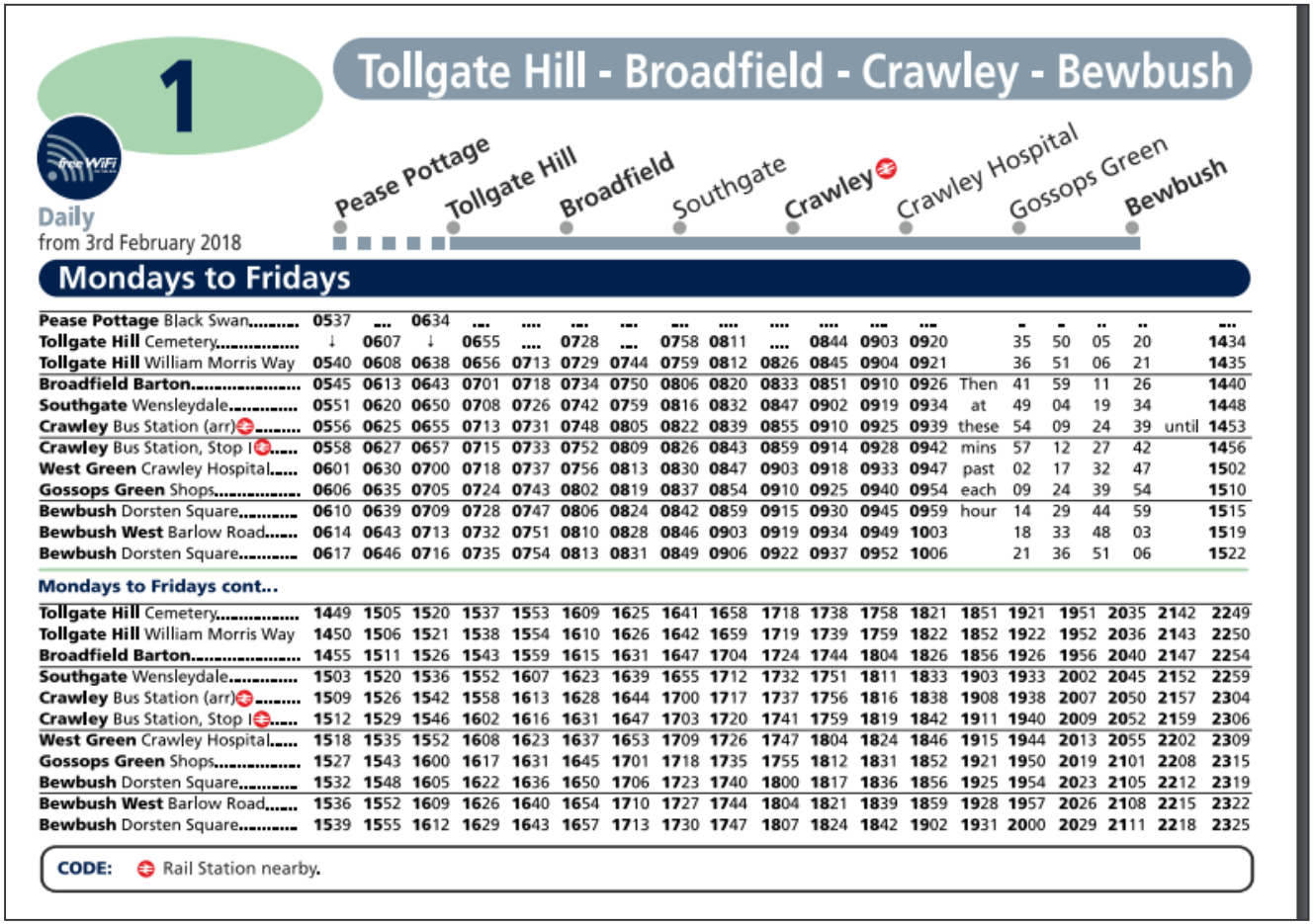
Data Models

- Using consistent definitions allows us build a model
  - Entities & attributes
  - Relationships
    - **Association**: 1:0:, 1:0, 1:*
    - **Aggregation** 1:*, 0:*
    - **Inheritance**
- A model lets us analyse how the data elements relate to different functions
  - Separate out concerns
  - Break down into separate submodels, clear dependencies
  - Factor out reusable components





A typical Bus timetable (Metrobus Route 1)



1 Tollgate Hill - Broadfield - Crawley - Bewbush

free WiFi

Daily
from 3rd February 2018

Pease Pottage · Tollgate Hill · Broadfield · Southgate · Crawley · Crawley Hospital · Gossops Green · Bewbush

Mondays to Fridays

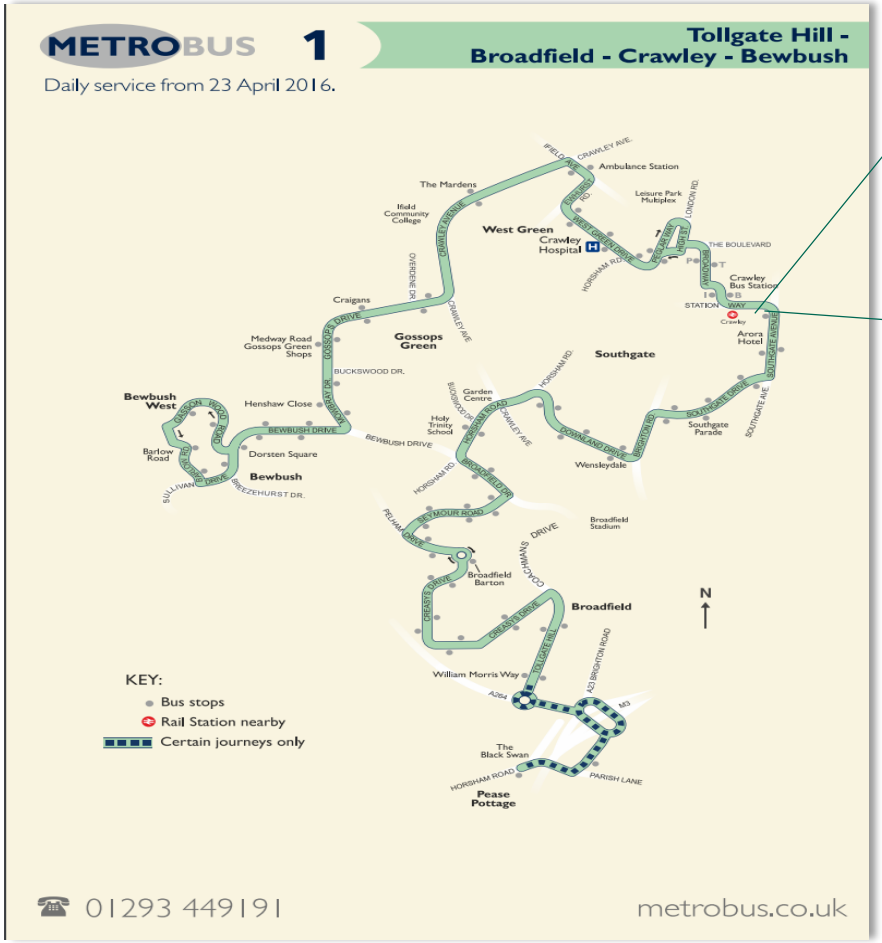
Pease Pottage Black Swan	0537	...	0634	...	....	...	...	...	....	....	....	....	...	...		-	-	..	..	...
Tollgate Hill Cemetery	↓	0607	↓	0655	....	0728	...	0758	0811	....	0844	0903	0920		35	50	05	20		1434
Tollgate Hill William Morris Way	0540	0608	0638	0656	0713	0729	0744	0759	0812	0826	0845	0904	0921		36	51	06	21		1435
Broadfield Barton	0545	0613	0643	0701	0718	0734	0750	0806	0820	0833	0851	0910	0926	Then	41	59	11	26		1440
Southgate Wensleydale	0551	0620	0650	0708	0726	0742	0759	0816	0832	0847	0902	0919	0934	at	49	04	19	34		1448
Crawley Bus Station (arr)	0556	0625	0655	0713	0731	0748	0805	0822	0839	0855	0910	0925	0939	these	54	09	24	39	until	1453
Crawley Bus Station, Stop I	0558	0627	0657	0715	0733	0752	0809	0826	0843	0859	0914	0928	0942	mins	57	12	27	42		1456
West Green Crawley Hospital	0601	0630	0700	0718	0737	0756	0813	0830	0847	0903	0918	0933	0947	past	02	17	32	47		1502
Gossops Green Shops	0606	0635	0705	0724	0743	0802	0819	0837	0854	0910	0925	0940	0954	each	09	24	39	54		1510
Bewbush Dorsten Square	0610	0639	0709	0728	0747	0806	0824	0842	0859	0915	0930	0945	0959	hour	14	29	44	59		1515
Bewbush West Barlow Road	0614	0643	0713	0732	0751	0810	0828	0846	0903	0919	0934	0949	1003		18	33	48	03		1519
Bewbush Dorsten Square	0617	0646	0716	0735	0754	0813	0831	0849	0906	0922	0937	0952	1006		21	36	51	06		1522

Mondays to Fridays cont...

Tollgate Hill Cemetery	1449	1505	1520	1537	1553	1609	1625	1641	1658	1718	1738	1758	1821	1851	1921	1951	2035	2142	2249
Tollgate Hill William Morris Way	1450	1506	1521	1538	1554	1610	1626	1642	1659	1719	1739	1759	1822	1852	1922	1952	2036	2143	2250
Broadfield Barton	1455	1511	1526	1543	1559	1615	1631	1647	1704	1724	1744	1804	1826	1856	1926	1956	2040	2147	2254
Southgate Wensleydale	1503	1520	1536	1552	1607	1623	1639	1655	1712	1732	1751	1811	1833	1903	1933	2002	2045	2152	2259
Crawley Bus Station (arr)	1509	1526	1542	1558	1613	1628	1644	1700	1717	1737	1756	1816	1838	1908	1938	2007	2050	2157	2304
Crawley Bus Station, Stop I	1512	1529	1546	1602	1616	1631	1647	1703	1720	1741	1759	1819	1842	1911	1940	2009	2052	2159	2306
West Green Crawley Hospital	1518	1535	1552	1608	1623	1637	1653	1709	1726	1747	1804	1824	1846	1915	1944	2013	2055	2202	2309
Gossops Green Shops	1527	1543	1600	1617	1631	1645	1701	1718	1735	1755	1812	1831	1852	1921	1950	2019	2101	2208	2315
Bewbush Dorsten Square	1532	1548	1605	1622	1636	1650	1706	1723	1740	1800	1817	1836	1856	1925	1954	2023	2105	2212	2319
Bewbush West Barlow Road	1536	1552	1609	1626	1640	1654	1710	1727	1744	1804	1821	1839	1859	1928	1957	2026	2108	2215	2322
Bewbush Dorsten Square	1539	1555	1612	1629	1643	1657	1713	1730	1747	1807	1824	1842	1902	1931	2000	2029	2111	2218	2325

CODE: Rail Station nearby.

A Typical Bus Route (Metrobus Route 1)



TM: The Network Description

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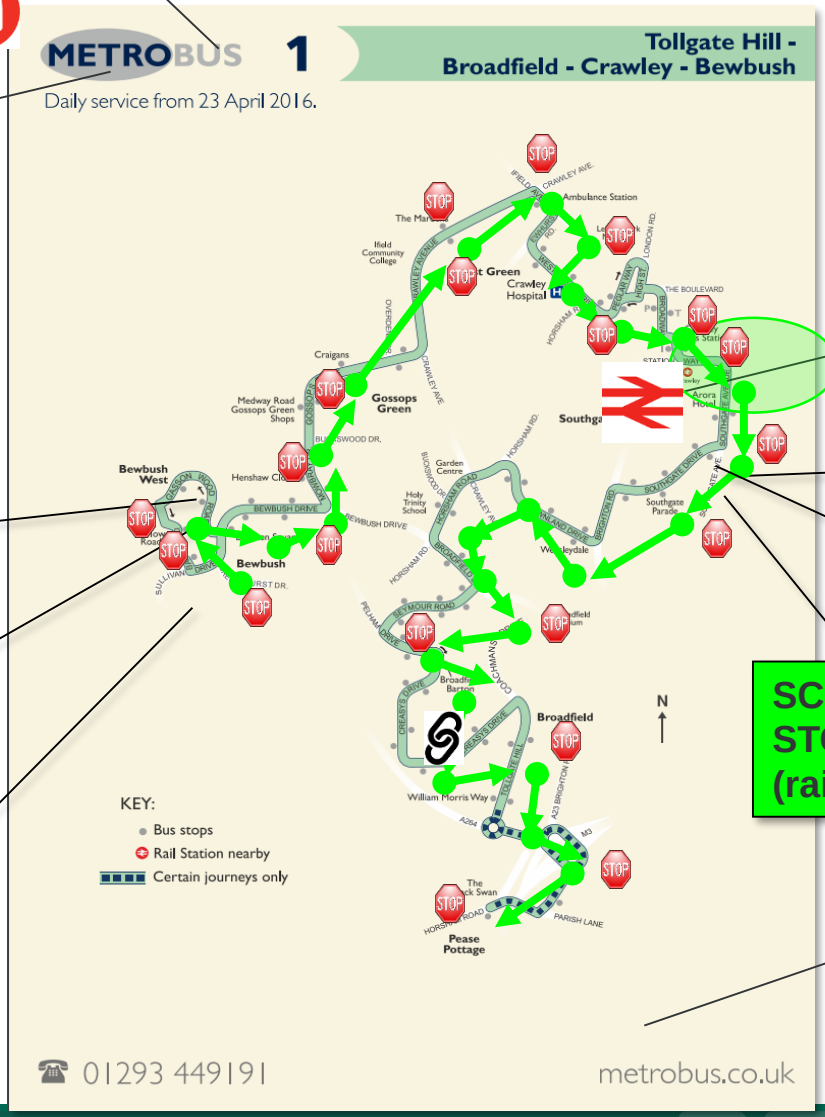
MODE

LINE



POINT OF INTEREST *(hospital)*

CONNECTION *(rail)*

STOP AREA

SCHEDULED STOP POINT (rail)

SCHEDULED STOP POINTs (bus)

SERVICE LINKs

SERVICE PATTERNs

TOPOGRAPHIC PLACEs

OPERATOR

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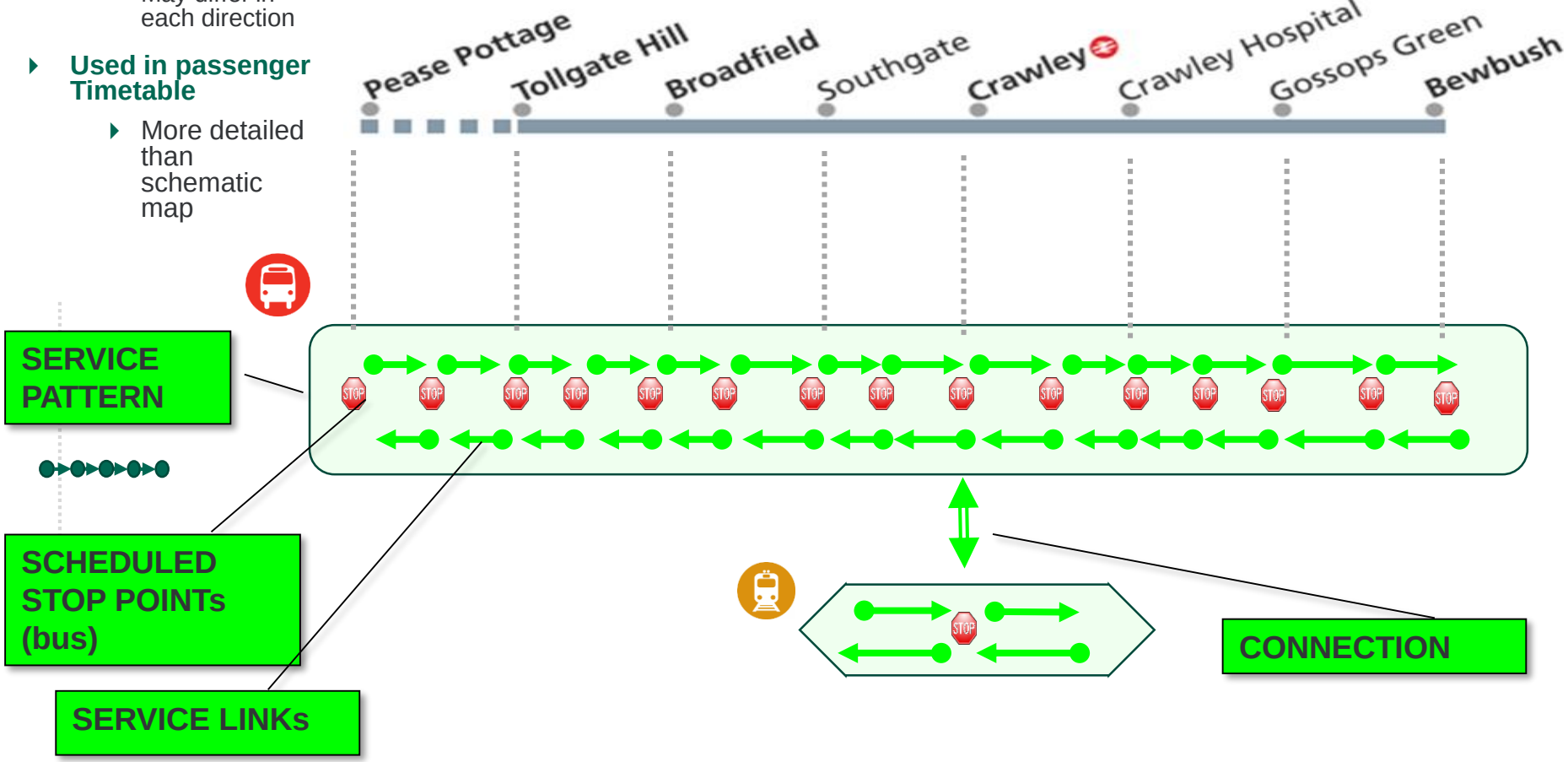
TM: The Network as the Timetabled Stops & Links

- **Directional !**
  - May differ in each direction
- **Used in passenger Timetable**
  - More detailed than schematic map



TM: The Network as a Physical Route

Department for Transport

MODE

LINE

ROUTE

ROUTE POINTs

ROUTE LINKs

OPERATOR

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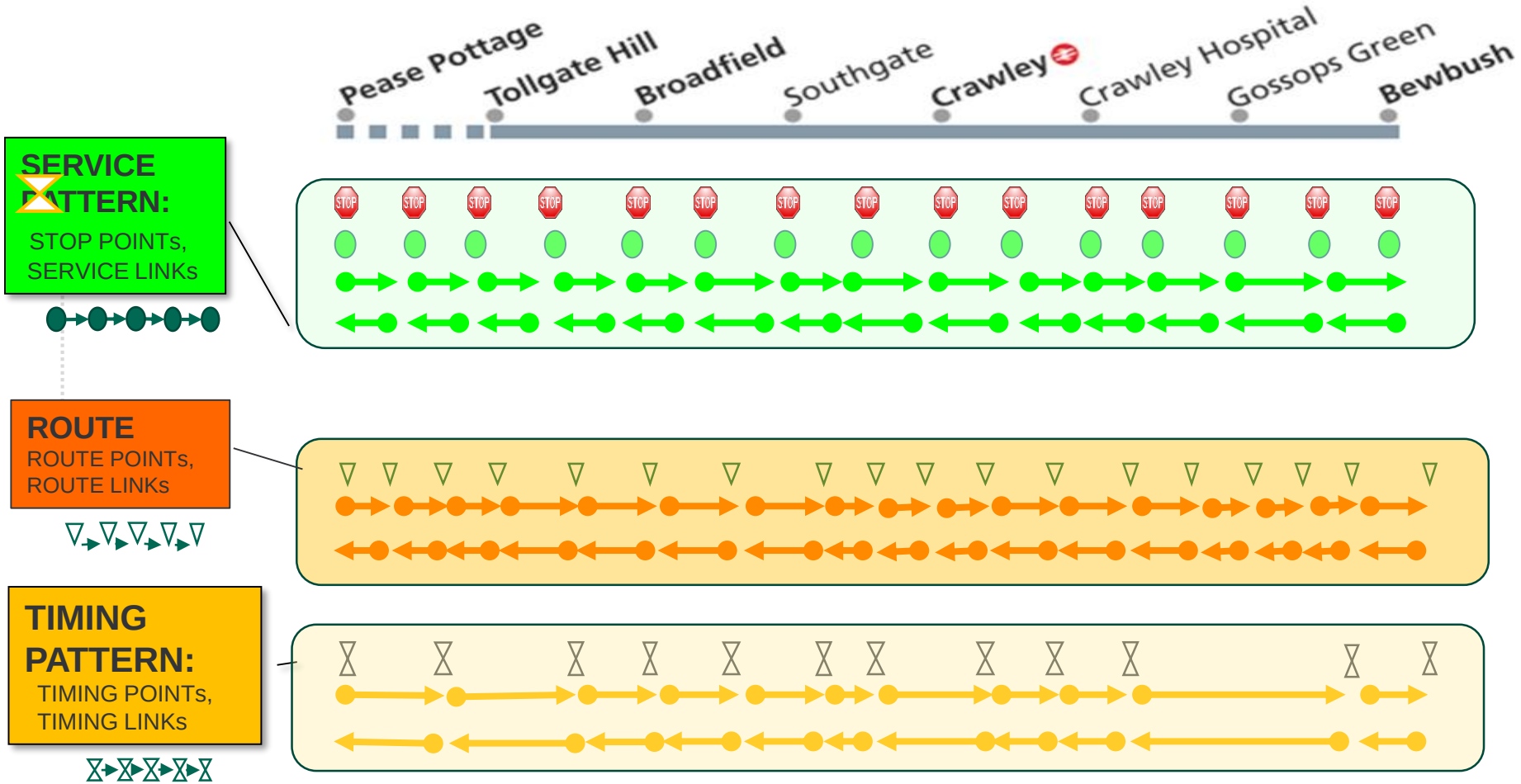
The Network as the Operational route



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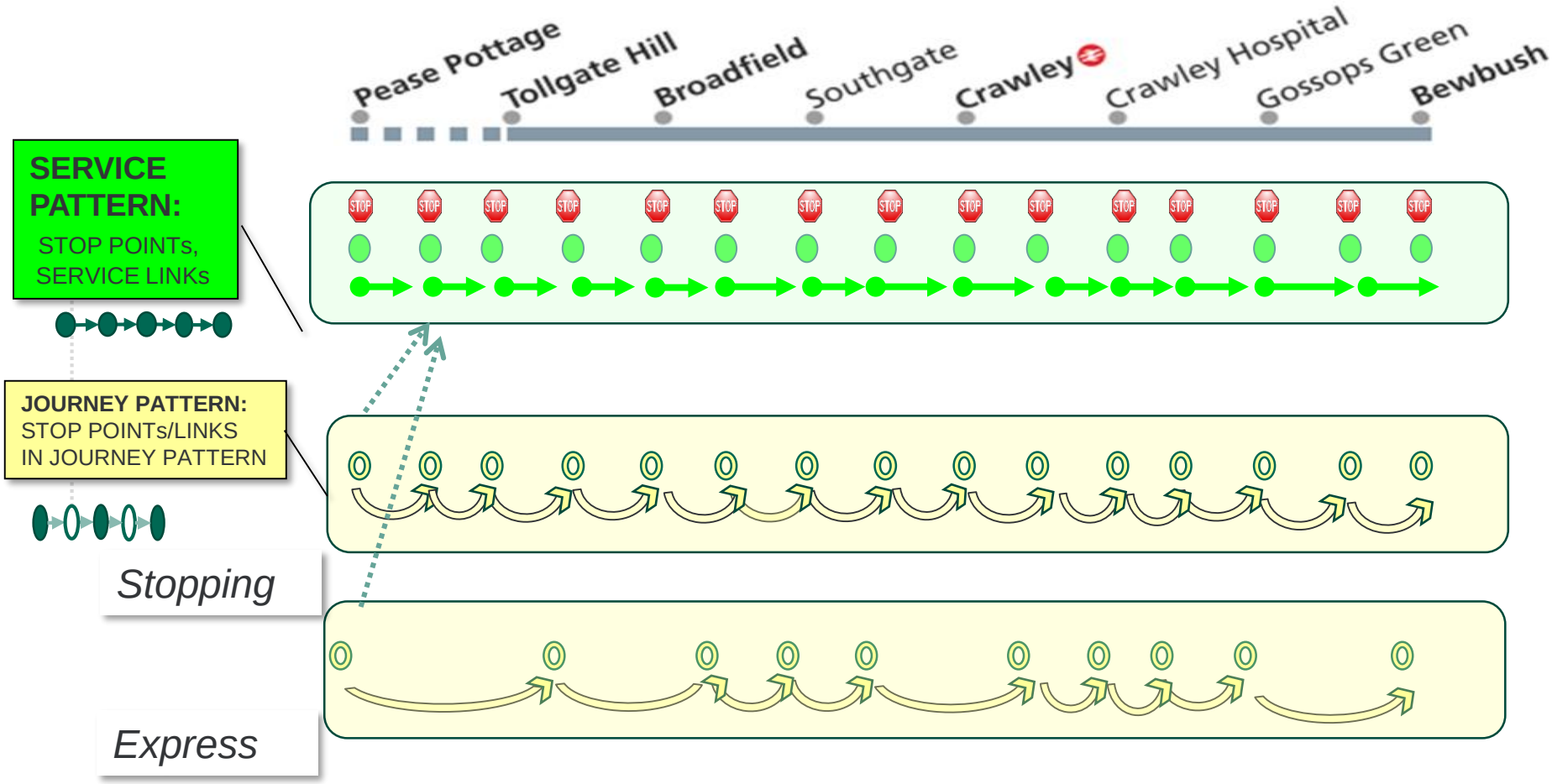
The Network for use in timetabling



TM: The Network Description

JOURNEY PATTERNs

POINTs IN JOURNEY PATTERN

POINTs IN JOURNEY PATTERN

OPERATOR

TM: A Vehicle Journey

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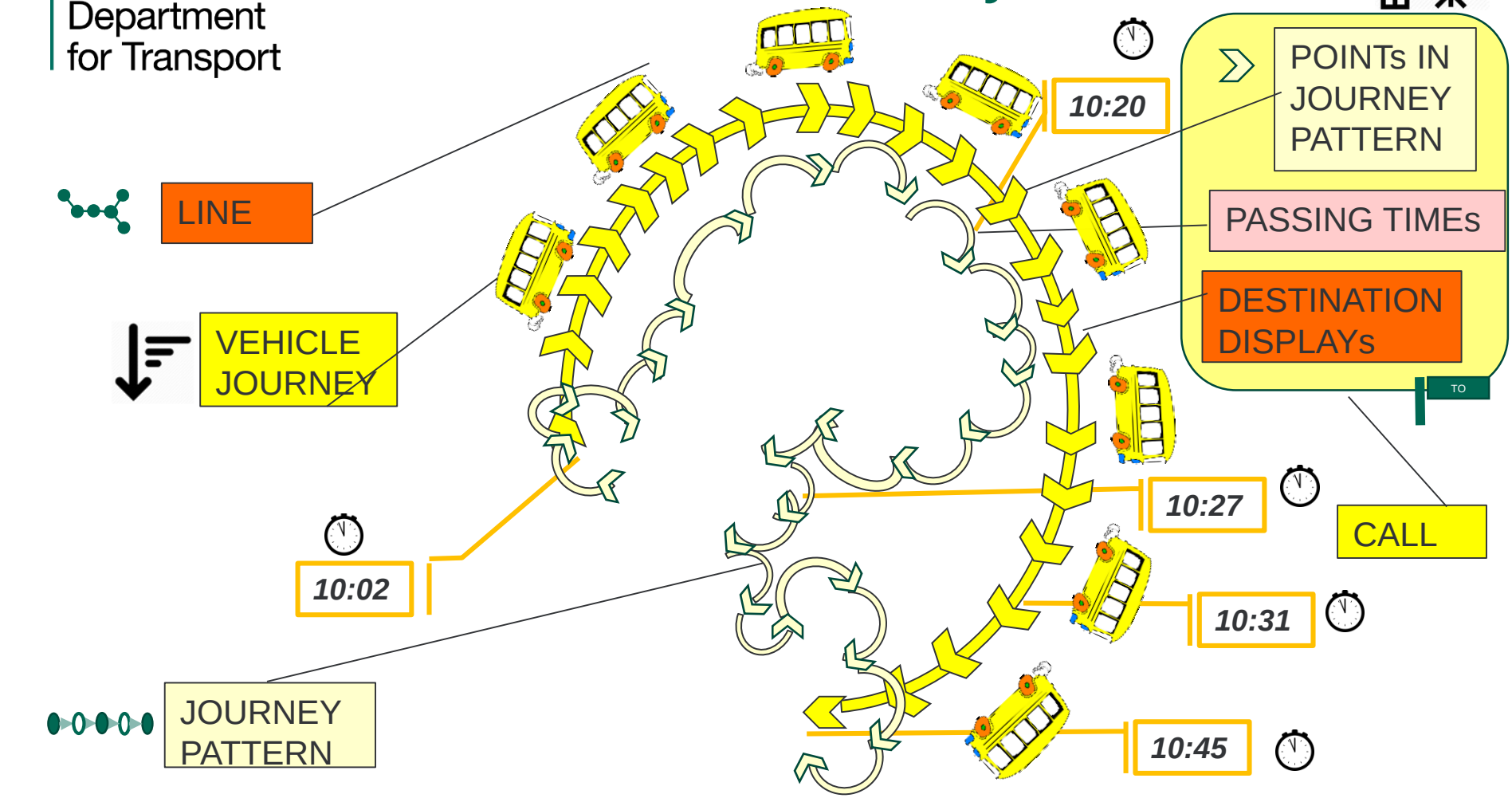
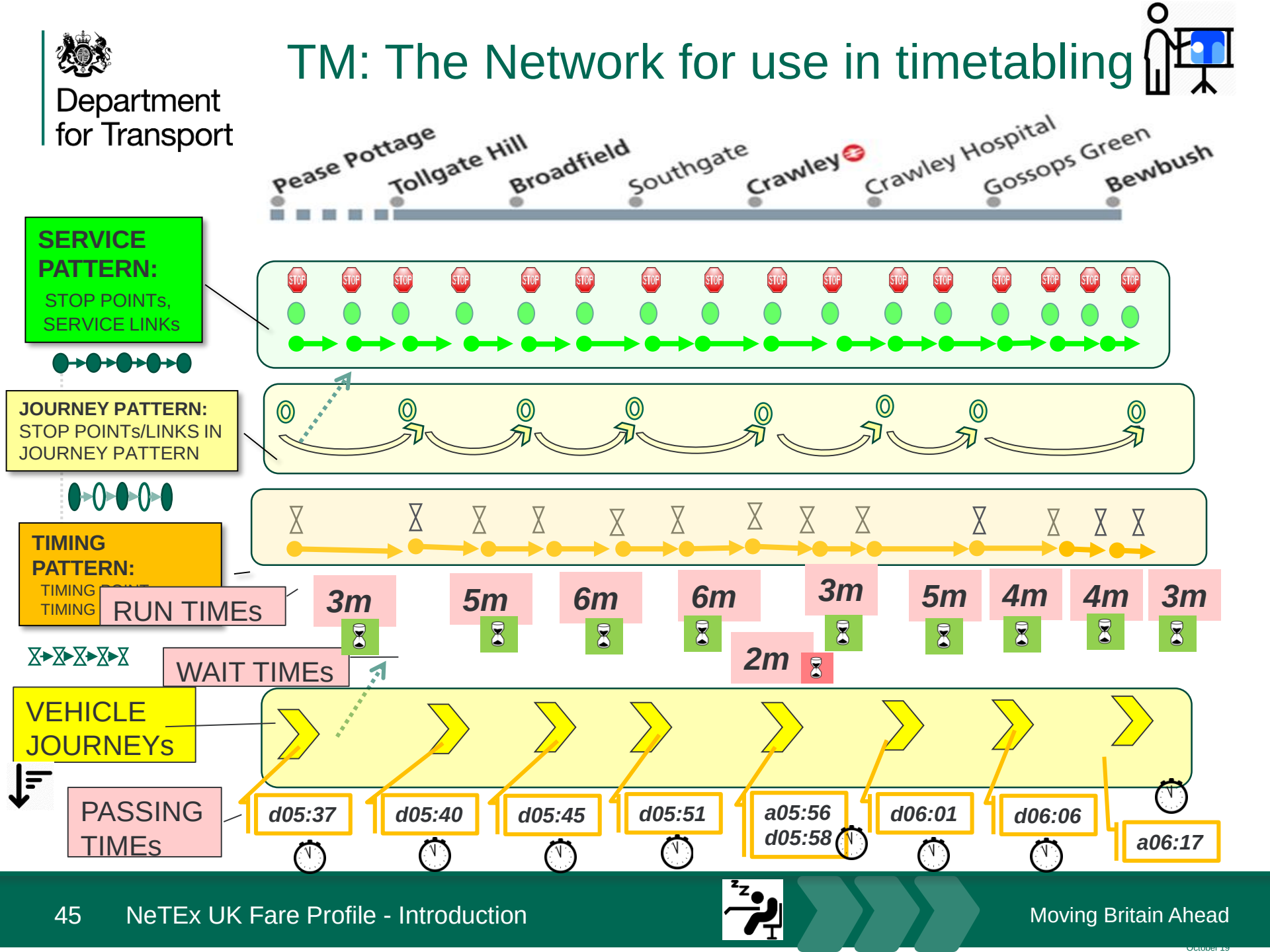


TM: The Network for use in timetabling



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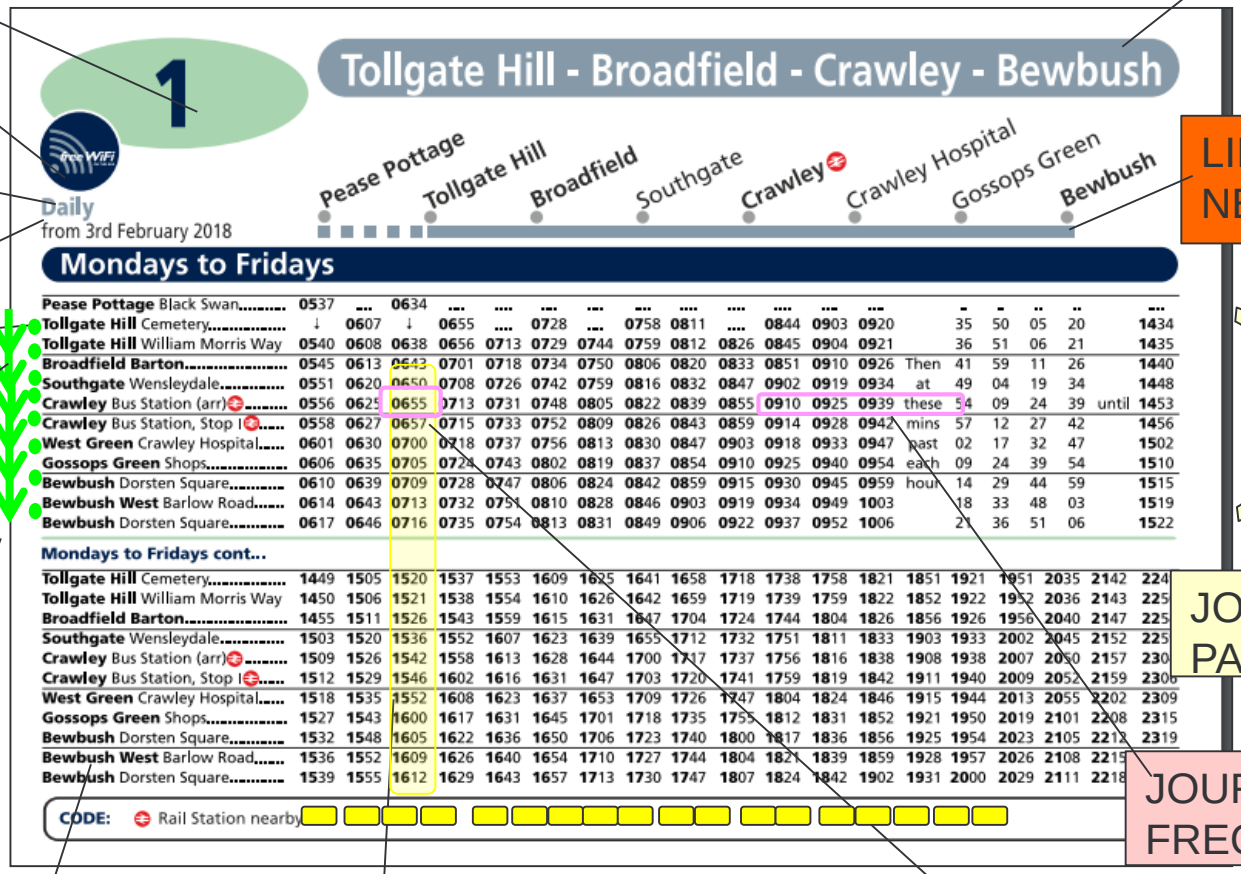
TM: A Bus timetable as model elements



LINE

FACILITY

DAY TYPE

VALIDITY CONDITION

SCHEDULED STOP POINTs

SERVICE LINKs

CONNECTION

SERVICE PATTERN

NOTICE

VEHICLE JOURNEYs

PASSING TIMEs

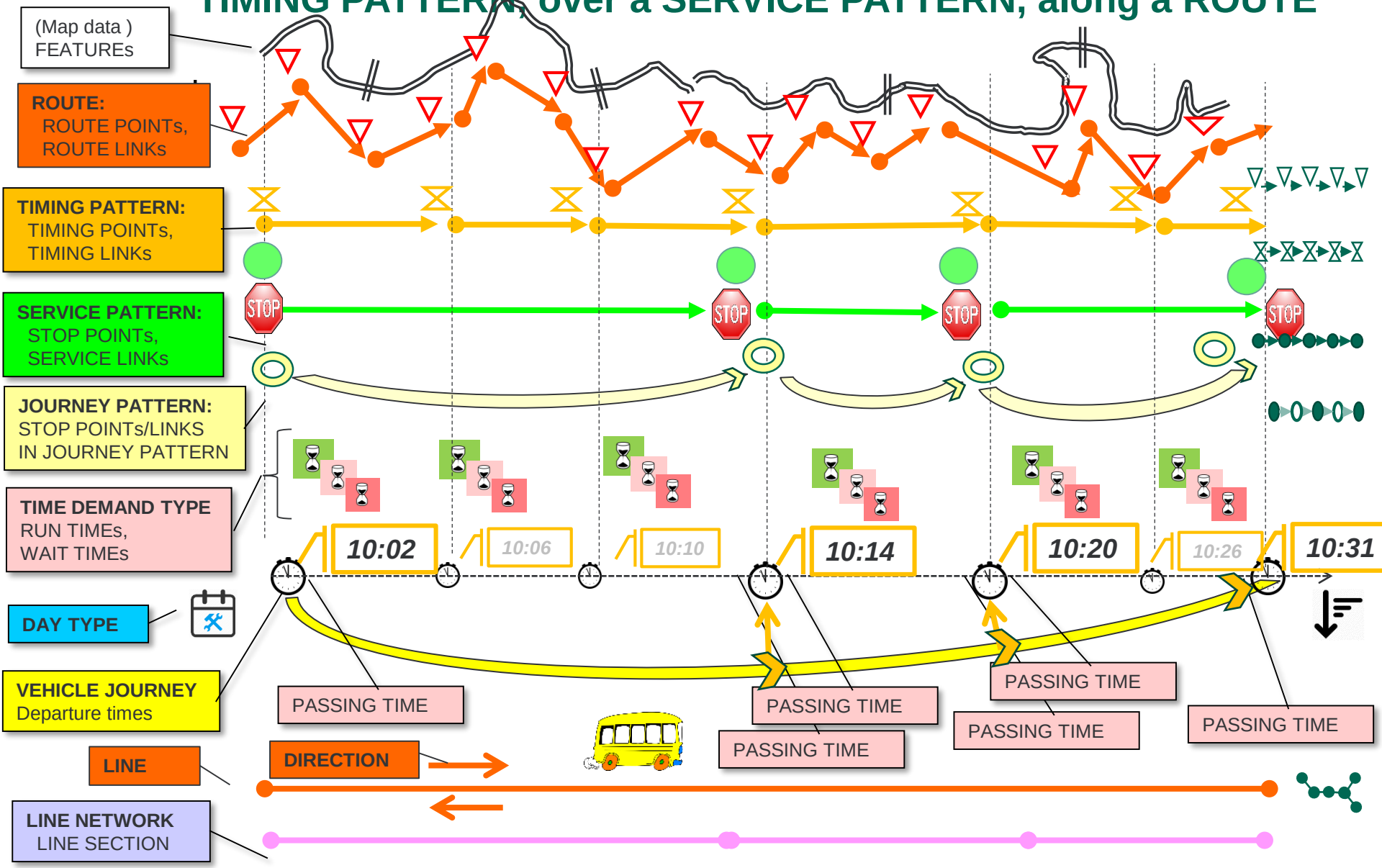
JOURNEY FREQUENCY

JOURNEY PATTERNs

LINE NETWORK

TIMETABLE

A VEHICLE JOURNEY follows a JOURNEY PATTERN, to a TIMING PATTERN, over a SERVICE PATTERN, along a ROUTE



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Some Transmodel principles: Separating Concerns

- Separate the different **functional** layers
  - E.g. Path on road (ROUTE) vs Sequence of Stops (SERVICE PATTERN)
- Separate the **spatial** from the **temporal**
  - E.g. Route vs Timings for the route
- Use a common architecture for spatial networks
  - Use a common “PATTERN of POINTs and LINKS”
  - Provide means of co-locating different layers (PROJECTION)
- Separate the **Planned** Calendar from the **Operational** Calendar
  - E.g. Day type that applies (SERVICE JOURNEY) versus assigned Calendar day (DATED JOURNEY)

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Advantages of Model Based Design

- **Reusable:**
  - The same concepts & data sets can be used for
    - **All PT domains**: e.g. Networks, Timetables & Fares,
    - For **all Modes**,
    - For **different use cases**: planning, operations, PI, etc
- **Precise, Modular**
  - Separates data sets of different stakeholders
  - Only need to use relevant components / modules
  - Extensible, Flexible
- **Less complicated overall**
  - Single, uniform set of concepts

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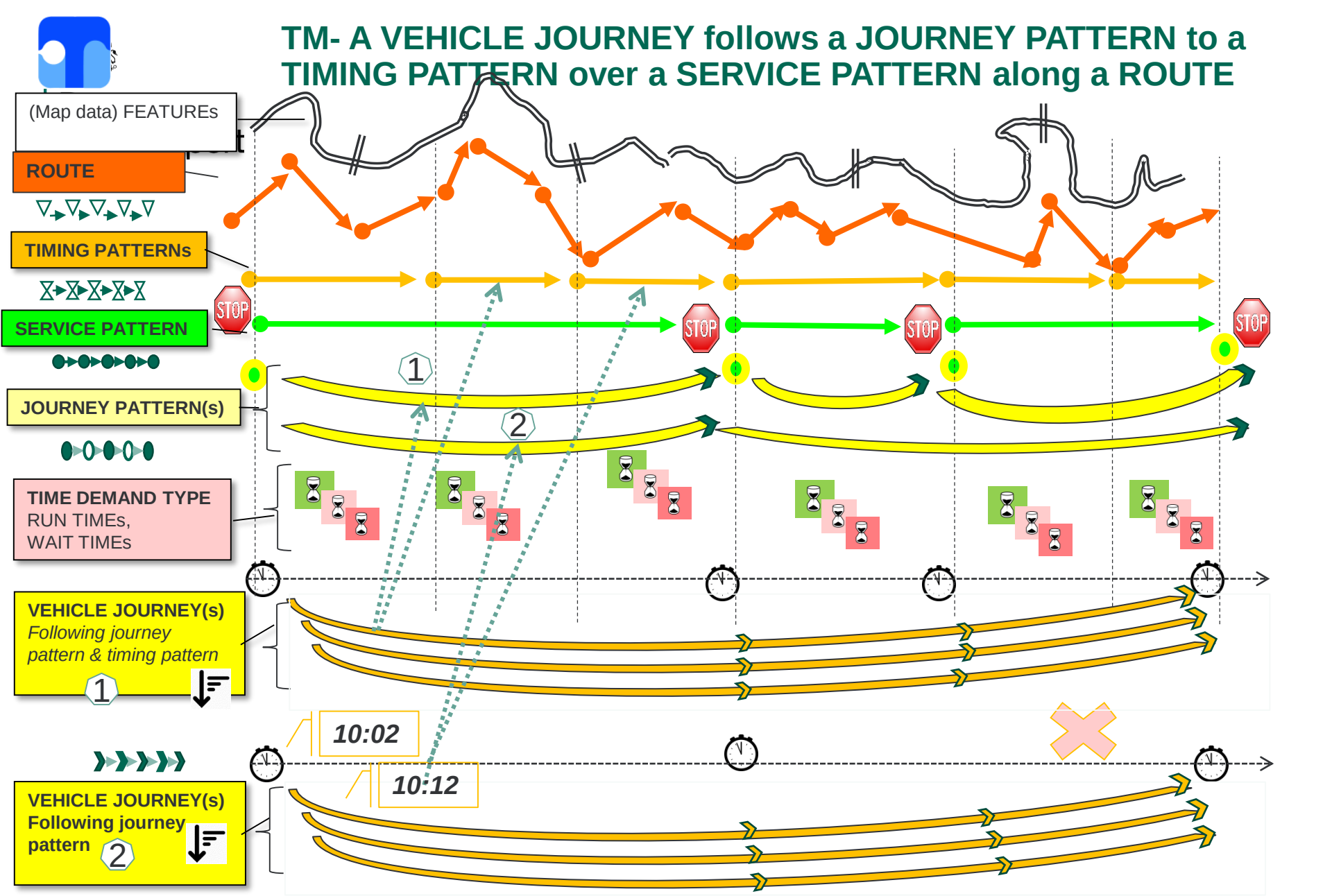
Some further Comparisons of Transmodel/NeTEx

- GTFS
- Rail Modes
- TransXChange

TM- A VEHICLE JOURNEY follows a JOURNEY PATTERN to a TIMING PATTERN over a SERVICE PATTERN along a ROUTE



GTFS

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

(Map data)

ROUTE Projection (Gtfs-Shape)

SCHEDULED STOP POINT (GTFS-Stop)

VEHICLE JOURNEY(s) (GTFS-Trip)

10:02

10:14

10:20

10:31

PASSING TIME (GTFS-Stop_times)

PASSING TIME

PASSING TIME

PASSING TIME

PASSING TIME

PASSING TIME

LINE (GTFS-Route

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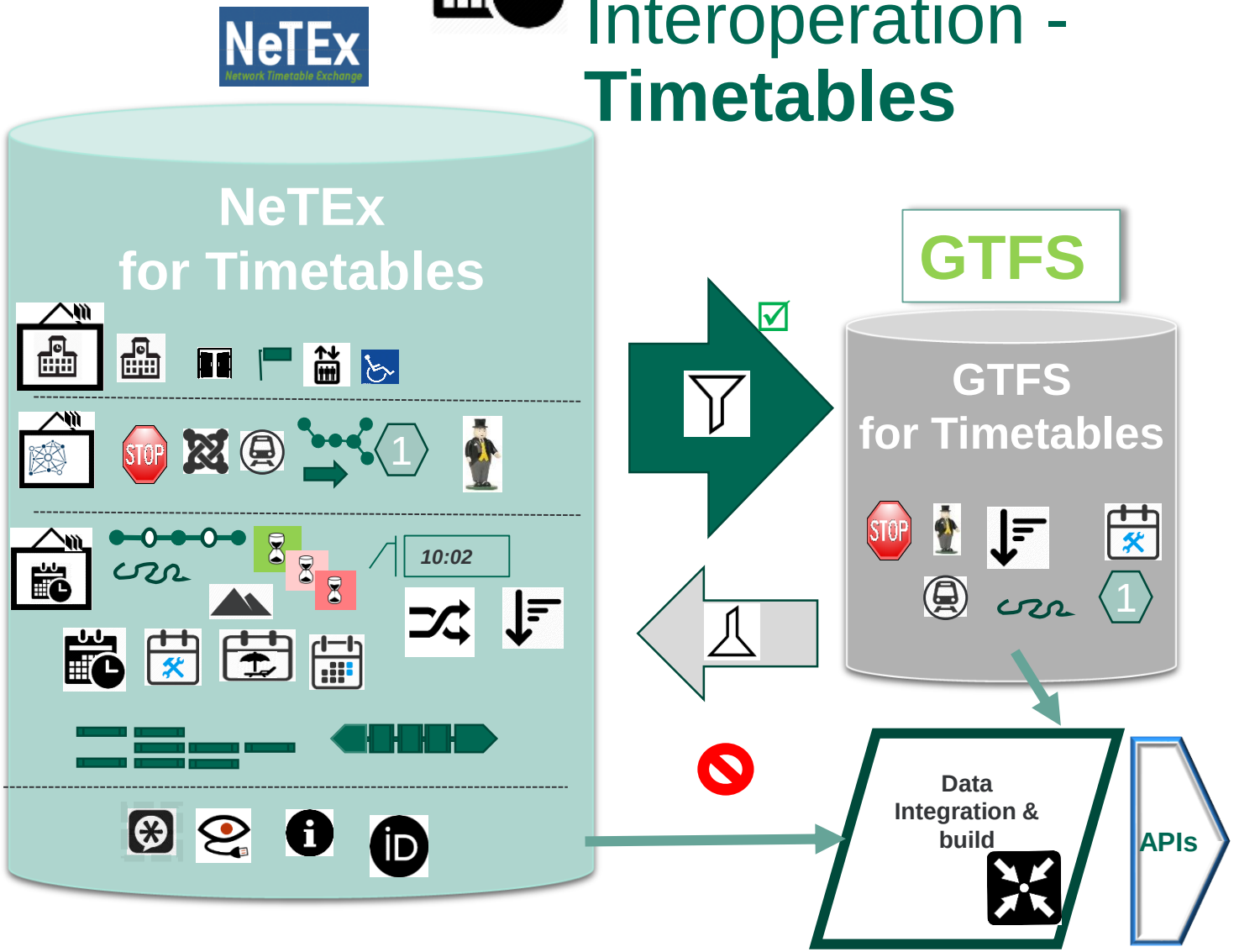
NeTEx & GTFS Interoperation - **Timetables**

- GTFS is useful subset of timetable data for trip planning
  - Layers & times at stop resolved
  - Does not have underlying reusable elements to build
    - e.g. journey patterns, routes.
  - Does not cover complex aspects
    - e.g. grouping, connections , join/spilt, makeup, etc
  - Does not cover some operational data
- Round trip is “Lossy”
  - Lose some elements
  - Interpolation errors



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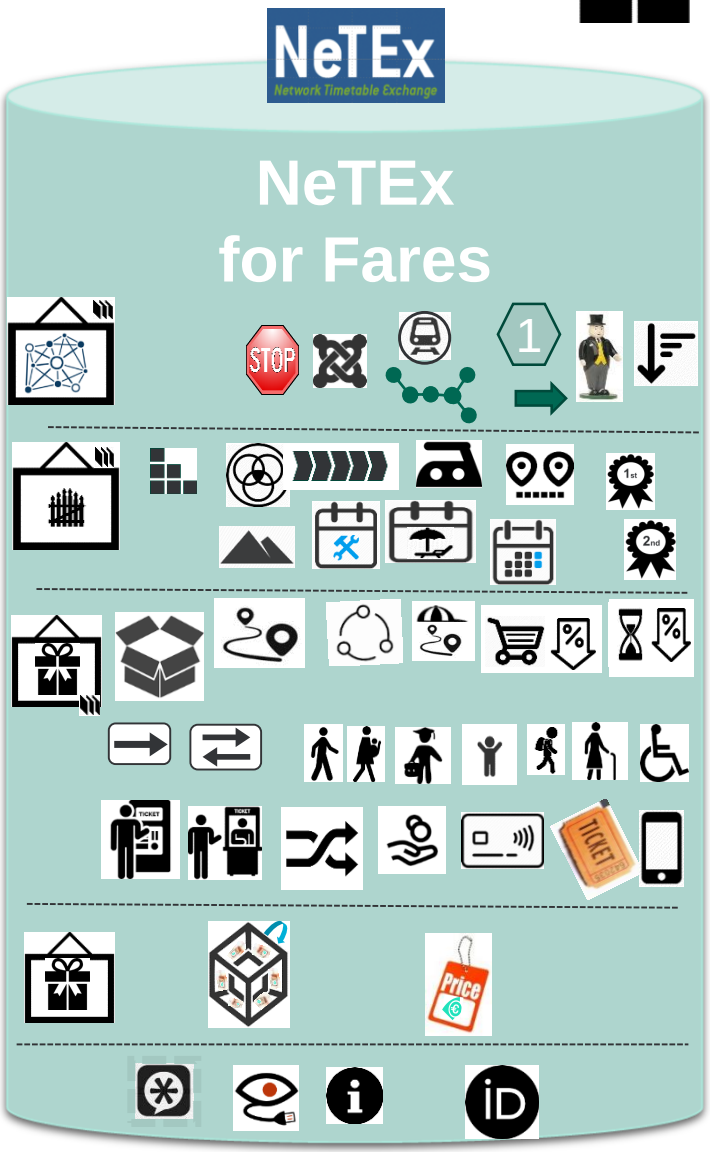
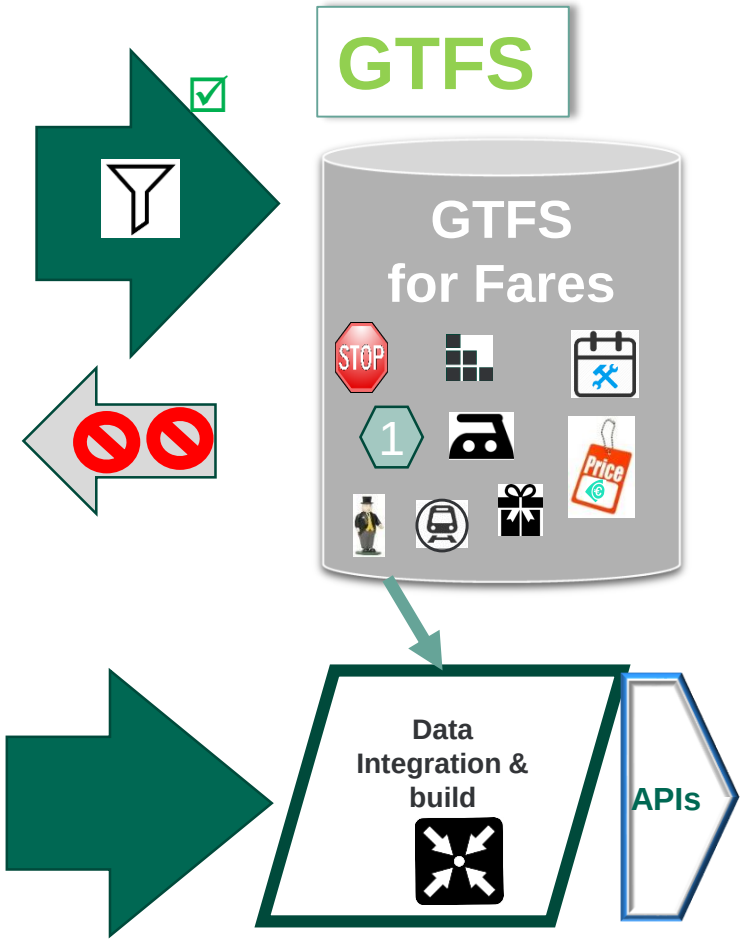
NeTEx & GTFS Interoperation – **Fares & Prices**

- **GTFS is very basic subset of fare data**
  - Flat & P2P structures
  - Simple absolute prices
  - Minimal "product" definition
  - Missing many common distinctions
- **Round trip is very, very "Lossy"**





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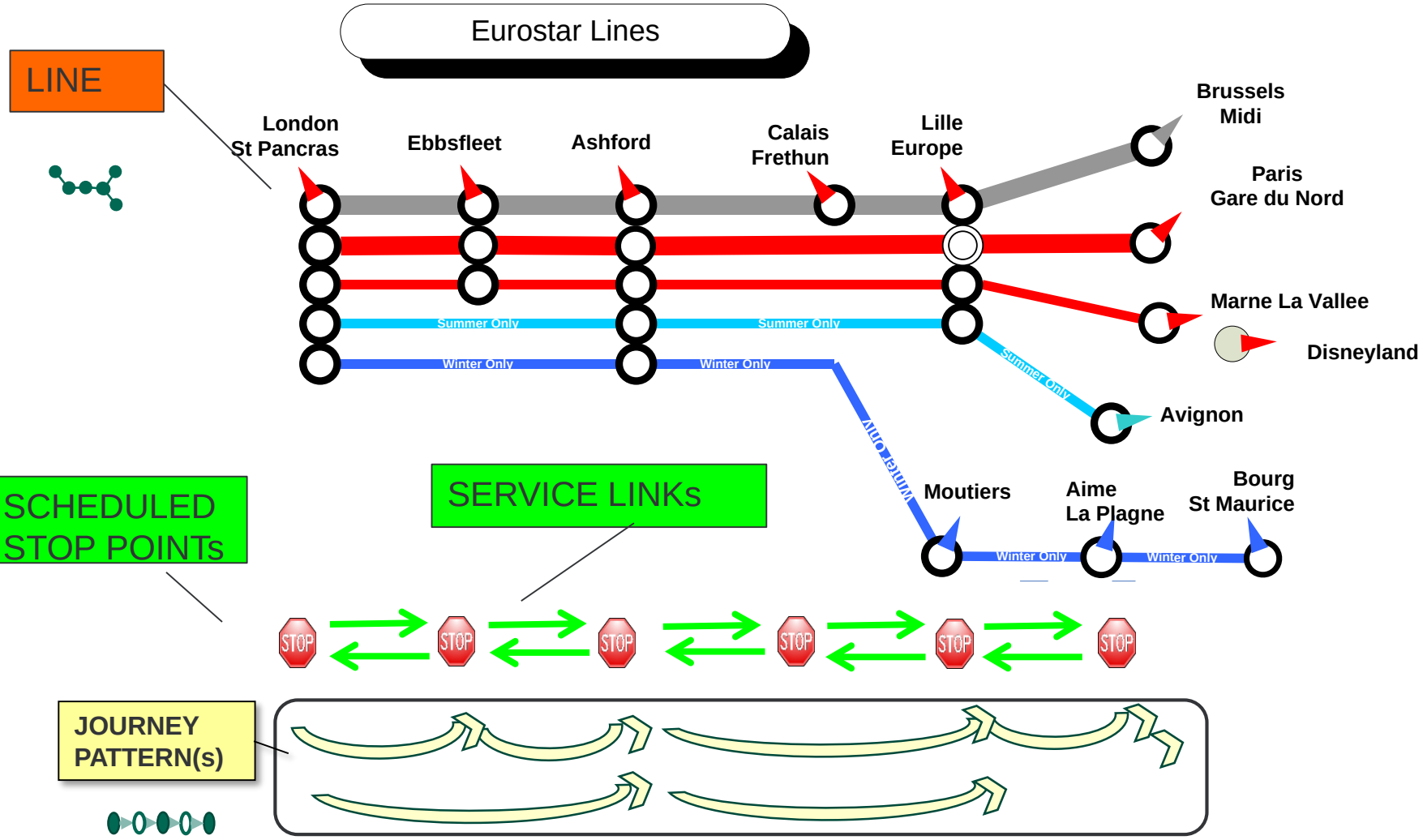
This works for any mode - e.g. Eurostar Routes & Destinations



TIMETABLE

Eurostar timeta

SCHEDULED STOP POINTs

SERVICE PATTERN

OPERATOR

SERVICE LINKs

LINE

DAY TYPE

VALIDITY CONDITION

PASSING TIMEs

TRAIN NUMBERs

EUROSTAR™

BRUSSELS > LILLE / LONDON

STOP STOP STOP STOP STOP

Notes	Mon	Tue	Wed	Thur	Fri	Sat	Sun	BRUSSELS Midi/Zuid	LILLE Europe	CALAIS Fréthun	ASHFORD International	EBBSFLEET International	LONDON St Pancras Intl	Train no.
	✓	-	-	-	-	-	-	06:56	07:35	-	-	-	07:59	9109
	✓	✓	✓	✓	✓	✓	-	07:56	08:35	-	-	-	08:59	9113
	✓	✓	✓	✓	✓	✓	✓	08:52	09:30	10:01	-	-	09:57	9117
2	-	-	-	-	✓	-	-	10:56	11:35	-	-	-	11:57	9125
4	✓	✓	-	-	-	-	-	10:56	11:35	-	-	-	11:57	9125
3	-	-	✓	✓	-	-	-	10:56	11:35	-	-	-	11:57	9125
	-	-	-	-	-	-	✓	11:56	12:35	-	-	-	12:57	9131
	✓	✓	✓	✓	✓	✓	-	12:52	13:30	14:01	-	13:45	14:05	9133
	-	-	-	-	-	-	✓	14:52	15:30	16:01	-	15:45	16:05	9141
	✓	✓	✓	✓	✓	✓	-	14:56	15:35	-	-	15:45	16:05	9141
1	-	-	-	-	-	-	✓	15:56	16:35	-	-	-	16:57	9145
	✓	✓	✓	✓	✓	✓	-	16:56	17:35	-	17:34	-	18:06	9149
1	-	-	-	-	-	-	✓	16:56	17:35	-	17:34	-	18:06	9149
2	-	-	-	-	-	-	✓	16:56	17:35	-	-	17:45	18:03	9149
	✓	✓	✓	✓	✓	-	-	17:56	18:35	-	-	18:45	19:03	9153
1	-	-	-	-	-	-	✓	17:56	18:35	-	-	18:45	19:03	9153
2	-	-	-	-	-	-	✓	17:56	18:35	-	18:35	-	19:10	9153
1	-	-	-	-	-	-	✓	18:52	19:30	20:01	-	19:45	20:03	9159
2	-	-	-	-	-	-	✓	18:56	19:35	-	-	-	19:57	9159
4	-	-	-	-	✓	-	-	18:56	19:35	-	-	-	19:57	9159
	✓	✓	✓	✓	✓	✓	-	19:52	20:30	21:01	-	20:45	21:03	9163
6	-	-	-	-	-	-	✓	19:52	20:30	21:01	-	20:45	21:03	9163

- DAY TYPES
- 6 SCHEDULED STOP POINTs
- 5 SERVICE LINKs (Each way)
- 5 JOURNEY PATTERNs

NOTICE

1 Runs from 1 April 2018
2 Runs until 31 March 2018
3 Runs from 4 May 2018
4 Runs until 5 January and from 4 February until 30 March 2018
5 Runs until 19 March 2018
6 Runs until 12 April 2018
4 February 2018

JOURNEY PATTERNs

VEHICLE JOURNEYs

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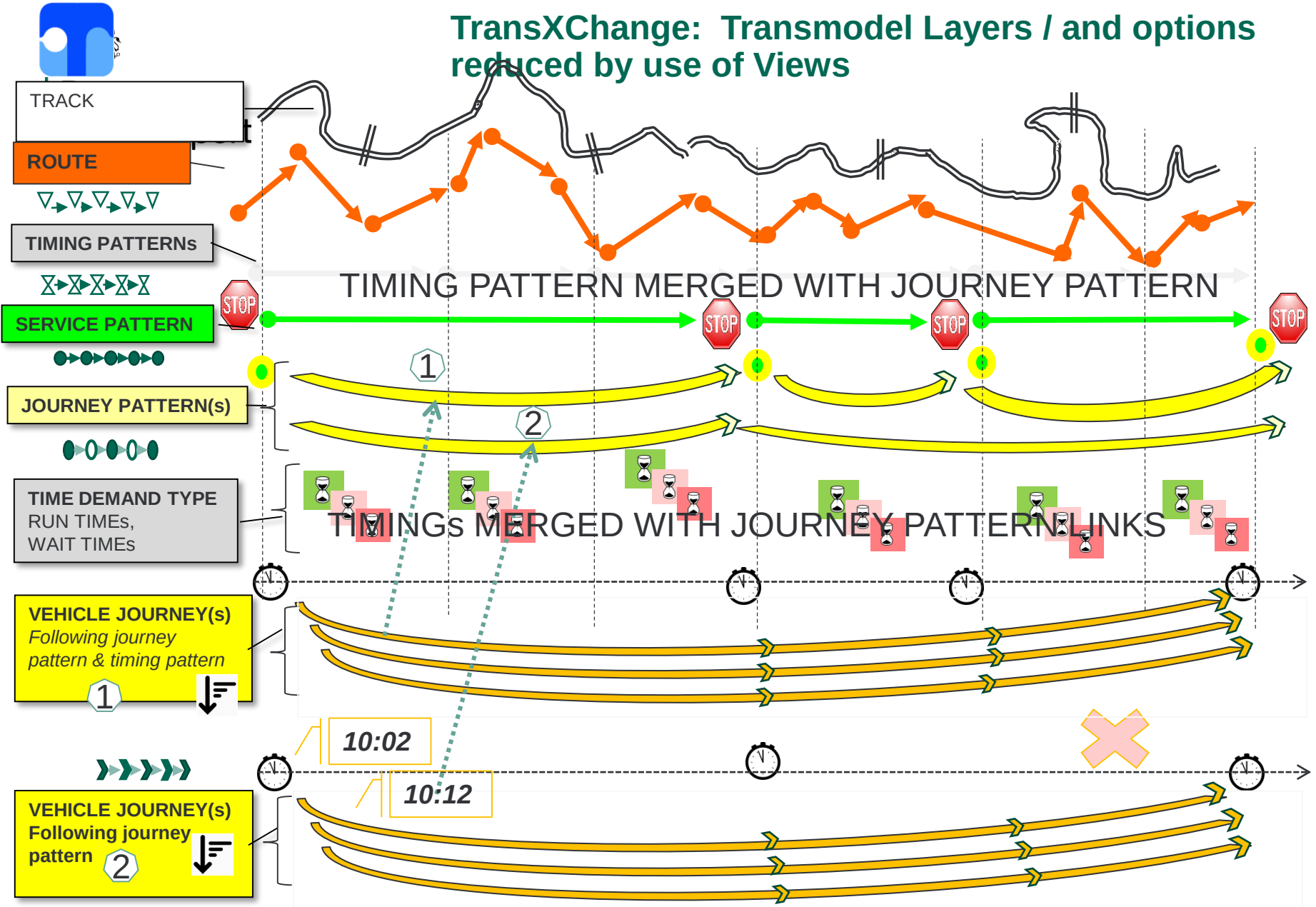
TransXChange vs Transmodel

- Some use of views in TXC to combine TM elements to simplify
  - (E.g. Timing Patters & Service Patterns)
  - E.g. TimingLink + Runlime , Usage + Wait time
- Some changes in TM since TM 5.1
  - E.g. Routes vs Service Patterns
  - E.g. Separate Logical and Physical stops
- Some discrepancies in TXC
  - E.g. TXC Day types (TXC: “Operating Profile”)
  - are not first class entities E.g. Dead Runs
- Some UK Specific Features
  - E.g. EBSR Registrations

TransXChange: Transmodel Layers / and options reduced by use of Views



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Some other useful PT things that TM/ NeTEx can model

- Stations & Transport Interchanges
- Navigation & Accessibility
- Journey Interchanges & Timings
- Journey Accounting (e.g. Subsidies)

- Journey Coupling, Train Make up, etc

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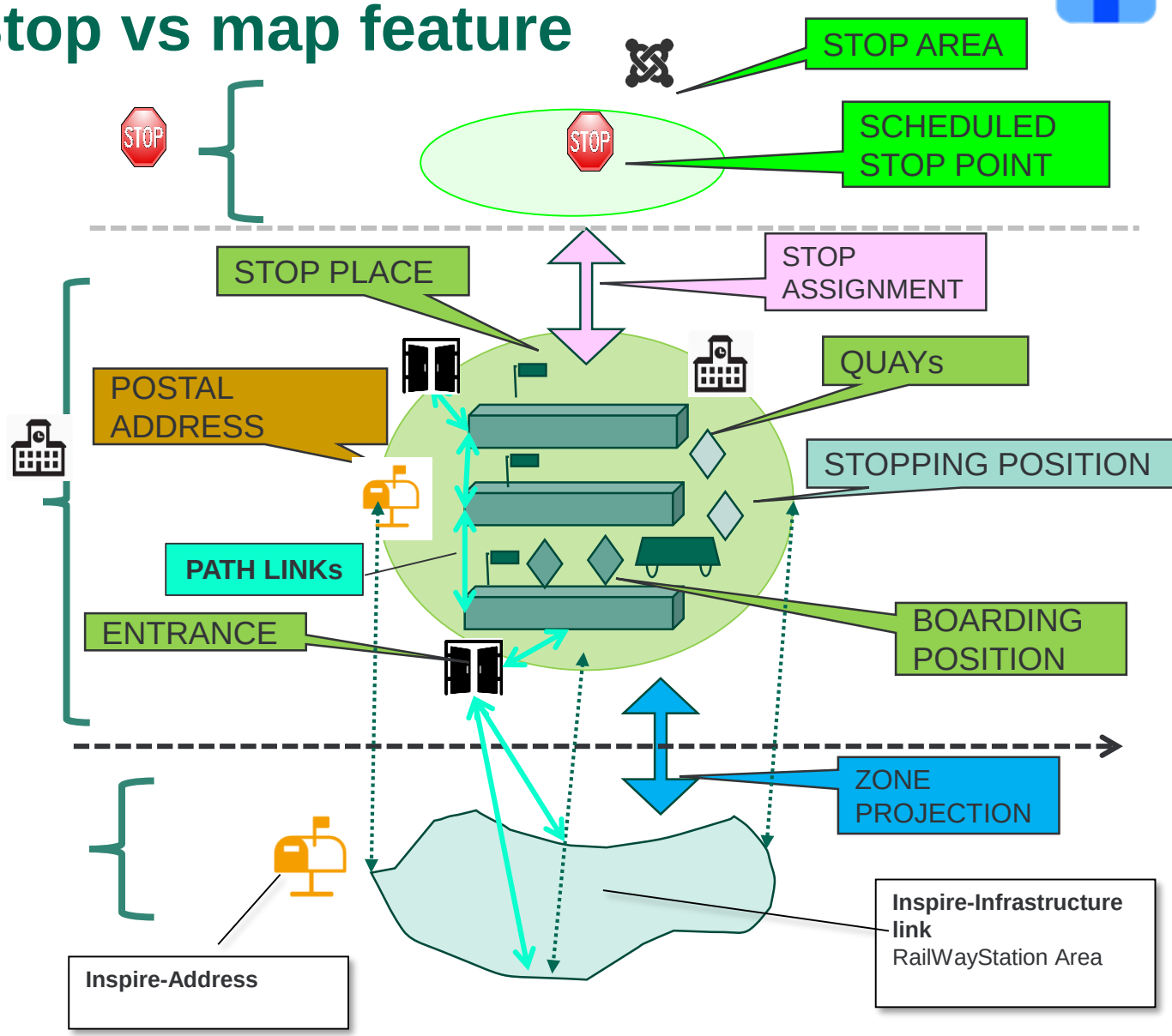
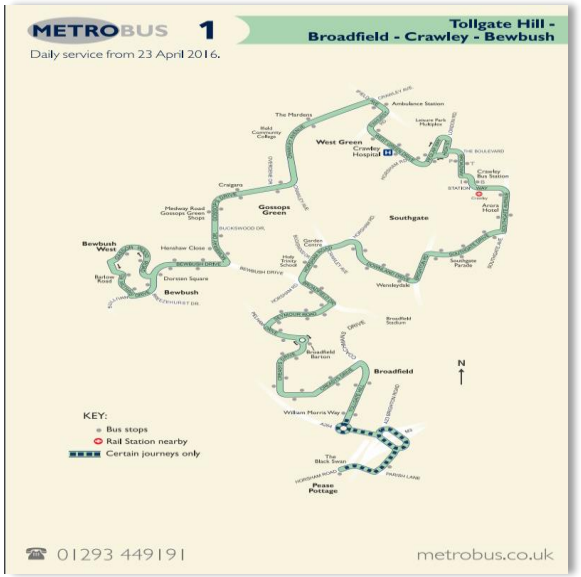
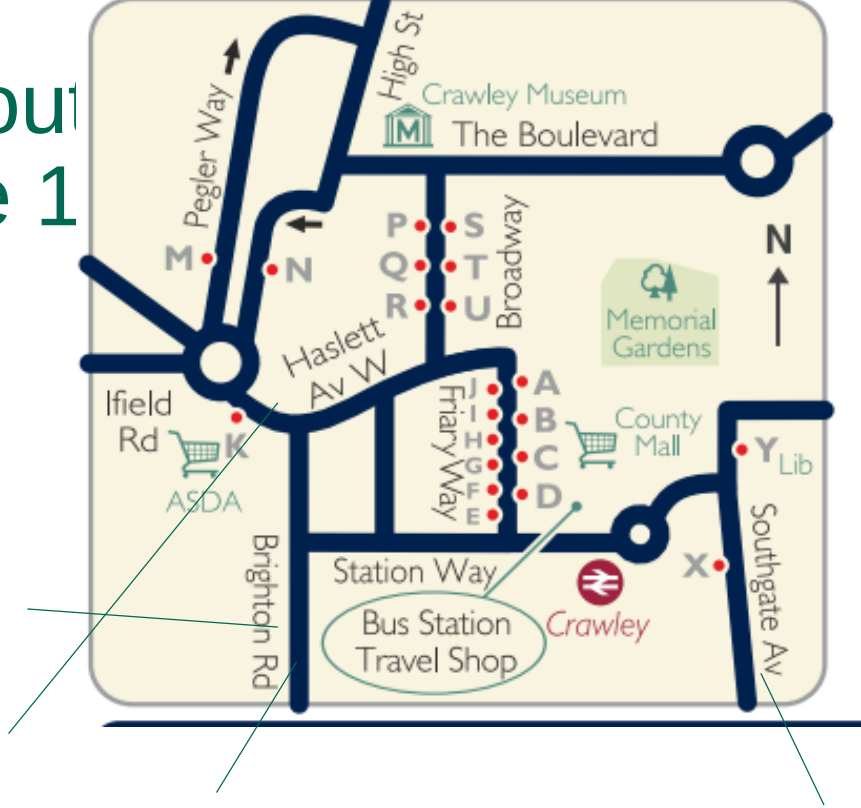
Logical Stop vs Physical Stop vs map feature

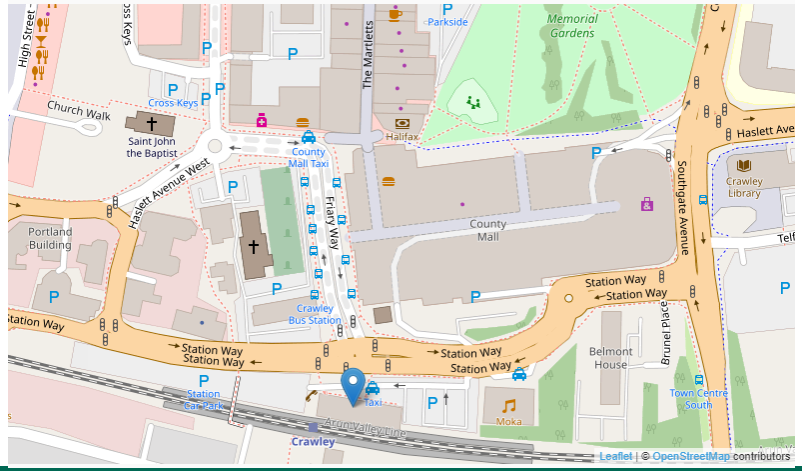
- Transmodel: PT layers for SITES
  - 2D areas as ZONEs
  - Physical Stop is distinct from logical stop
  - Multiple layers, separation of concerns
  - “Projection” spatial mapping between layers as polygons
  - Any location system (OS, WGS etc)
- Can be integrated with Spatial data eg Inspire
  - Areas as Polygons



A Typical Bus Rou
(Metrobus Route 1







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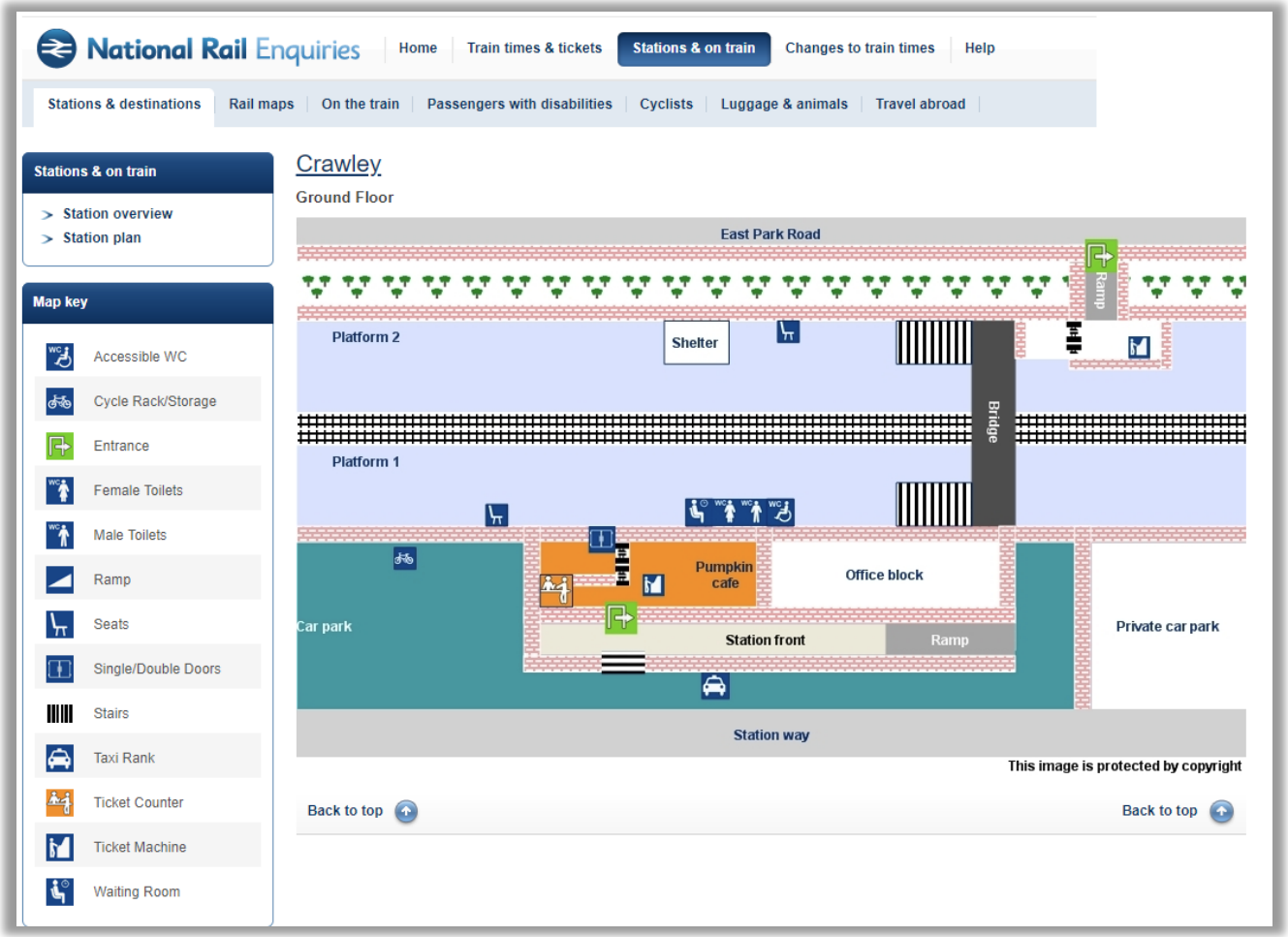
Crawley Station - Accessibility



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http://www.nationalrail.co.uk/stations-and-destinations/stations-made-easy/crawley-station-plan

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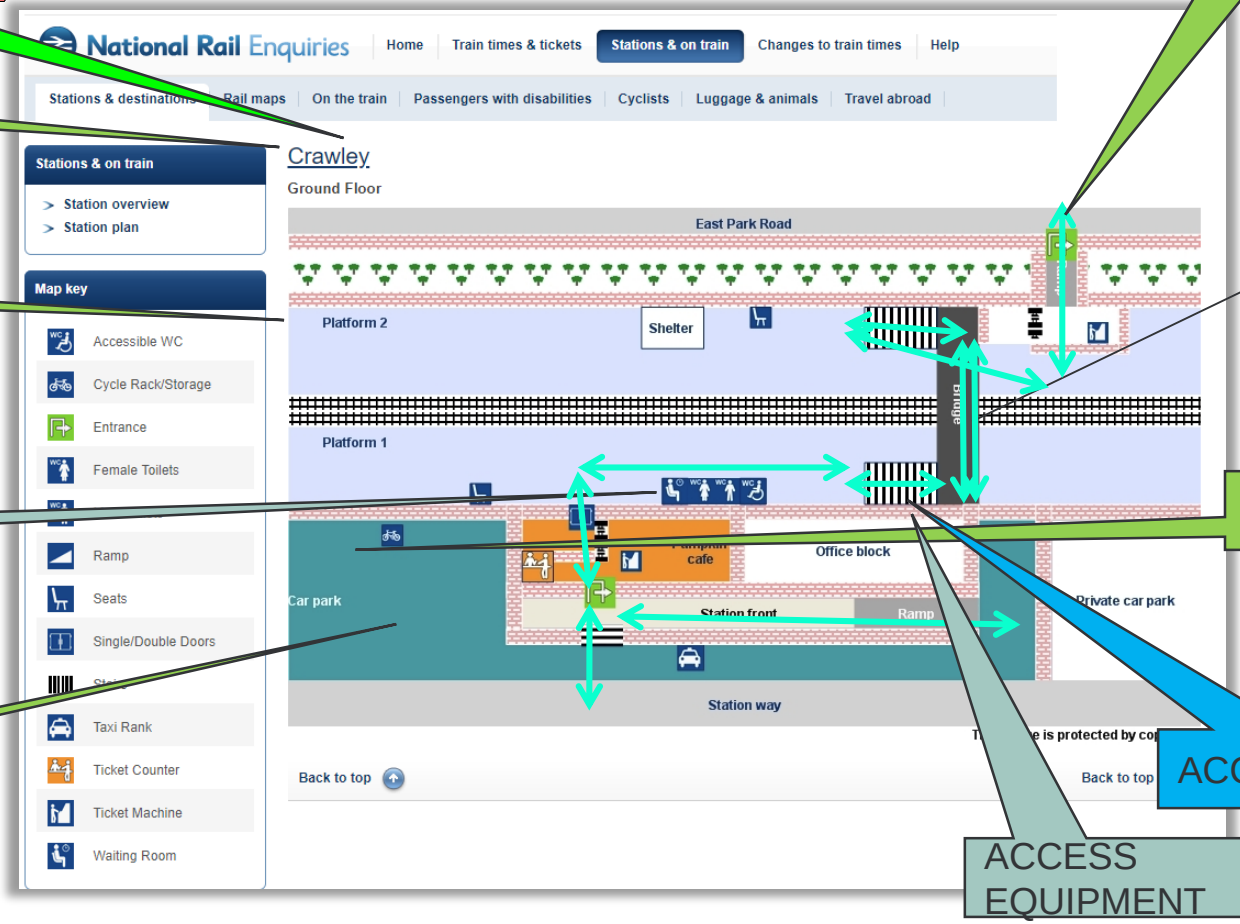
Crawley Station - Accessibility



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http://www.nationalrail.co.uk/stations-and-destinations/stations-made-easy/crawley-station-plan

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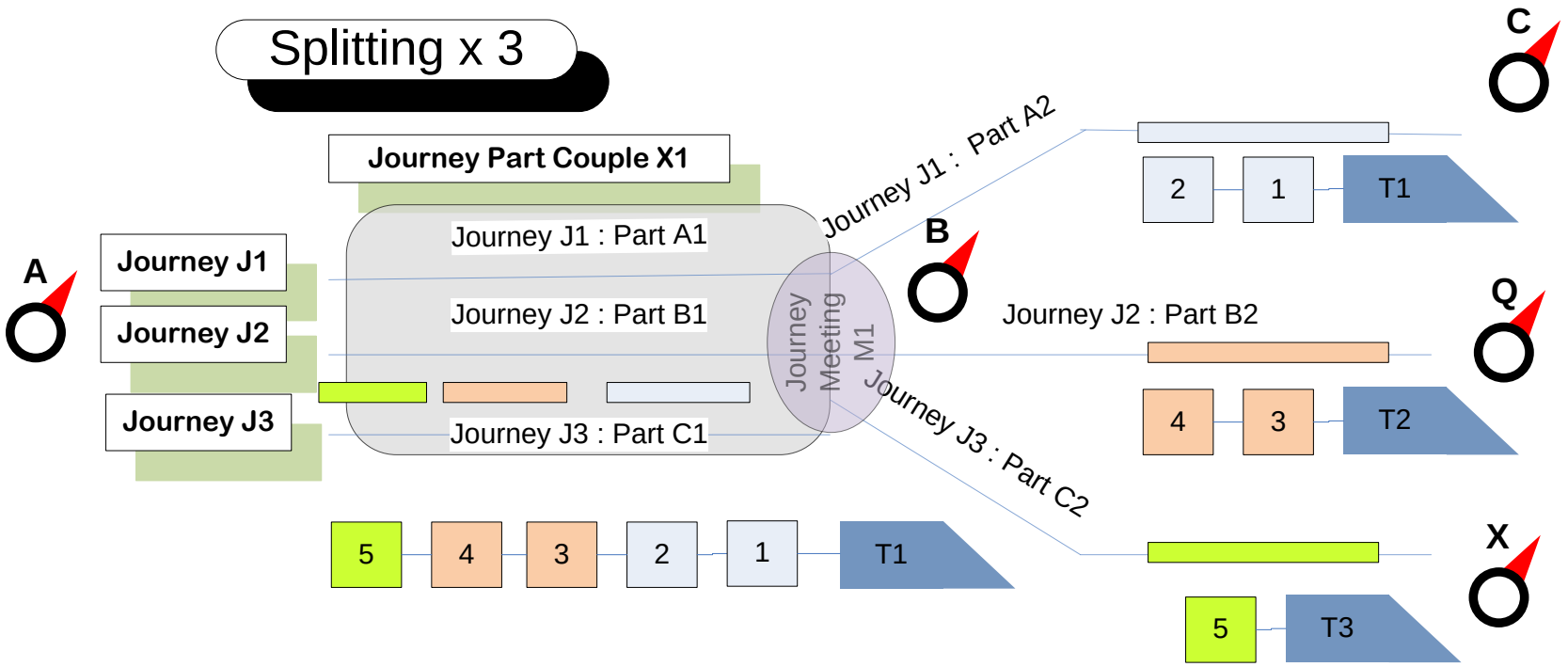
Journeys that split or join, Train Makeup



- VEHICLE JOURNEY, JOURNEY PARTs, JOURNEY PART COUPLEs, JOURNEY MEETINGs, etc
- TRAIN, TRAIN COMPONENT, etc

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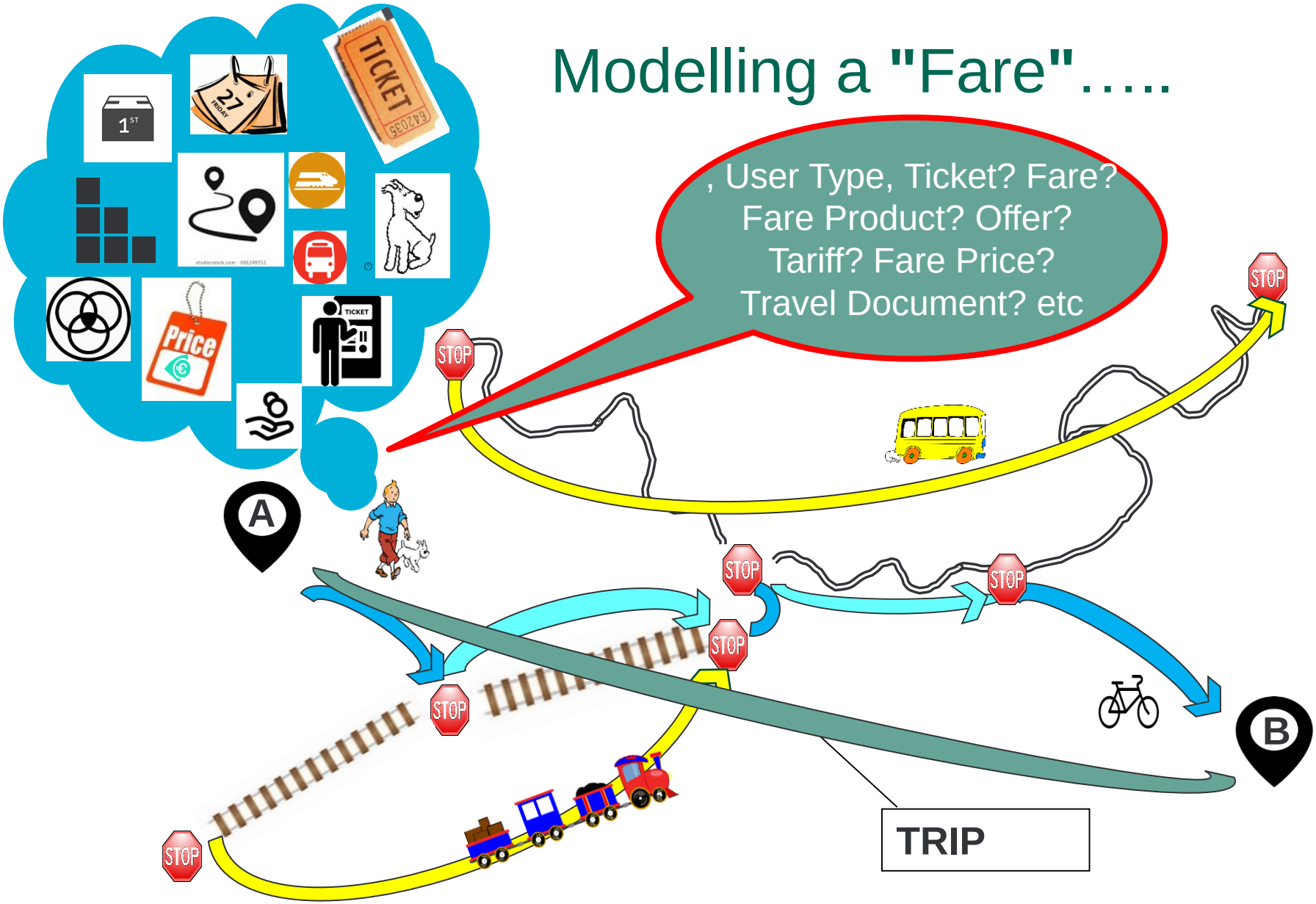
A Conceptual Model for Fares - an introduction

Modelling a "Fare"…..



Describing Fares with Transmodel / NeTEx

Network Basis

Tariff Structure

Access Rights

Fare Products

Sales Offer Packages

Travel Specification

Pricing

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

Fulfilment & Payment
Control & Validation
Billing &Clearing

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*

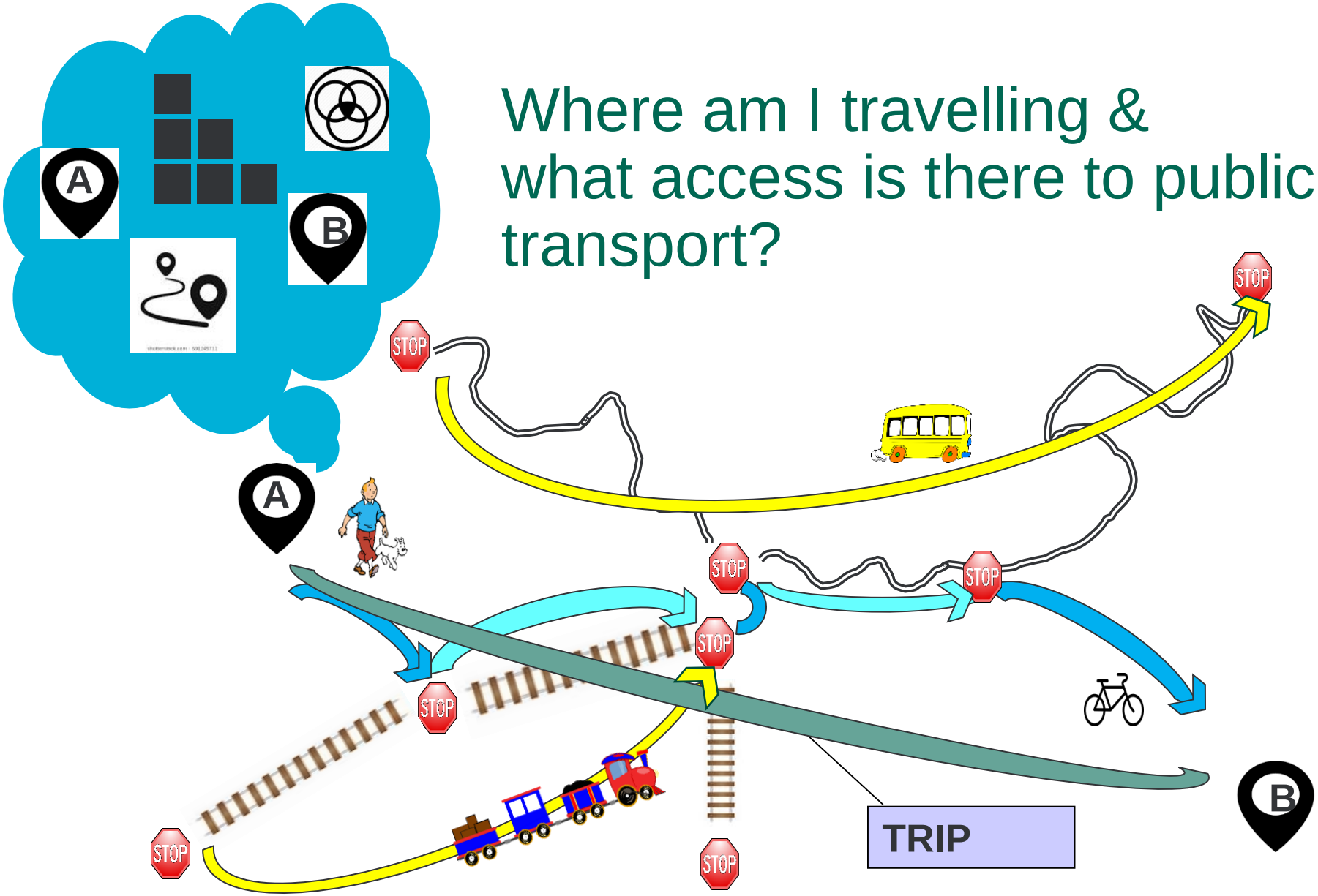
Rights to access & consume services:
- scope and order of use
- validity and usage rules
- *bus trip stop X to stop Y, metro trip 3 zones*

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*

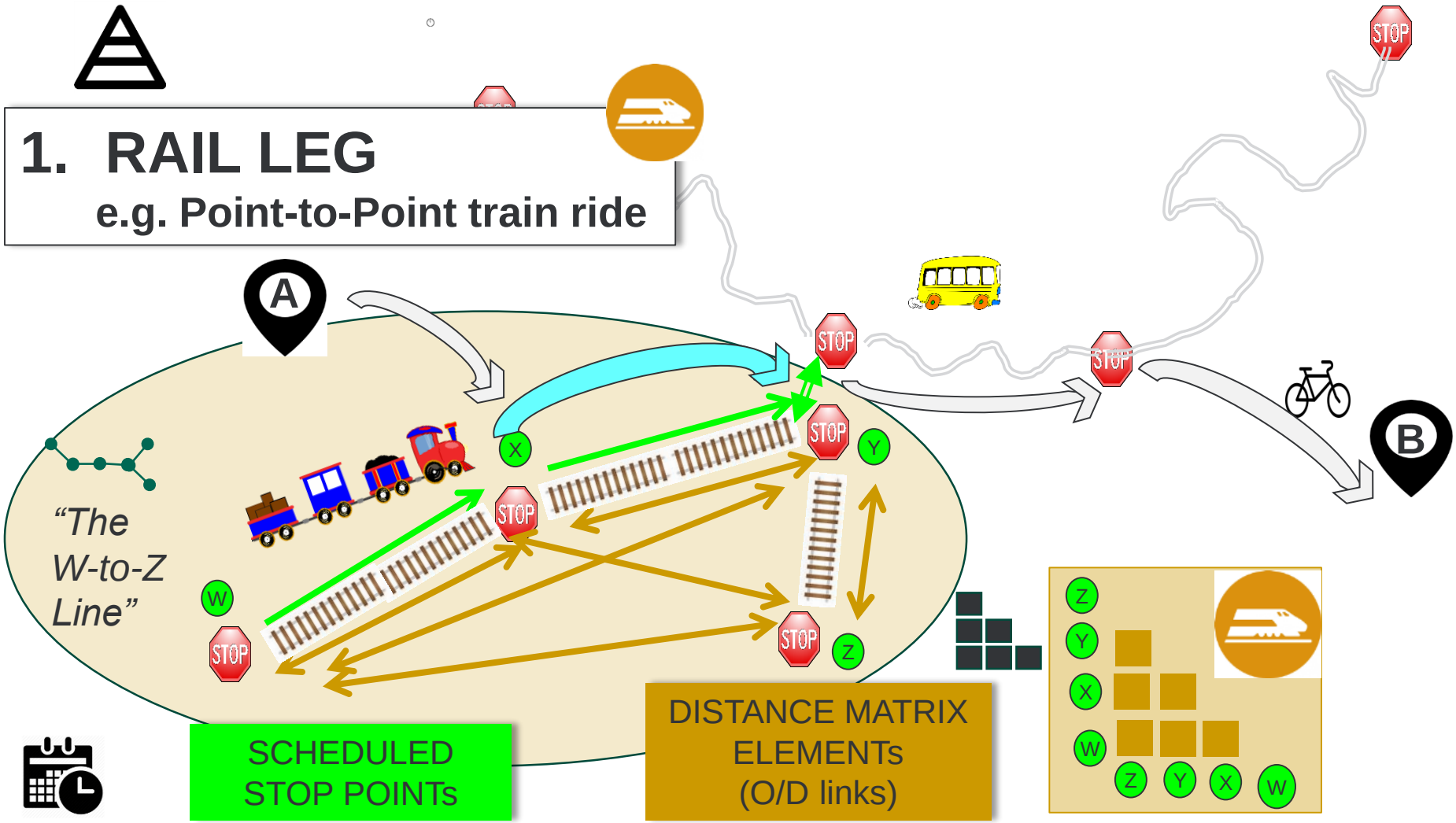
Travel Specification
- Specific set of choices to purchase
- *Adult single A to B on a smartcard*

Where am I travelling & what access is there to public transport?



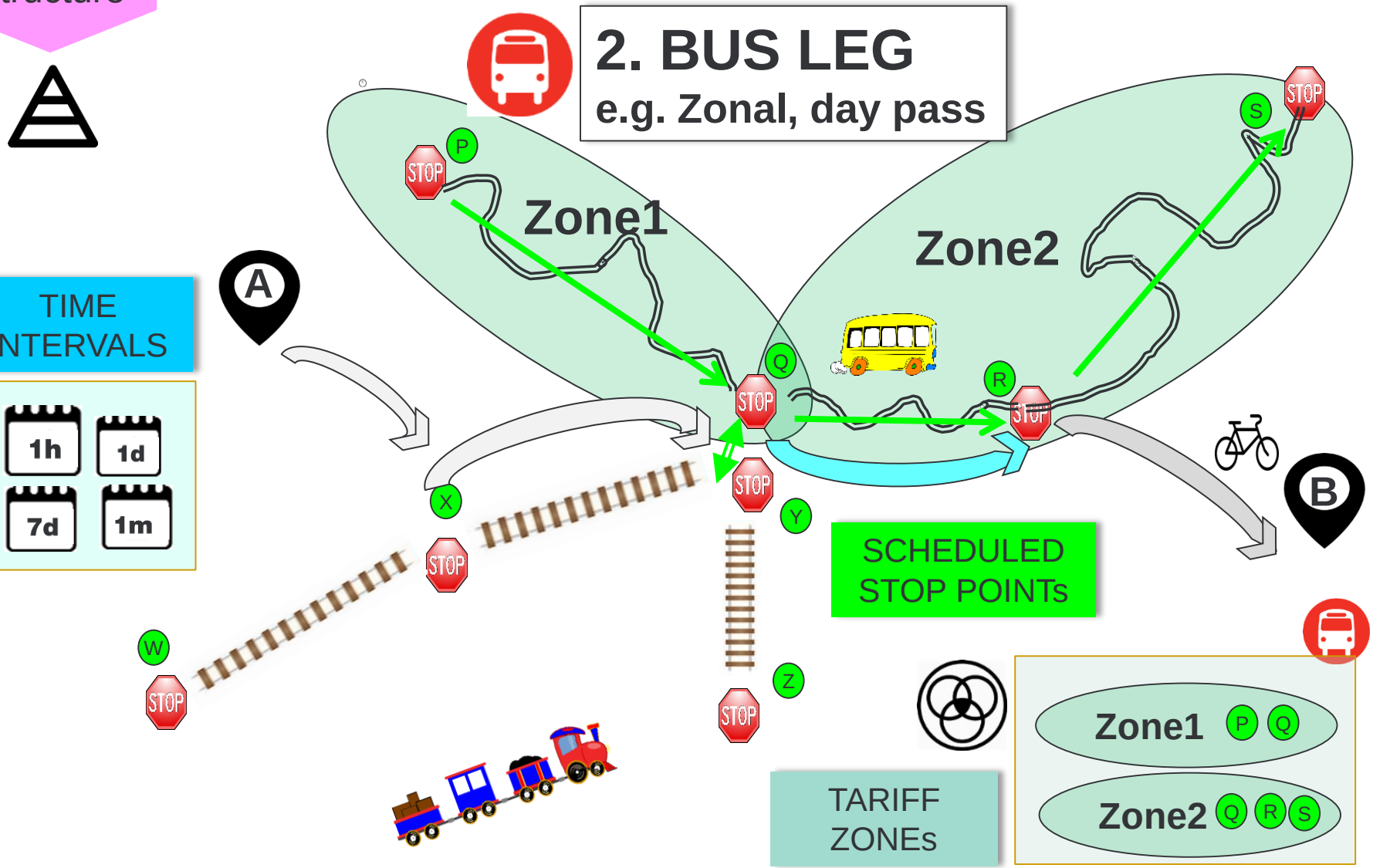
Tariff Structure

The tariff structure describes the basis of fares in terms of network and time elements (as already used to define timetables, etc)

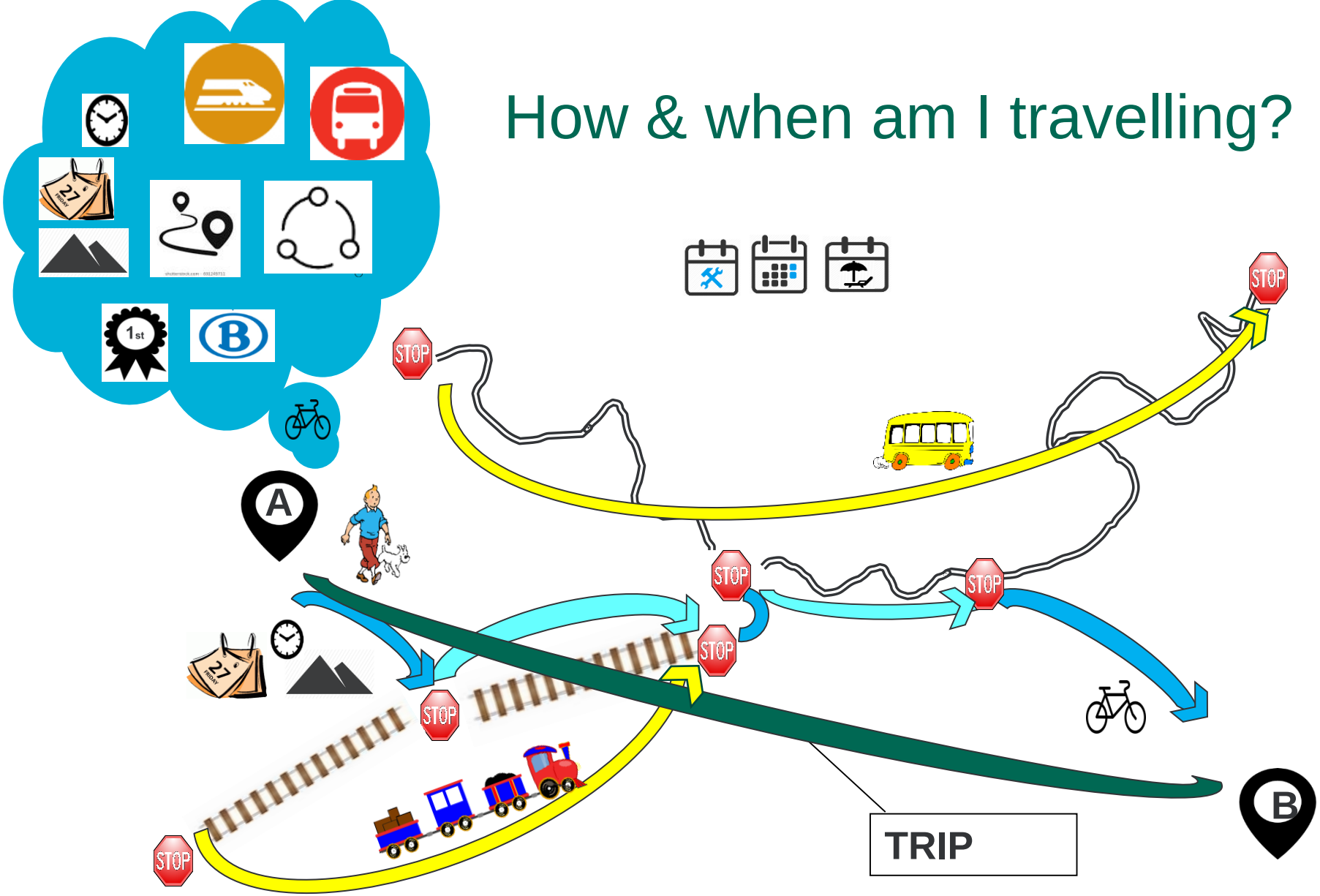


Tariff Structure

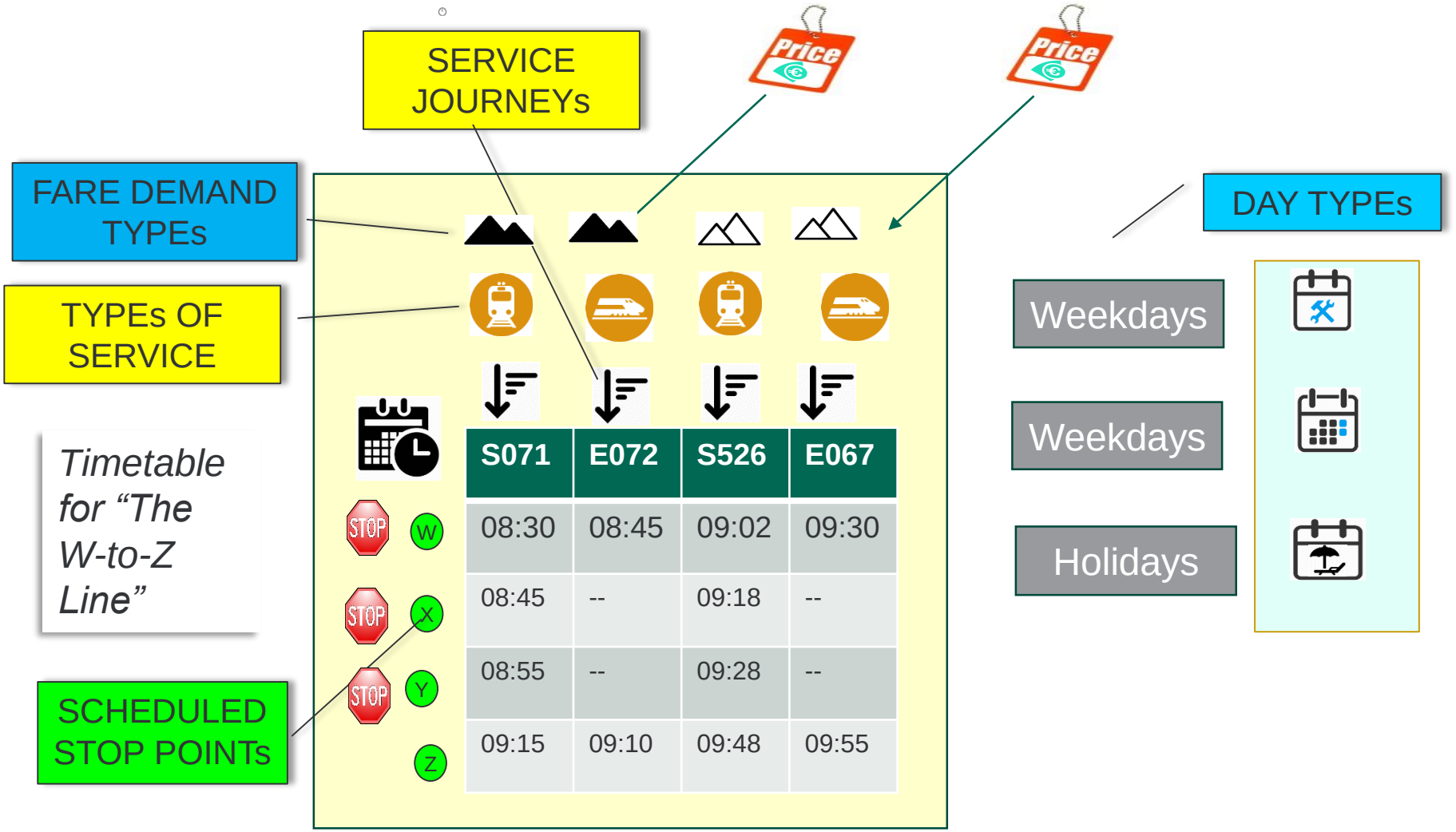
Fare structures may be Point-to-point, Zonal, flat, zone counting, distance based, time-based, etc



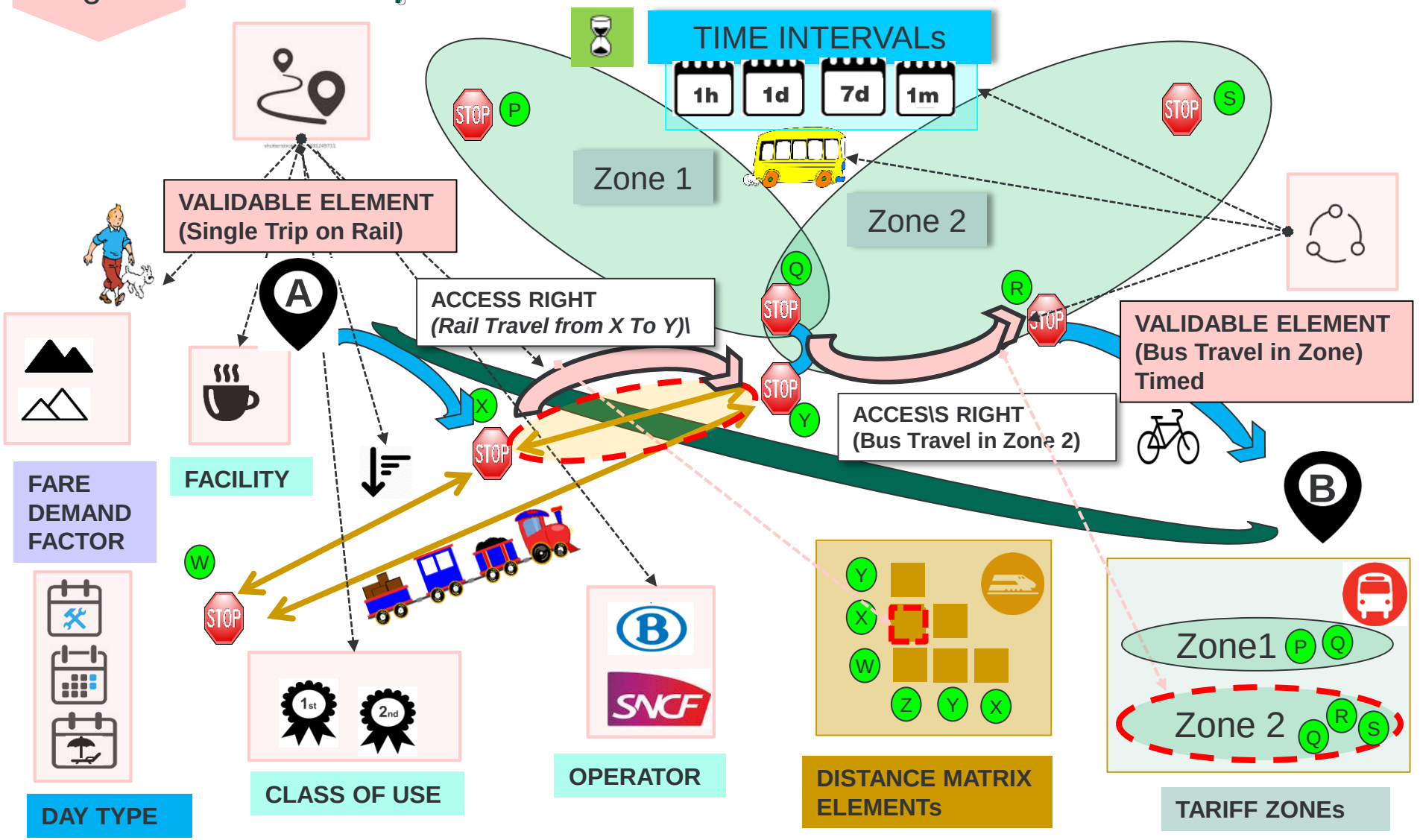
How & when am I travelling?



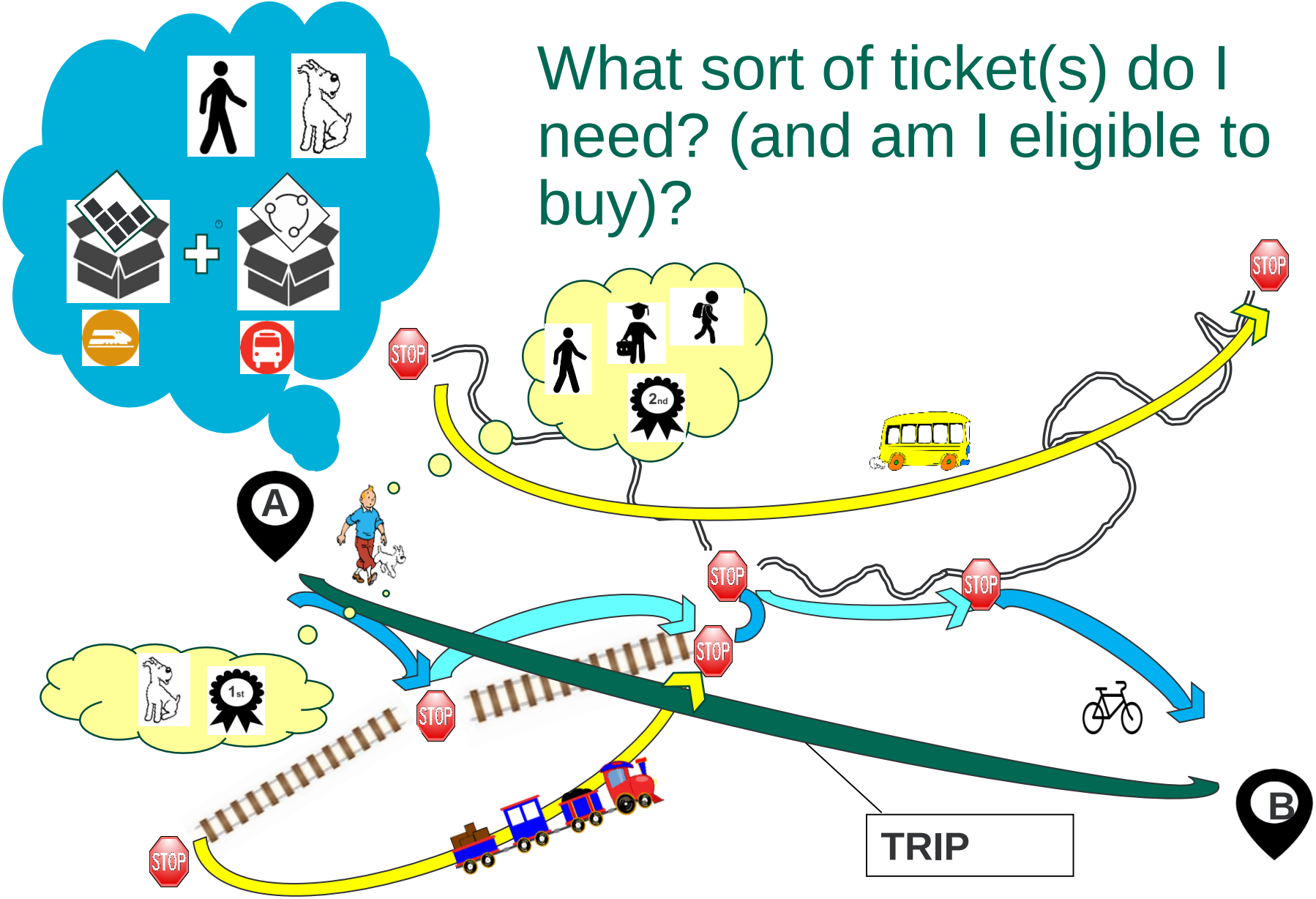
The tariff structure may also be based on Schedule related aspects, e.g. fare demand type (Peak, Off-peak, etc), train category, specific services, etc



Access Rights specify which transport services can be consumed

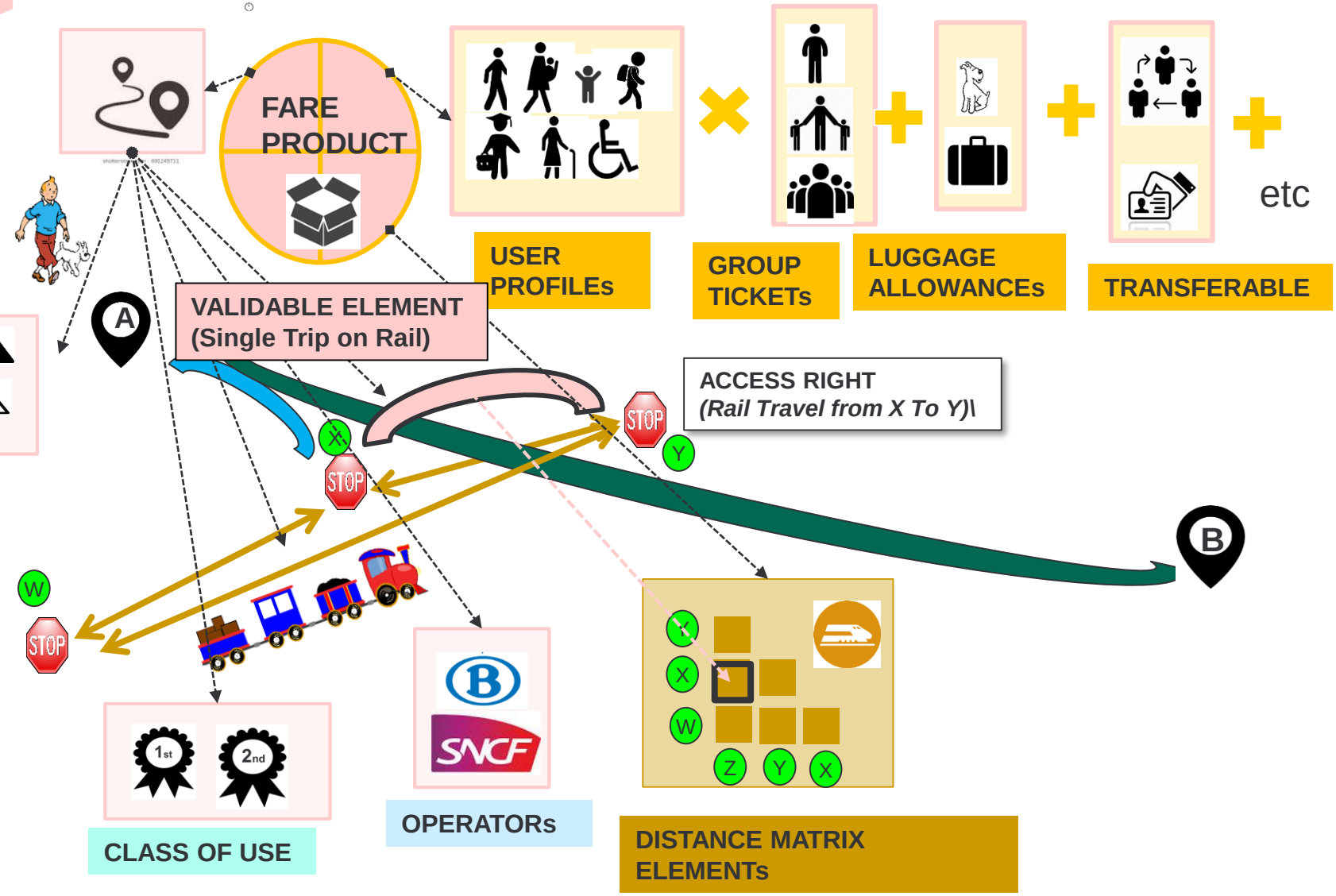


What sort of ticket(s) do I need? (and am I eligible to buy)?

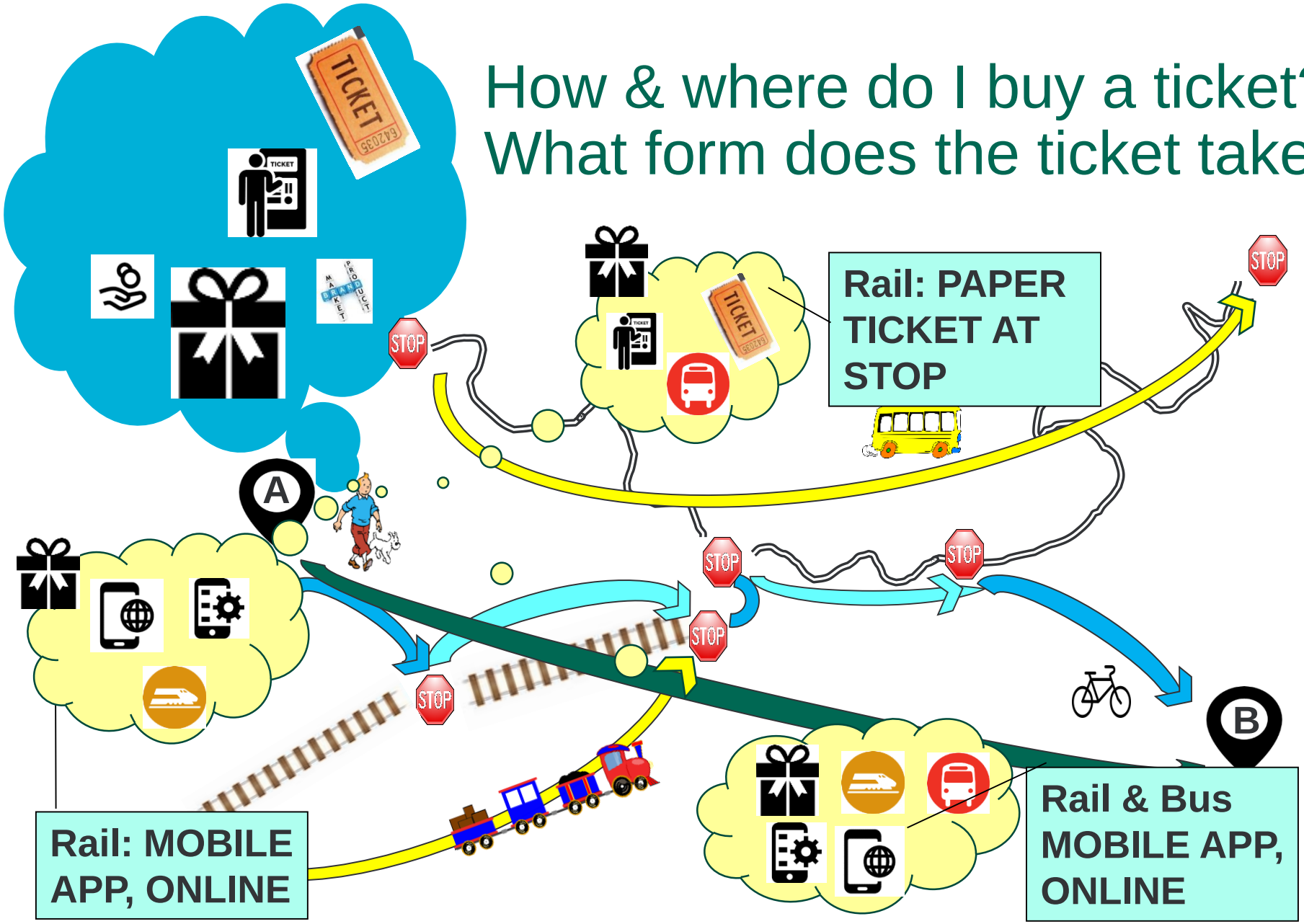


Fare Products

a FARE PRODUCT is a marketable set of access rights & other validity parameters

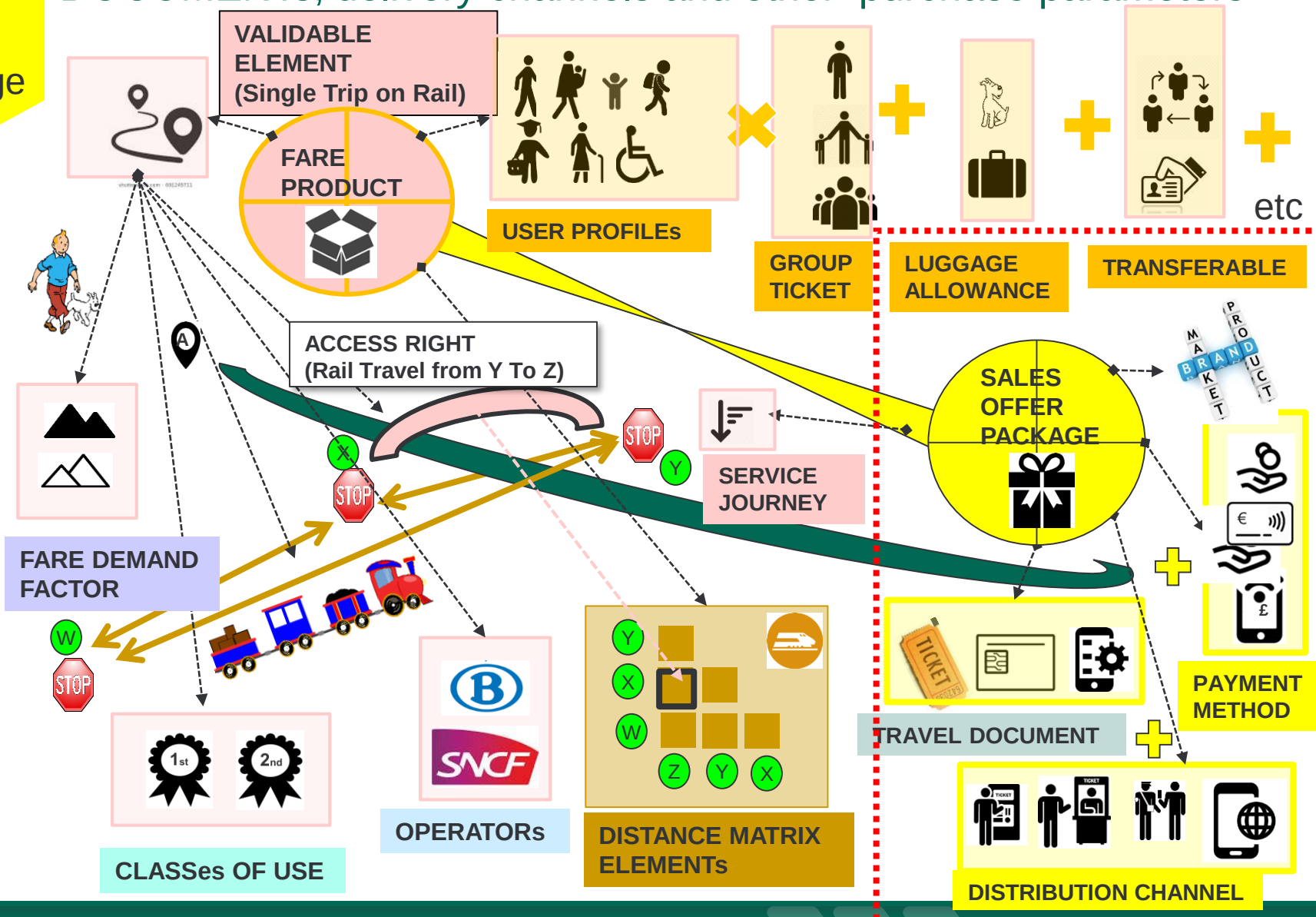


How & where do I buy a ticket? What form does the ticket take?

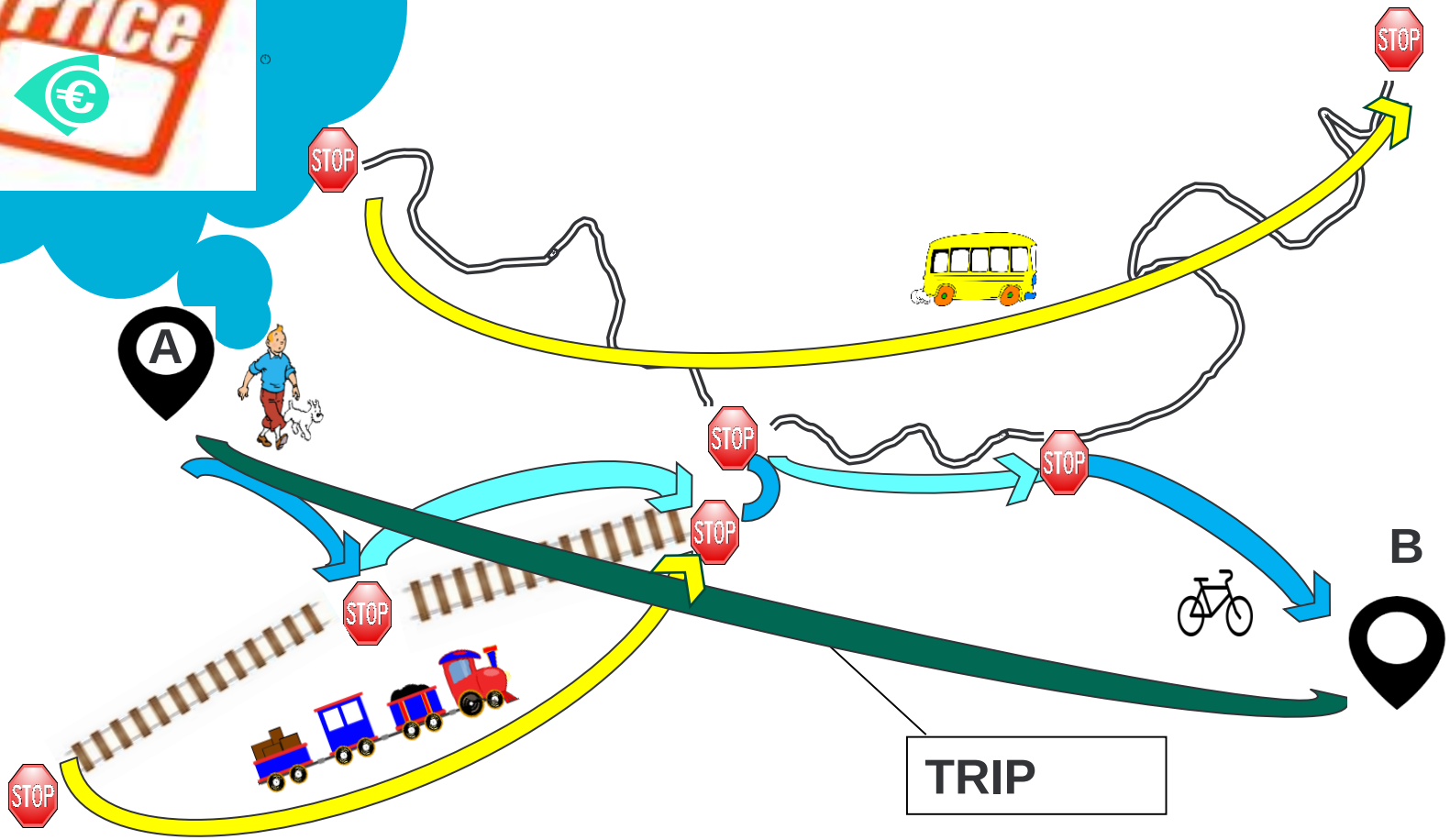


Sales Offer Package

A SALES OFFER PACKAGE specifies available TRAVEL DOCUMENTs, delivery channels and other purchase parameters

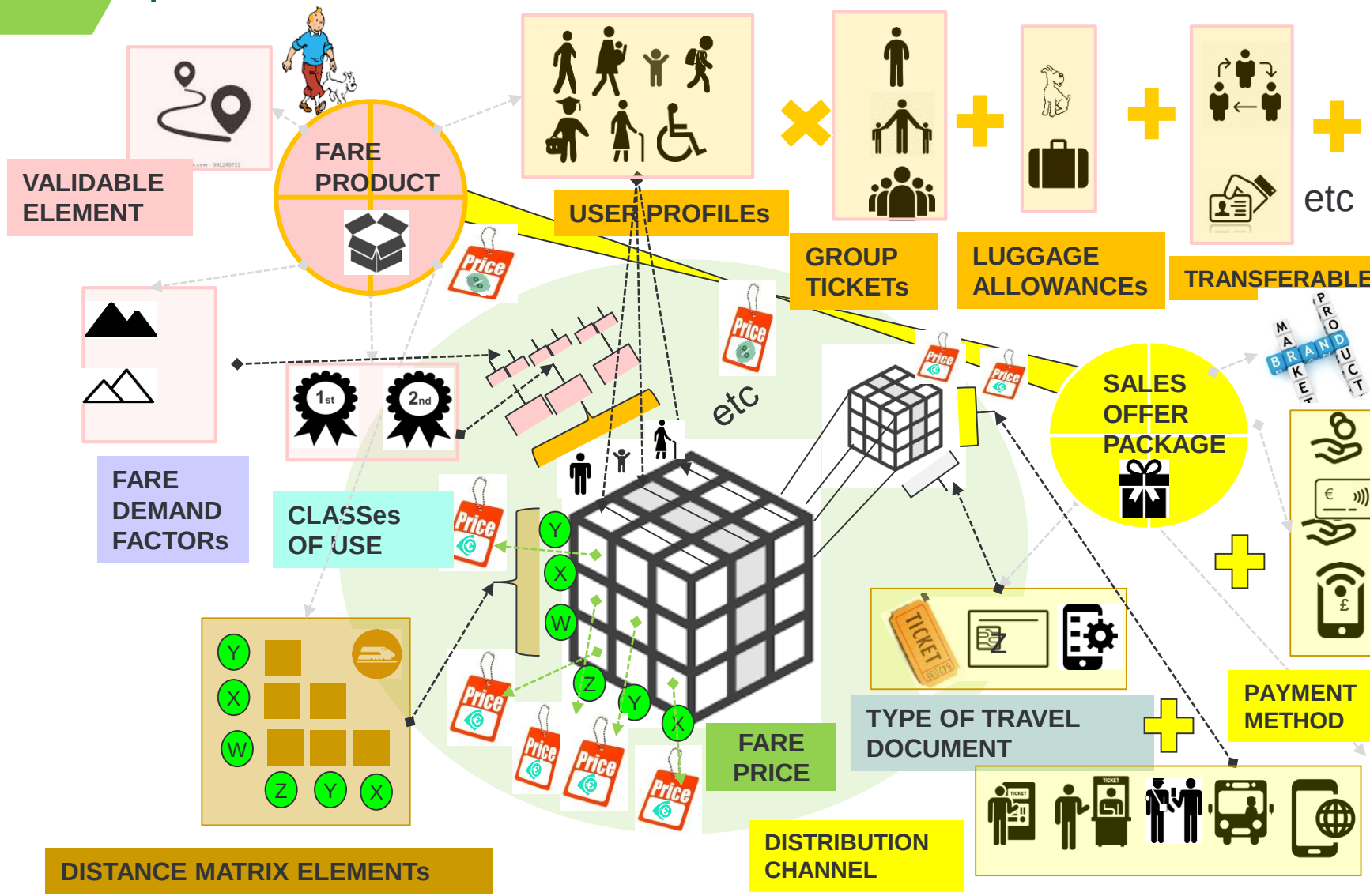


What does it cost?…..



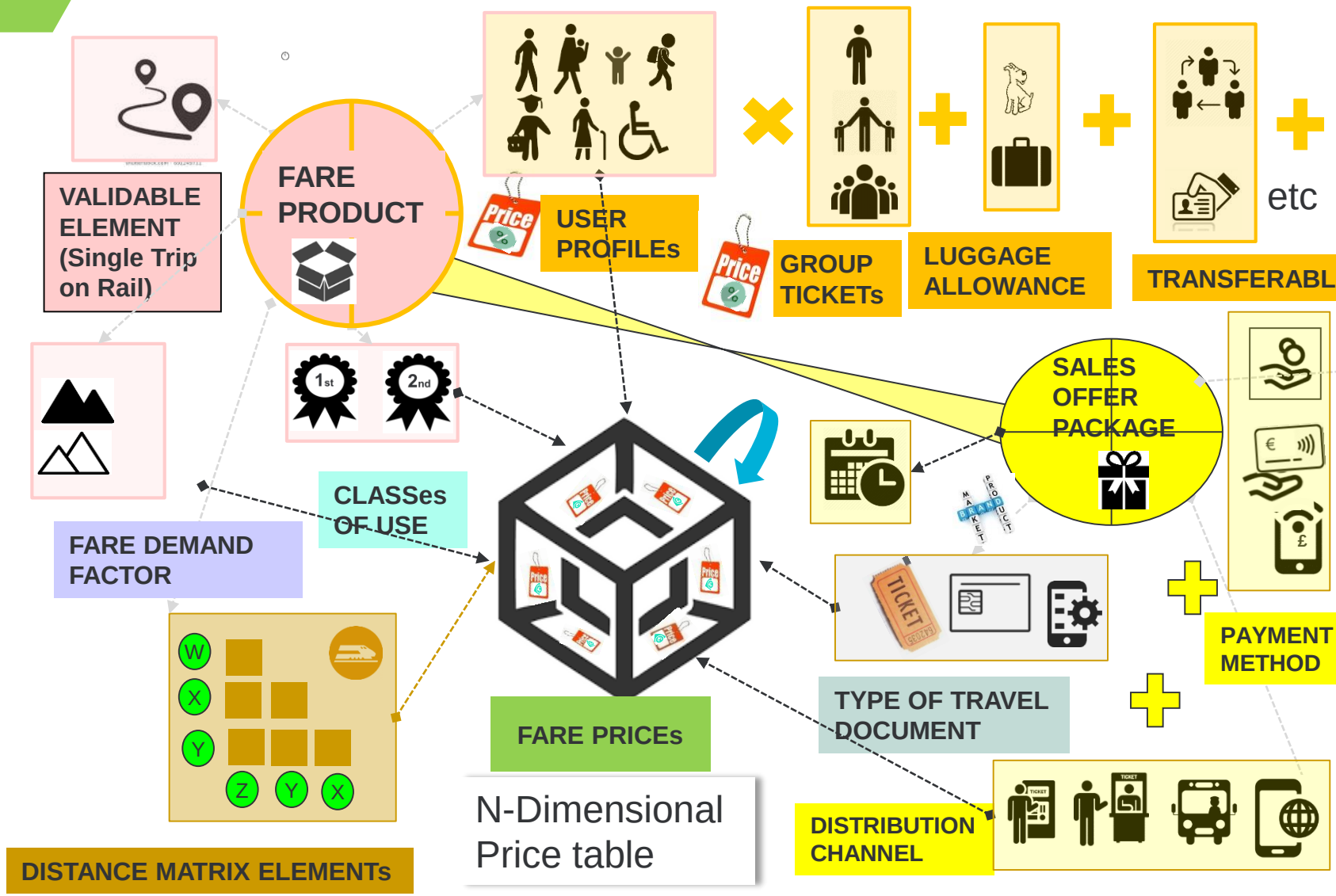
Pricing

FARE PRICEs are separate. There may be distinct prices for each available combination of fare elements

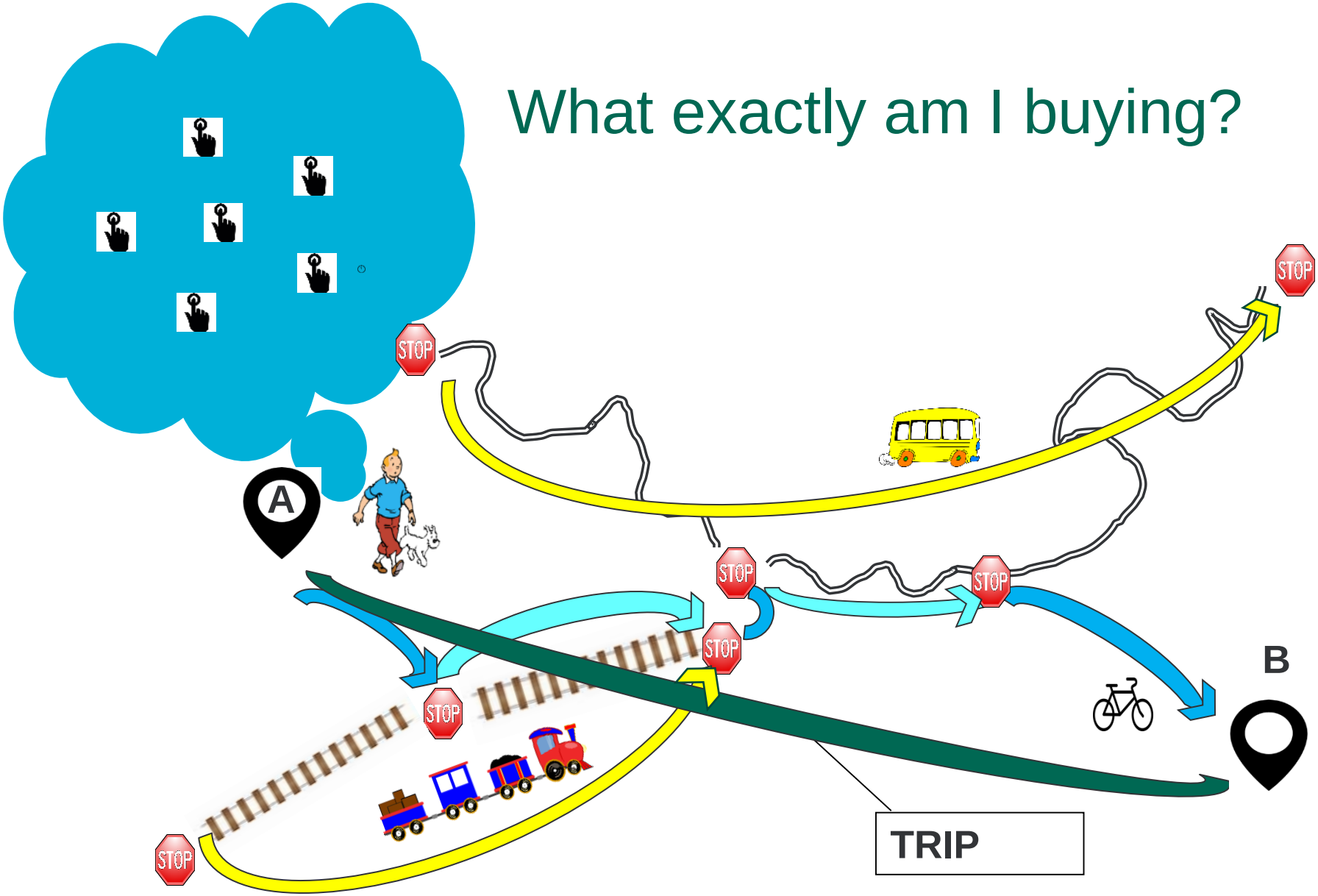


Pricing

FARE PRICEs are separate. There may be distinct prices for each available combination of fare elements

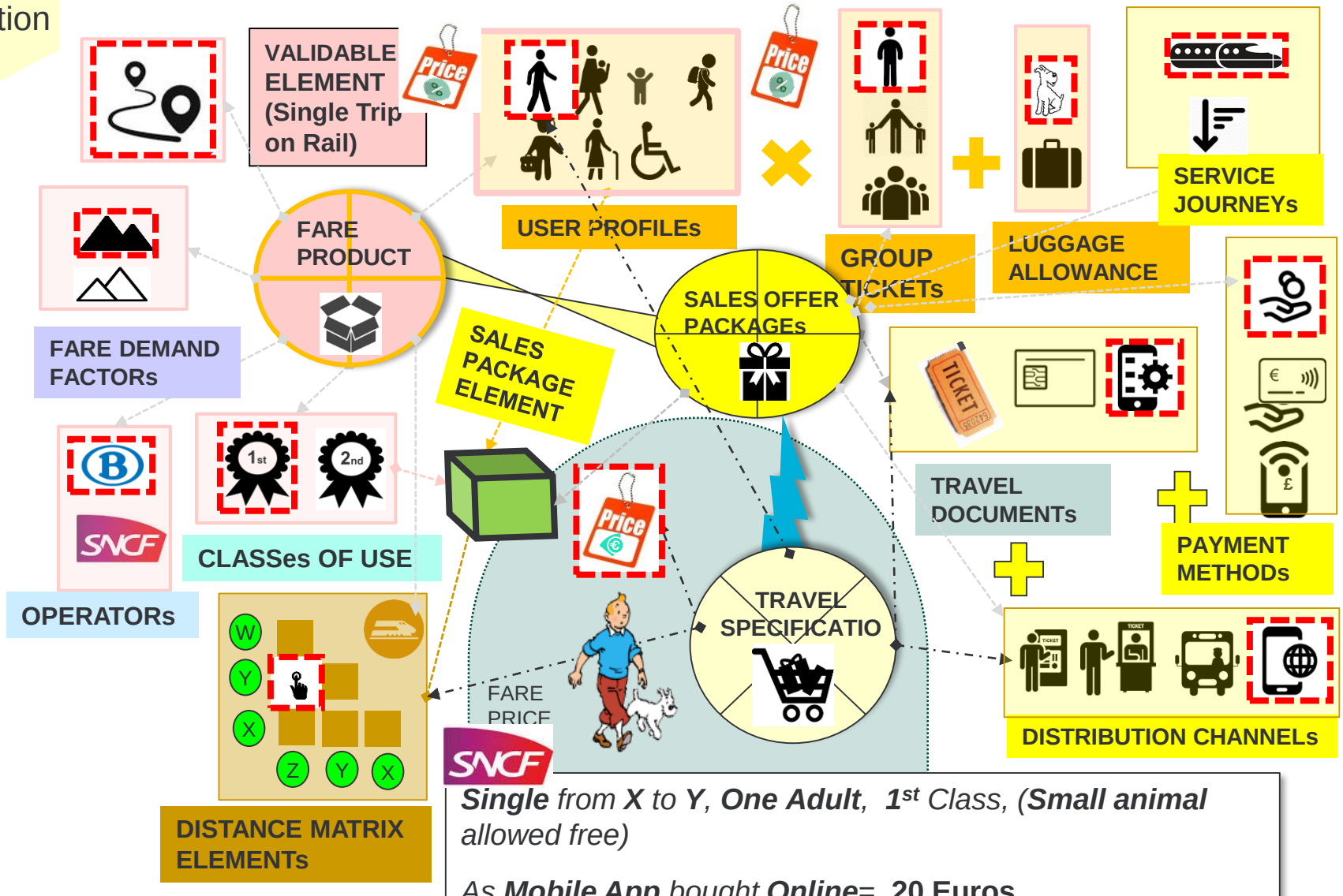


What exactly am I buying?



Travel Specification

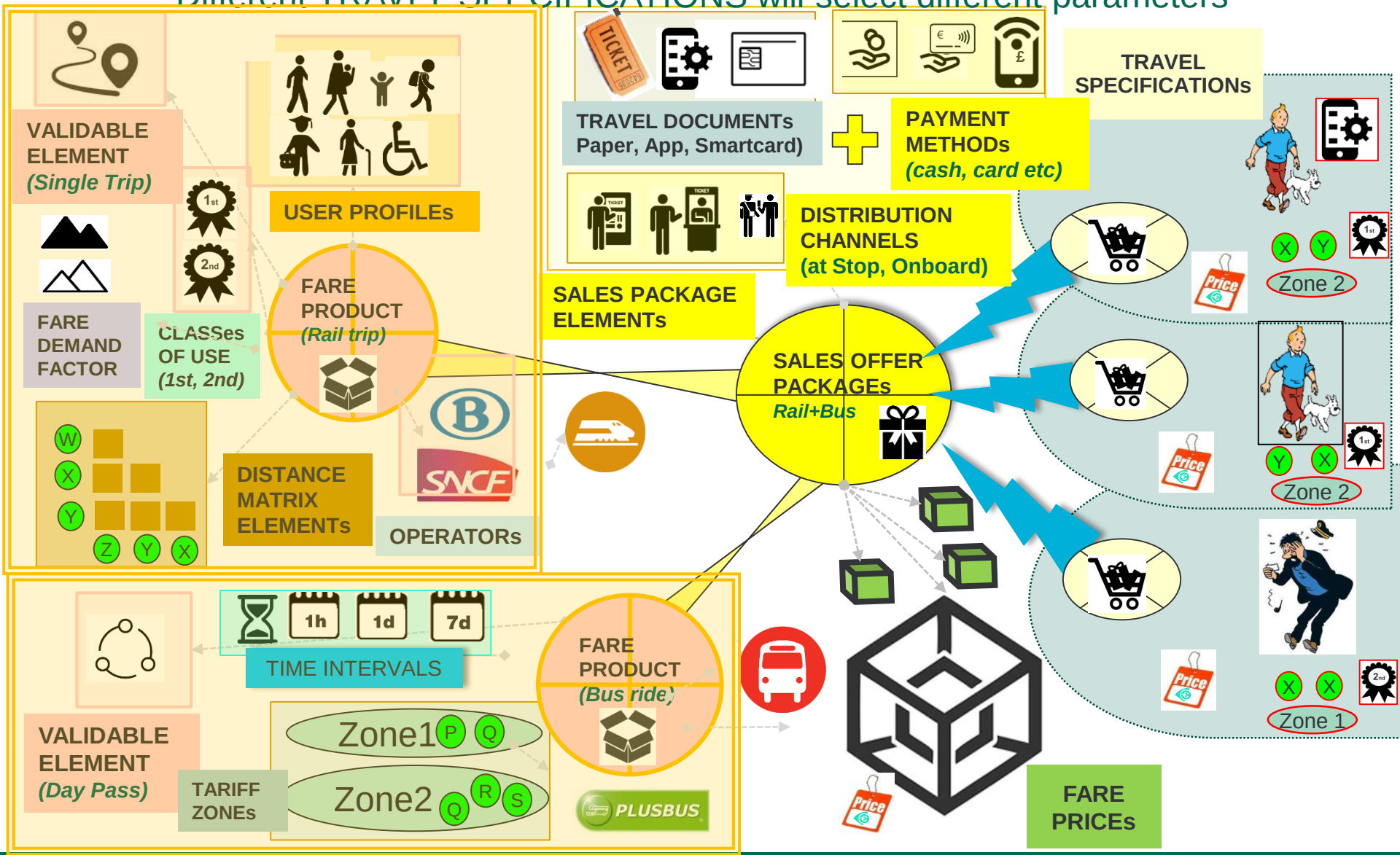
A TRAVEL SPECIFICATION describes the specific choices of access rights & parameters for a given TRIP.



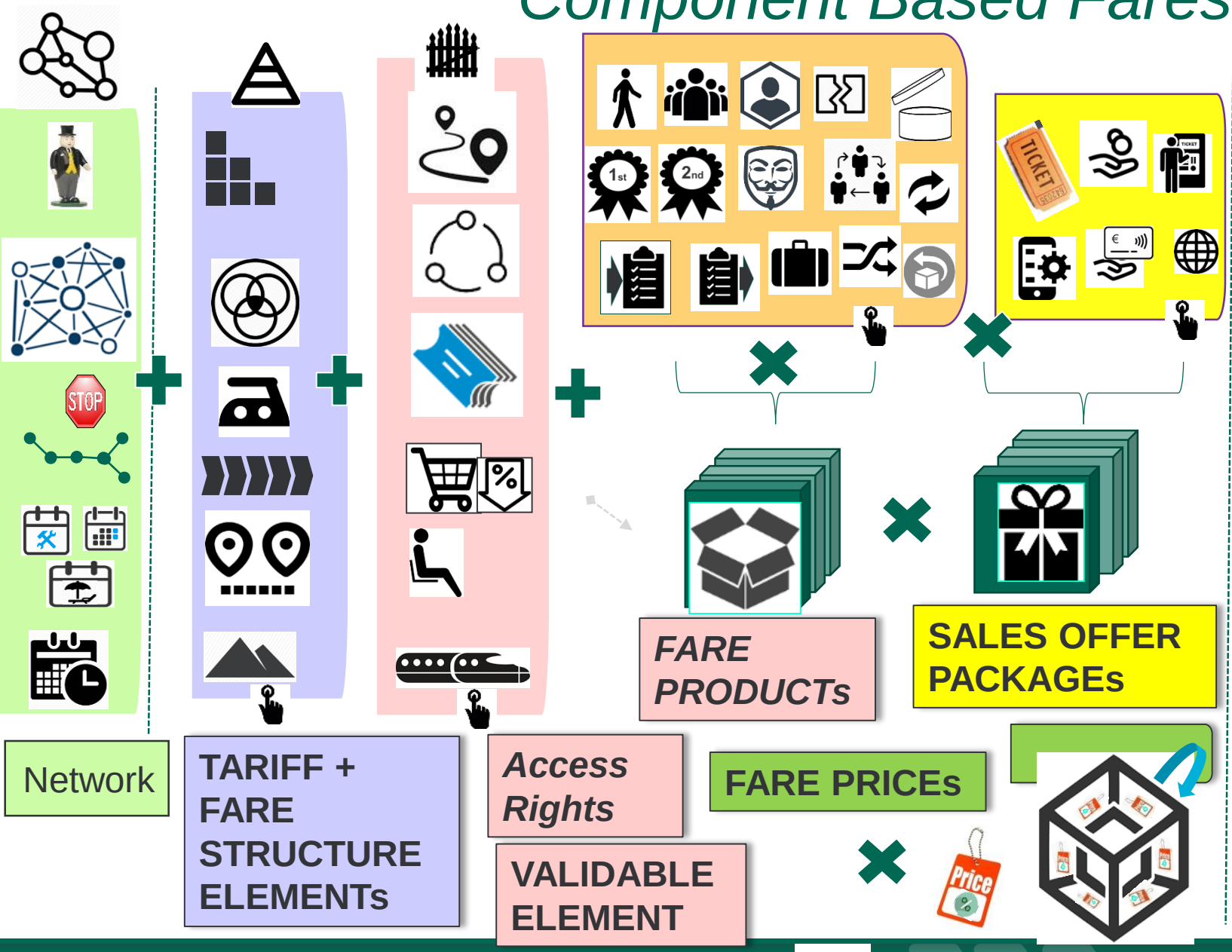
***Single** from **X** to **Y**, **One Adult**, **1st** Class, (**Small animal** allowed free)*

*As **Mobile App** bought **Online**= **20 Euros***

A SALES OFFER PACKAGE may include several different products.
A FARE PRODUCT may be used in different SALES OFFER PACKAGES.
Different TRAVEL SPECIFICATIONS will select different parameters



Component Based Fares



Department for Transport

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

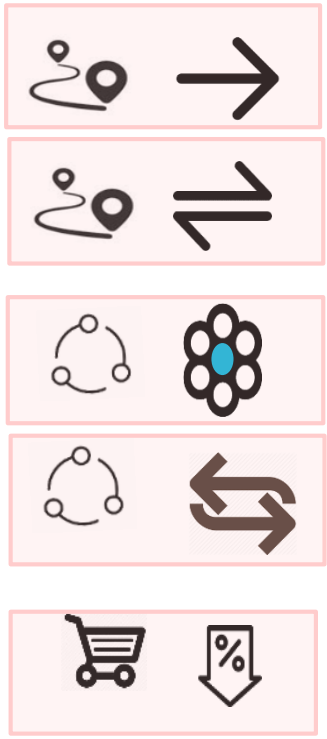
- PRODUCTs
  - Parameters, *User Types, Travel, After Sales,* etc

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

- PRICEs
  - Base & Derived

Department for Transport

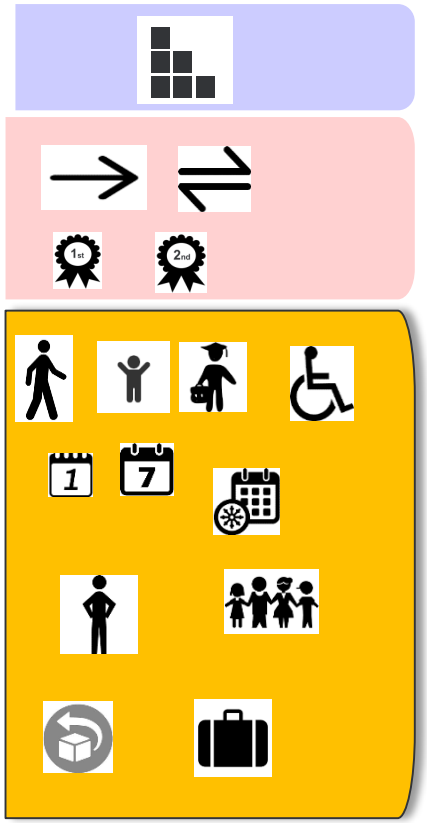
A product gives specific access rights



- That can be validated…
  - *E.g. A single trip between two points*
  - *E.g. A return trip to be made within a given period*
  - *E.g. Unlimited travel within a zone for a given period*
  - *E.g. Unlimited travel along a route between two points for a given period*
  - *E.g. The right to buy other products at a discount for a given period*

Department for Transport

A Fare Product is a set of options



- A single FARE PRODUCT may includes **all** 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*

Department for Transport

Combining products to make offers

With a simple visual notation for showing product choices and offer packages

(NB This is not part of the official standard)

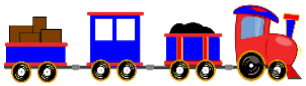
Department for Transport

Fare Products can be combined into Sales offers

- The same components may need to be combined in many different ways to meet specific business requirements
  - One SALES OFFER PACKAGE may bundle multiple products
    - E.g. Plusbus = Rail ticket + Bus day pass
  - The same product may be in used in many SALES OFFER PACKAGEs
    - E.g. Rail ticket by itself or in Plusbus bundle
    - E.g. Mobile App ticket or paper Ticket
    - E.g. Same rail ticket sold by different operators

Department for Transport

Q1. What is available to purchase?
"Rail Trip Offer + Bus Day Pass Offer"



Offer: ***"Rail Trip, walk-up purchase"***

- **Available:** *At stop (at discount), or on-board (no discount);*
- **Pay with:** *cash or card (at stop only).*
- **Travel Document:** *Printed ticket;*

Offer: ***Rail Trip, Online purchase***

- **Available:** *online (at extra discount)*
- ***Pay with:*** *debit card or credit card (extra fee) only*
- ***Travel Document:*** *Mobile app*

Product; *Rail Trip*

- **Tariff Structure:** *P2P,*
- **Access Rights**: *Trip, Single or Return, 1st or 2nd Class*
- **Fare Demand Types**: *Peak or | off Peak*
- **User Profiles:** *Adult, Child, Student; Senior, handicapped (different prices)*
- **Conditions:** *Cannot break journey; No interchange; Not Transferable)*
- **Luggage Allowance:** *Pets, 3 Suitcases free*

Offer: ***Bus trip, walk-up purchase***

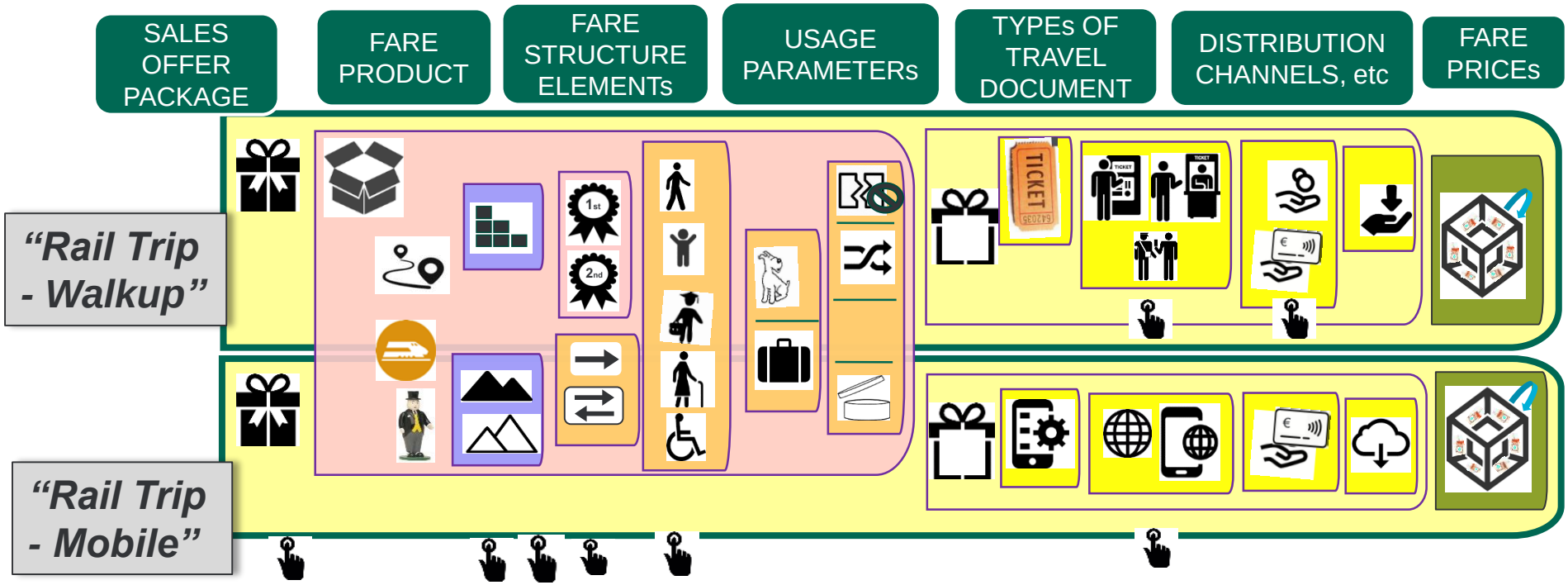
- **Available***: at stop, or on-board (Same price)*
- **Pay with:** *cash*
- **Travel Document:** *Printed ticket;*

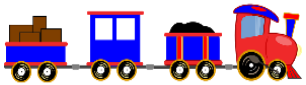
Bus Trip Product;

- **Tariff Structure:** *Named Zones,*
- **Access Rights** : *Day Pass, till end of Fare day (2am)*
- **Fare Demand Types***: Travel at anytime*
- **User Profiles:** *Adult, Child (different prices)*
- **Conditions:** *Can break journey; Can interchange; Transferable)*
- **Luggage Allowance:** *Pets, Prams free*

Department for Transport

Q1. What is available to purchase? – Rail offer





A set of permissible options for rail tickets on the W-to-Z line

Department for Transport

Q1. What is available to purchase? - Bus Offer

SALES OFFER PACKAGE | FARE PRODUCT | FARE STRUCTURE ELEMENTs | USAGE PARAMETERs | TYPEs OF TRAVEL DOCUMENT | DISTRIBUTION CHANNELS, etc | FARE PRICEs

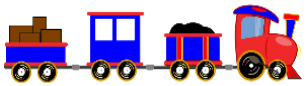
"Bus Day Pass"

A set of permissible options for bus tickets

Department for Transport

Q2 What do I actually buy?

Parameters for electronic ticket data

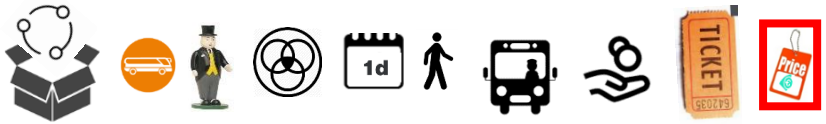


Rail Trip Purchase;

- ***Single Trip*** *from* ***X*** *to* ***Y****,*
- ***One Adult****,* ***1st*** *Class, (****Small animal*** *allowed free).*
- *Valid only on* ***Off peak*** *Trains (Leaving X after 9.30)*
- *As* ***Mobile App*** *ticket bought* ***on-line*** *with a* ***credit card***
- ***Price = 20 Euros***

Bus Trip Purchase;

- ***Day Pass*** *for* ***Zone 2****,*
- ***One Adult****, (****Small animal*** *allowed free)*
- *Valid till* ***end of fare day*** *(2am) on all buses from* ***Operator A***
- *As* ***Paper ticket*** *bought from* ***Driver*** *with* ***cash***
- ***Price = 3 Euros***

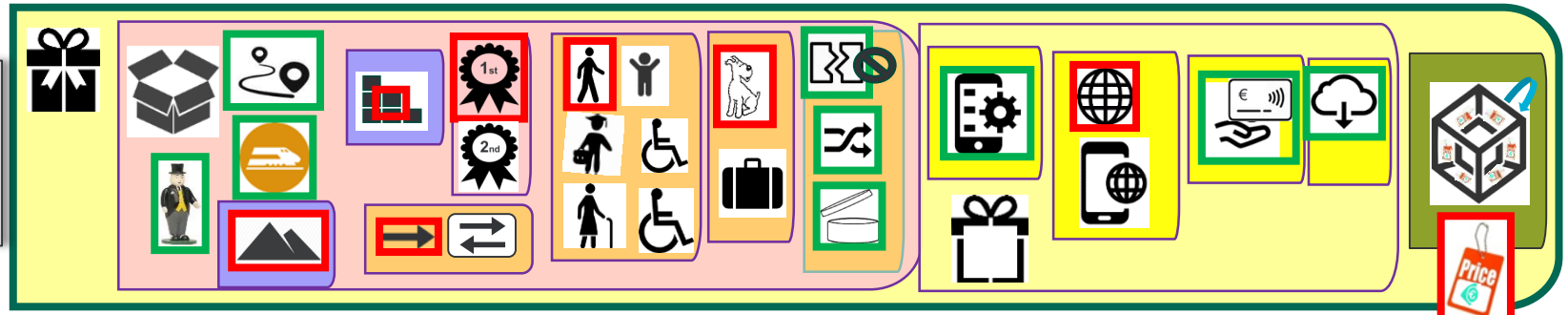


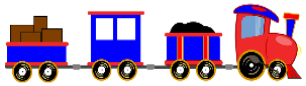
Department for Transport

Q2. What did I actually buy?

SALES OFFER PACKAGE	FARE PRODUCT	FARE STRUCTURE ELEMENTs	USAGE PARAMETERs	TYPEs OF TRAVEL DOCUMENT	DISTRIBUTION CHANNELS, etc	FARE PRICEs

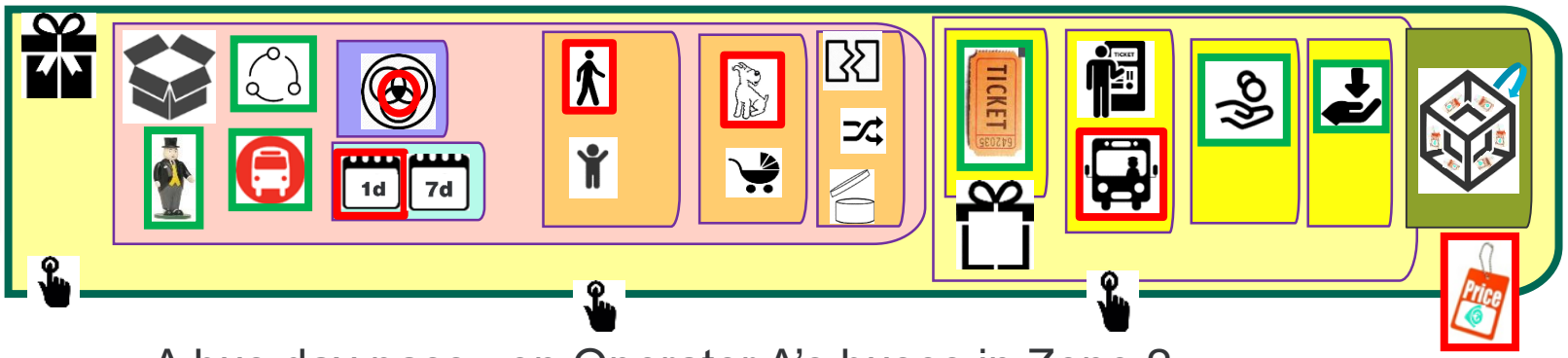
"Rail Trip online"





"A mobile app train ticket for a rail trip Y to Z"

"Bus Day Pass"



A bus day pass on Operator A's buses in Zone 2

Department for Transport

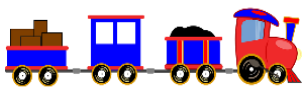
Q3. What does the Rail price depend on?

SALES OFFER PACKAGE ELEMENTs

SALES OFFER PACKAGEs | FARE PRODUCT | FARE STRUCTURE ELEMENTs | USAGE PARAMETERs | TYPEs OF TRAVEL DOCUMENT | DISTRIBUTION CHANNELs, etc | FARE PRICEs

"Rail Trip - Walkup"

"Rail Trip - Mobile"



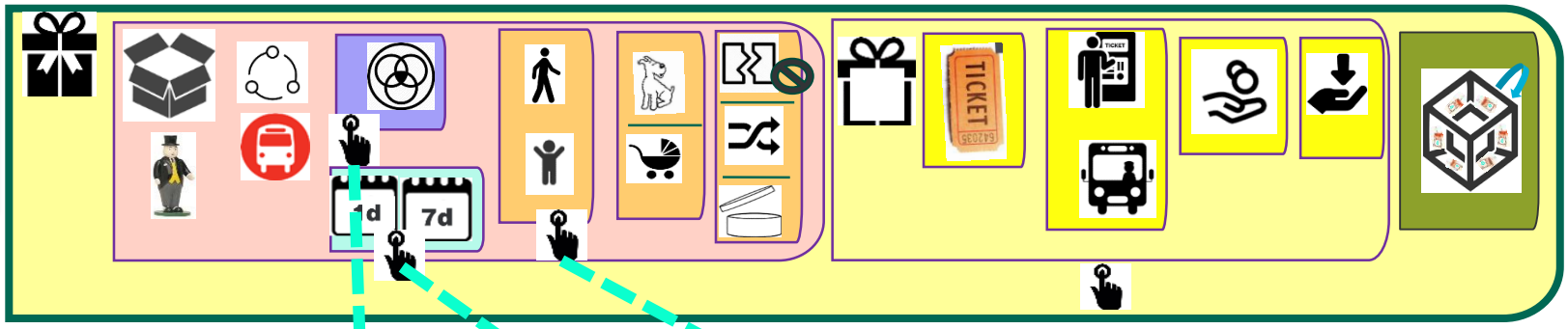
DISTANCE MATRIX ELEMENTs | FARE DEMAND TYPEs | ROUND TRIP | CLASSes OF USE | USER PROFILEs | SALES OFFER PACKAGEs | DISTRIB-UTION CHANNELs | PAYMENT METHODs

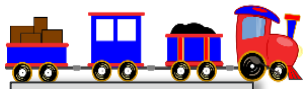
Prices Allowed combinations

Q3. What does the Bus price depend on?

SALES OFFER PACKAGE | FARE PRODUCT | FARE STRUCTURE ELEMENTs | USAGE PARAMETERs | TYPEs OF TRAVEL DOCUMENT | SALES CHANNELS, etc | FARE PRICEs

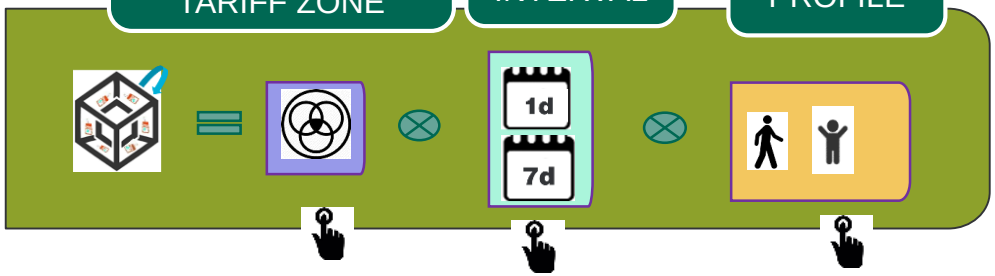
"Bus Day Pass"





Prices - Allowed combinations

FARE STRUCTURE ELEMENT / TARIFF ZONE | TIME INTERVAL | USER PROFILE



Price depends on

- Which zone chosen?
- Pass duration?
- User type?

Department for Transport

Different ways we might market exactly the same product elements

1. **Separate Rail and Bus offers, no discount,** separate travel documents
   - { [❒ **Rail leg**], 🗎**ticket**] } + { [❒**Bus leg**], 🗎ticket] }
   - ❖ See example above
2. **Single "Plusbus" offer, discounted**, separate travel documents
   - { [❒**Rail leg,** 🗎**ticket**] + [❒**Bus leg,** 🗎**ticket**] }
   - ❖ See next example below "*A Single offer, Rail & Plusbus together*"
3. Single "Plusbus" offer, discounted, single travel document
   - { [❒**Rail leg] + [❒Bus leg,** 🗎**ticket]** }
4. **Separate purchase "Plusbus" as a later add on, discounted price**, separate travel documents
   - { [❒**Rail leg,** 🗎**ticket] + [❒Bus leg,** 🗎**ticket**] }
   - ❖ See example below "bundled products purchased separately"

Department for Transport

Bundling two products as a single offer

Rail Trip Product;

- ***Tariff Structure:*** *P2P,*
- ***Access Rights****: Trip, Single or Return, 1st or 2nd Class*
- **Fare Demand Types***: Peak or | off Peak*
- ***User Profiles:*** *Adult, Child, Student; Senior, handicapped (different prices)*
- ***Conditions:*** *Cannot break journey; No interchange; Not Transferable)*
- ***Luggage Allowance:*** *Pets, 3 Suitcases free*

Bus Trip Product;

- ***Tariff Structure:*** *Named Zones,*
- ***Access Rights*** *: Day Pass, till end of Fare day (2am)*
- **Fare Demand Types***: Travel at anytime*
- ***User Profiles:*** *Adult, Child (different prices)*
- ***Conditions:*** *Can break journey; Can interchange; Transferable)*
- ***Luggage Allowance:*** *Pets, Prams free*

***Plusbus Offer;* Walk up**

- ***Available:*** *At stop (at discount), or on-board (no discount);*
- ***Pay with:*** *cash or card (at stop only).*
- ***Travel Document:*** *Printed ticket;*

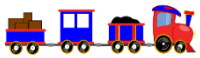
***Plusbus Offer;* Online,**

- ***Available:*** *online (at extra discount)*
- ***Pay with:*** *debit card or credit card (extra fee) only*
- ***Travel Document:*** *Mobile app*

Department for Transport

Bundling Products: A Single Offer with Rail & Plus Bus Pass together

SALES OFFER PACKAGE | FARE PRODUCT | FARE STRUCTURE ELEMENTs | USAGE PARAMETERs | TYPEs OF TRAVEL DOCUMENT | SALES CHANNELS, etc | FARE PRICEs



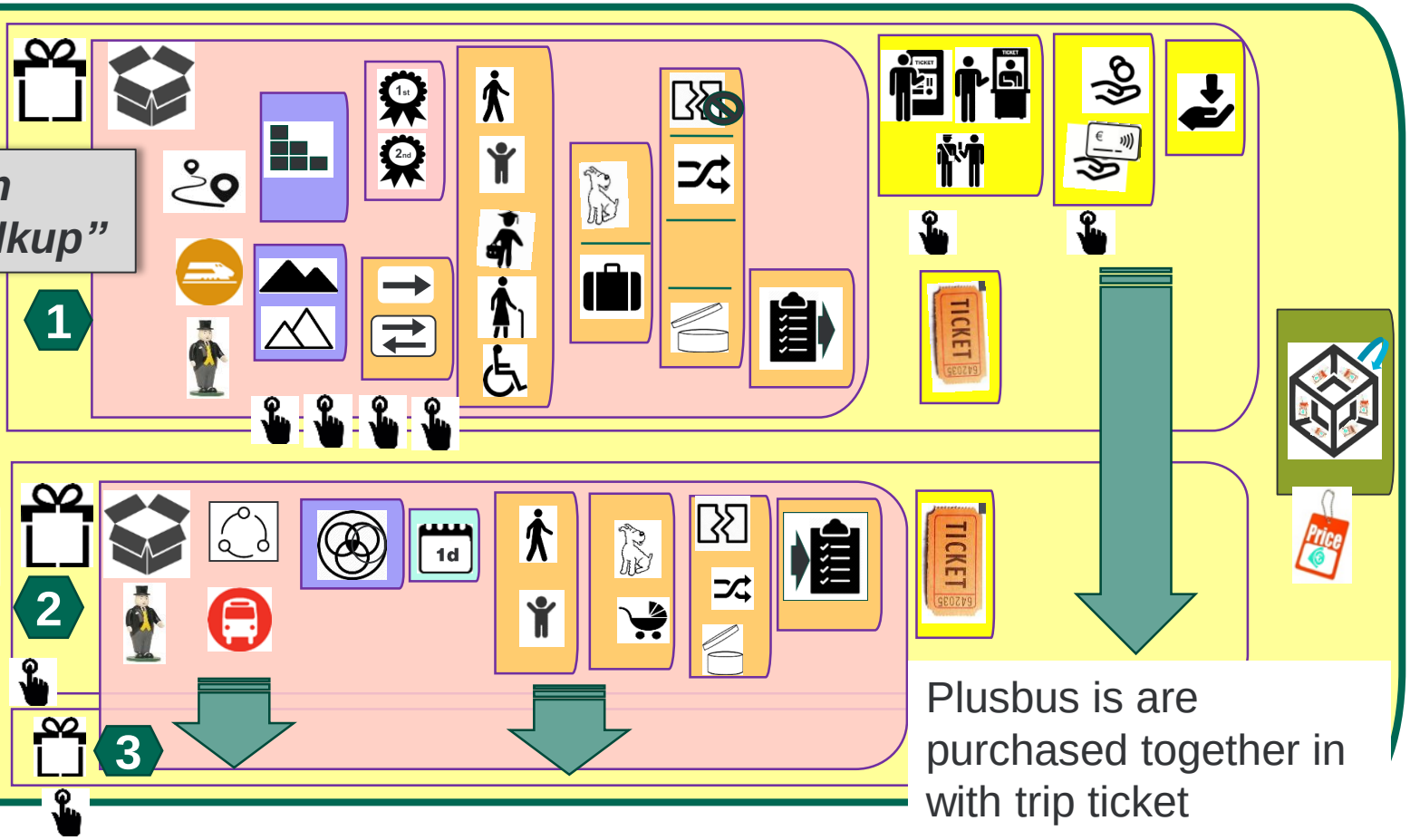
"Rail Trip with PlusBus - Walkup"

PlusBus for origin

SALES OFFER PACKAGE ELEMENT

PlusBus for destination

SALES OFFER PACKAGE ELEMENT



Plusbus is are purchased together in with trip ticket

Bundled products purchased separately

SALES OFFER PACKAGE | FARE PRODUCT | FARE STRUCTURE ELEMENTs | USAGE PARAMETERs | TYPEs OF TRAVEL DOCUMENT | SALES CHANNELS, etc | FARE PRICEs

1

"Rail Trip"

ENTITLEMENT GIVEN

ENTITLEMENT REQUIRED

Must have a rail ticket to buy a PlusBus ticet
➔ENTITLEMENT states PRODUCT / Product dependencies

SALES OFFER PACKAGE

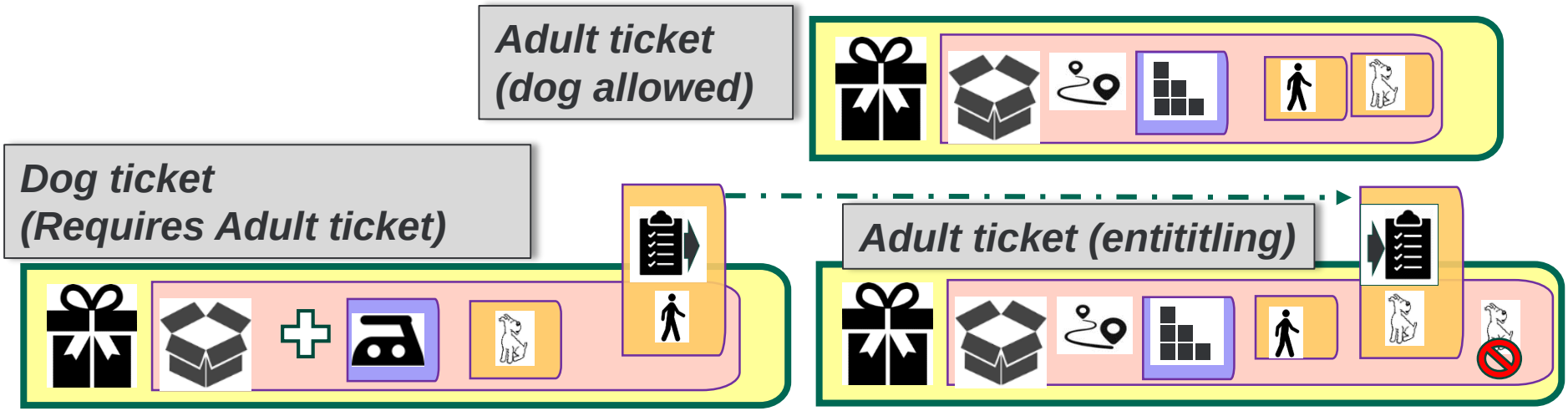
"Bus Day Pass as separate Rail trip add on, "

2

Department for Transport

What about the dog? Packaging as a Supplements product versus packaging as product parameters

1. Dog allowed as “baggage”
   - ⌘ {[{[❒**Rail leg (◈dog allowed) }** 🗎**ticket** }
2. Dog requires separate ticket with its own travel document
   - ⌘ {[**{[❒Person Rail leg}** 🗎**tic**ket } + {[❒**Rail Dog Supplement** 🗎**ticket** } }



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Another common bundle: Seat Reservation Supplements Bundled and /or unbundled

1. Separate Rail Seat Reservation, separate travel & seat documents
   - ⌘{ [❐**Rail leg,** 🗎**ticket }** + ⌘**{ [** ❐**Rail Seat Reservation,** 🗎**ticket** }
2. Rail leg includes Seat reservation, separate travel & seat documents
   1. ⌘{ [❐**Rail leg,** 🗎**ticket]** + **[** ❐**Rail Seat Reservation,** 🗎**ticket]** }
3. Rail leg includes Seat reservation, single travel document
   - ⌘{ **[** ❐**Rail leg,** 🗎**ticket]** + **[** ❐**Rail Seat Reservation,** 🗎**ticket]** }

Department for Transport

Further ways we might market the same product elements

1. **“Railcard” Purchased right to buy another product at a discount Additional discount** separate travel documents
   a) ⋇{ [❒**Sale Discount Right],** 🗎**membership card]** }
   b) Each purchase of ⋇{ [❒**Rail leg, (at reduced price],** 🗎**ticket]** }
2. **“Frequent Flyer” Usage based rebate, either as rebate or discounted price**
   a) ⋇{ [❒**Sale Discount Right],** 🗎**account number]** }
   b) Each purchase of ⋇{ [❒**Rail leg, (also has value in mileage points],** 🗎**ticket]** }

Department for Transport

Q5. What if there is a further discount ?

SALES OFFER PACKAGE ELEMENTs

SALES OFFER PACKAGE | FARE PRODUCT | FARE STRUCTURE ELEMENTs | USAGE PARAMETERs | TYPEs OF TRAVEL DOCUMENT | SALES CHANNELs, etc | PAYMENT METHODs

"Rail Trip - Walkup"

"Rail Trip - Mobile"

"Adult Rail Card"

Prices

DISTANCE MATRIX ELEMENT | FARE DEMAND | CLASS OF USE | USER PROFILE | SALES OFFER PACKAGE | SALES CHANNEL | PAYMENT METHOD

Department for Transport

Modelling Bus Fares - a component based analysis of some simple examples

- Single Trip, Point to Point Tariff Structure
  - Multiple User types
  - Derived prices
- Period Passes, Zonal Tariff Structure
  - Day, Season
  - Multi channel
- Multi-trip Carnet, Zonal Tariff Structure
  - Multiple User types
- Trip, Section Count Zonal Tariff Structure

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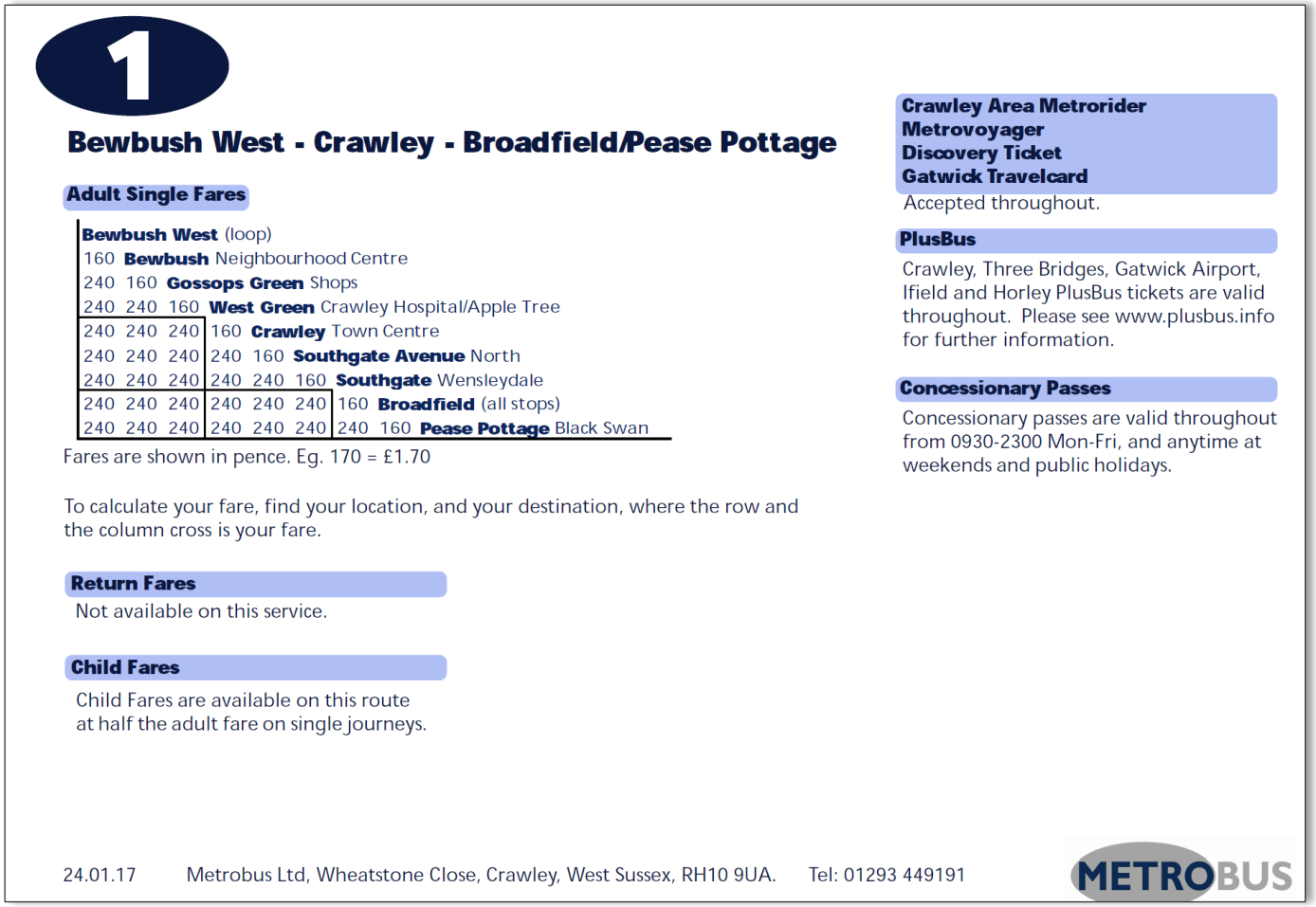
UK Bus Example: A Point to Point Fare

Department for Transport

Metrobus 1 - Single ride



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

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

Department for Transport

Metrobus 1 FARE ZONES

Department for Transport

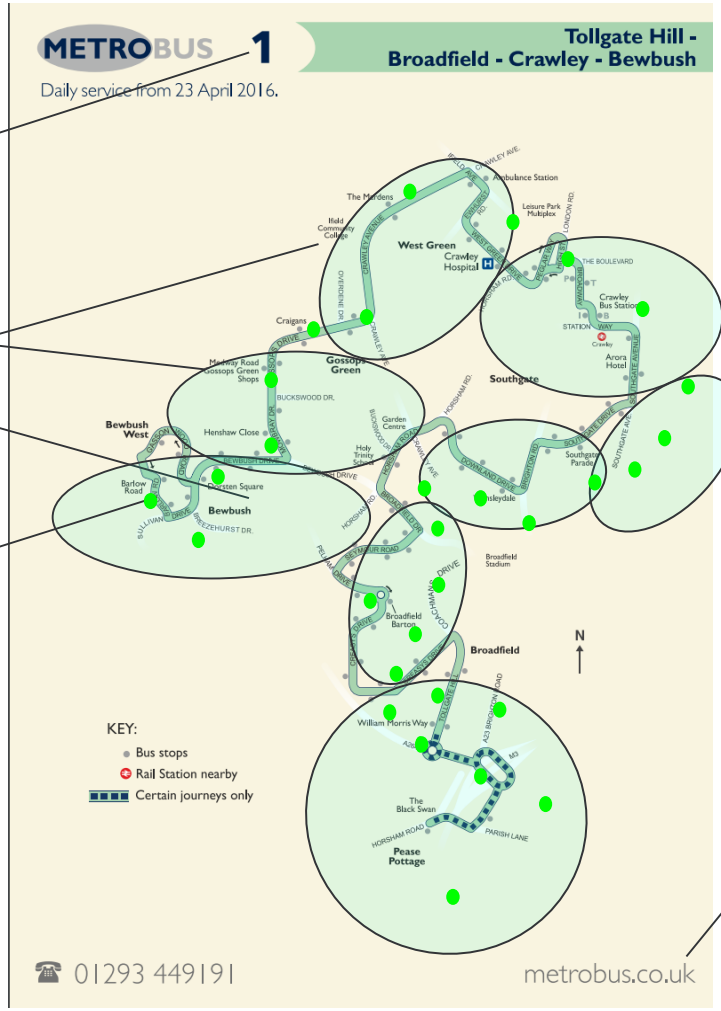
Metrobus 1 FARE ZONES

LINE

FARE ZONEs

SCHEDULED STOP POINTs

OPERATOR



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Analysing the Metrobus Line 1 offer

- Access Rights
  - Zone To Zone : Each zone covers several stops
  - Line: Line 1
  - Operator: Metrobus
- Products
  - Single product – a single Trip
  - User types: *Adult, Child (5-15) 50%,*
- Sales Offer packages
  - Travel Documents: *paper,*
- Pricing
  - O/D zone x User Profile
- Other products available – eg day pass, season pass, etc

Metrobus 1 - Single ride, (cash)

Department for Transport

TARIFF

FARE PRODUCT (Single Trip)

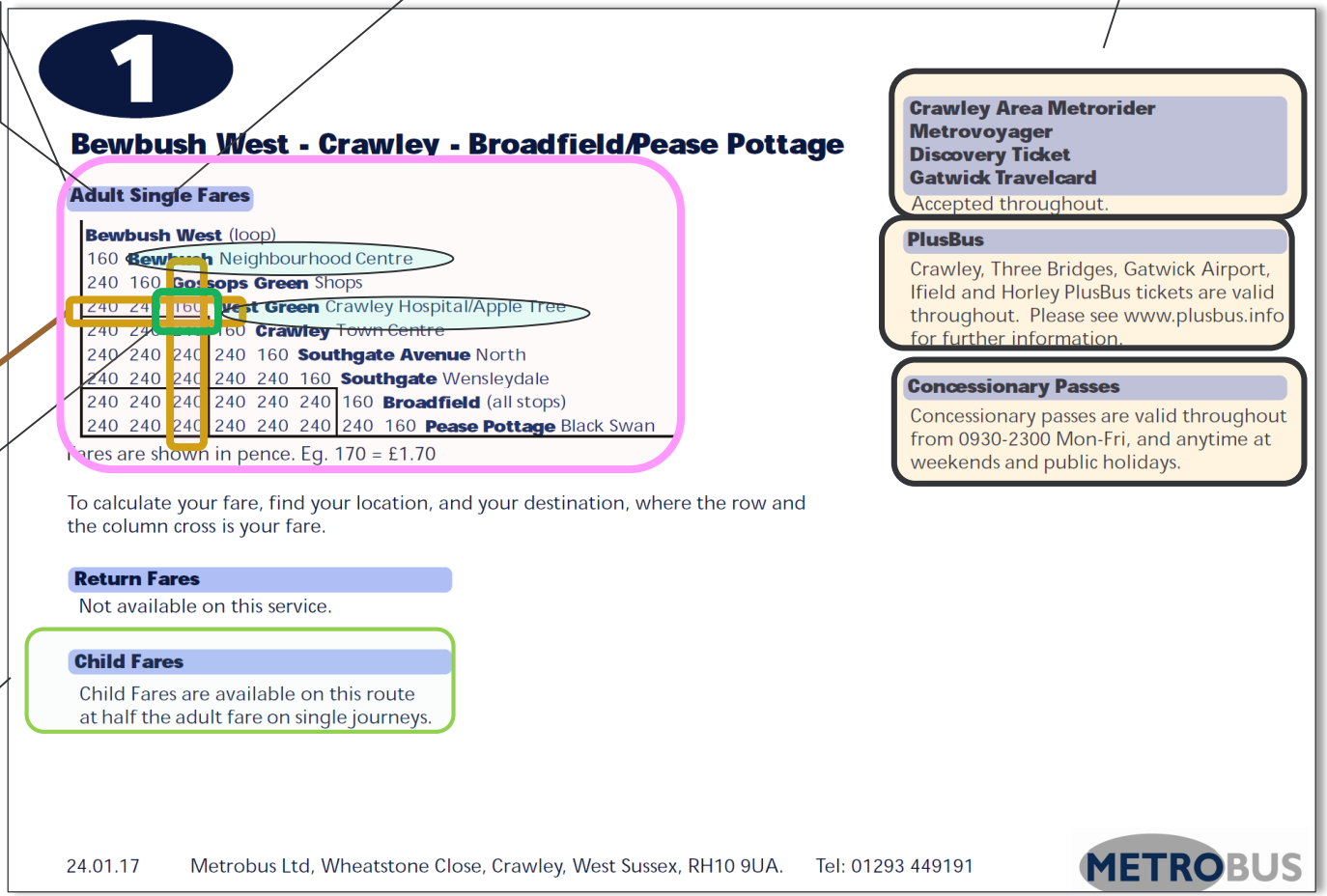
FARE PRODUCTs (Other day & Season passes)

USER PROFILE (Adult)

DISTANCE MATRIX ELEMENTs

FARE PRICEs

USER PROFILE (Child)



1

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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

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METROBUS

Single Trip Fare Pricess

LINE 1

SALES PACKAGE
Single ride, "Cash"

FARE PRODUCT

TYPE OF TRAVEL DOCUMENT

USER PROFILE
Adult

FARE ZONEs

TARIFF

DISTANCE MATRIX ELEMENTs

FARE PRICEs

FARE TABLE

PRICE UNIT

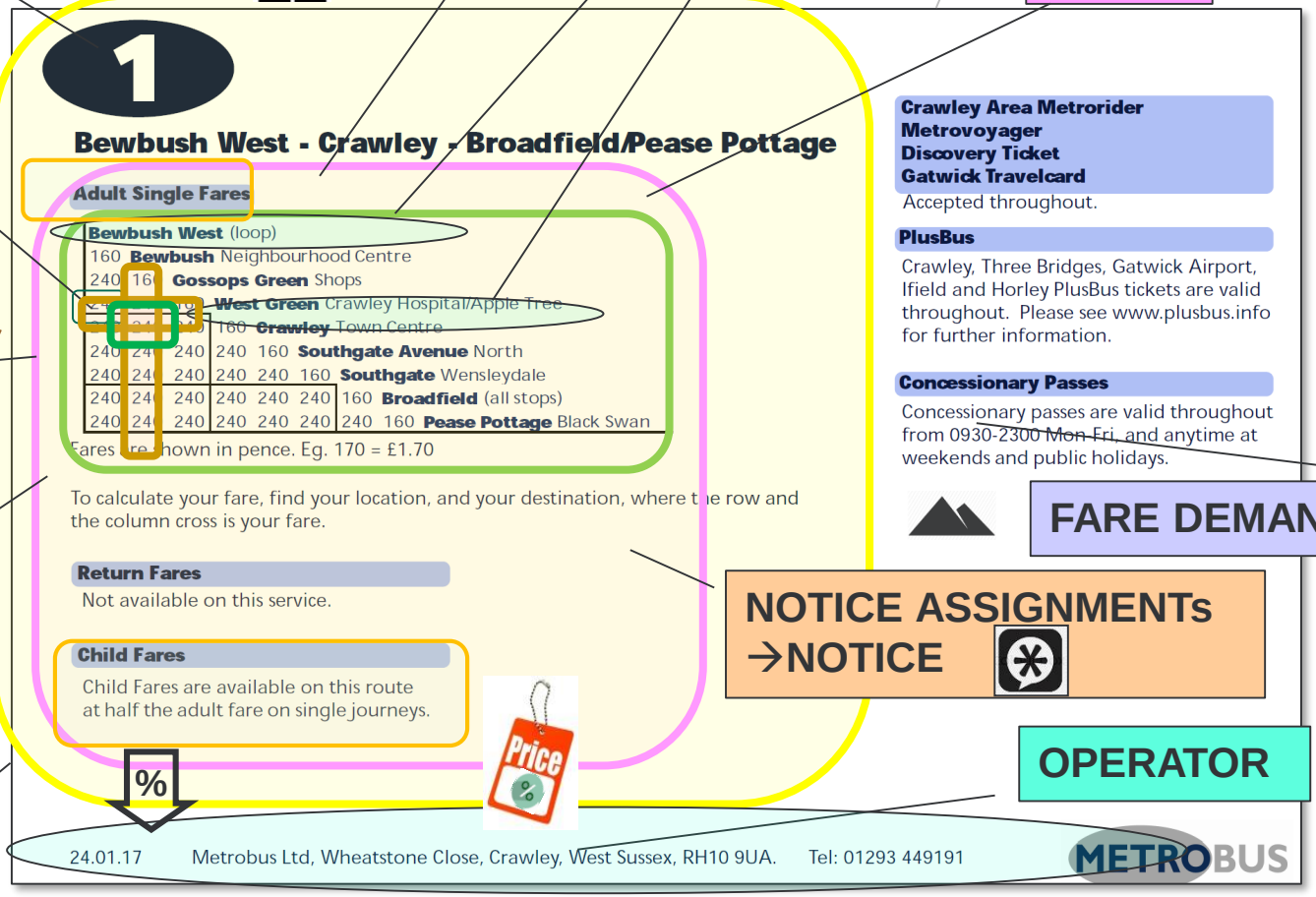
USER PROFILE

PRICE RULE

FARE DEMAND

NOTICE ASSIGNMENTs
→NOTICE

OPERATOR



Example – Single Trip Product

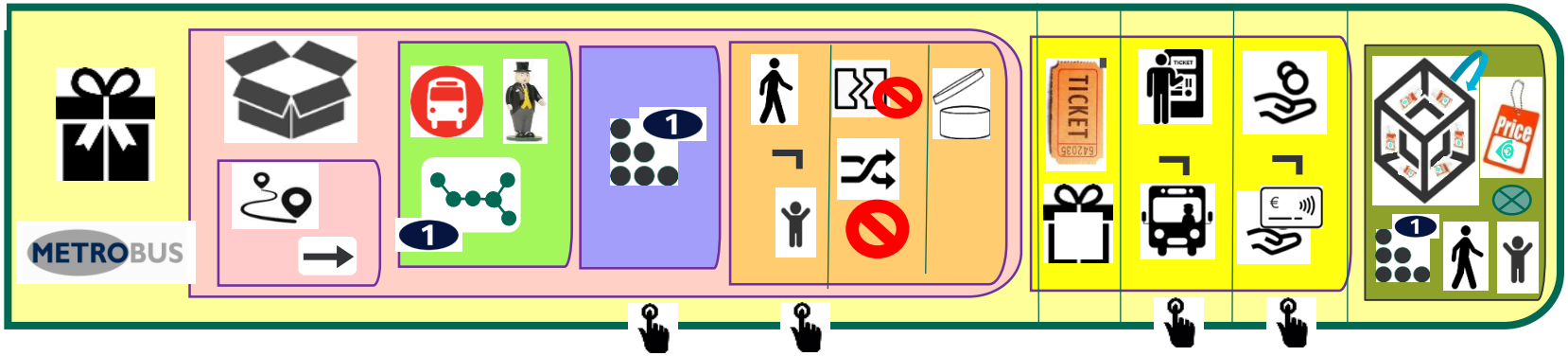
Department for Transport

FARE PRODUCT	FARE STRUCTURE ELEMENTs	USAGE PARAMETERs	DISTRIBUTION ASSIGNMENT	FARE PRICEs

METROBUS 1

SALES OFFER PACKAGE

"Cash Single"



Offer; "Metrobus cash ticket"

- **Tariff Structure:** *Zone to Zone;*
- **Product Access rights:** *single trip*; bus, Operator=*Metrobus, Line1*
- **User Profiles:** *Adult, Child,*
- **Conditions:** *Cannot break journey; Cannot interchange*; Refundable?
- **Travel Document:** *Printed "Cash ticket";*
- **Available:** at stop, or on-board (no discount);
- **Pay with:** *cash or card*
- **Prices :** ***Line1 x (n x n** Z2Z elements) x (Adult | Child)*
- **Brand** = *Metrobus*

1

Travel Specification;

- ***Which Zones?***
  - *Origin + Destination*
- ***Which User Profile?***
  - *(Adult | Child)*

Purchase options

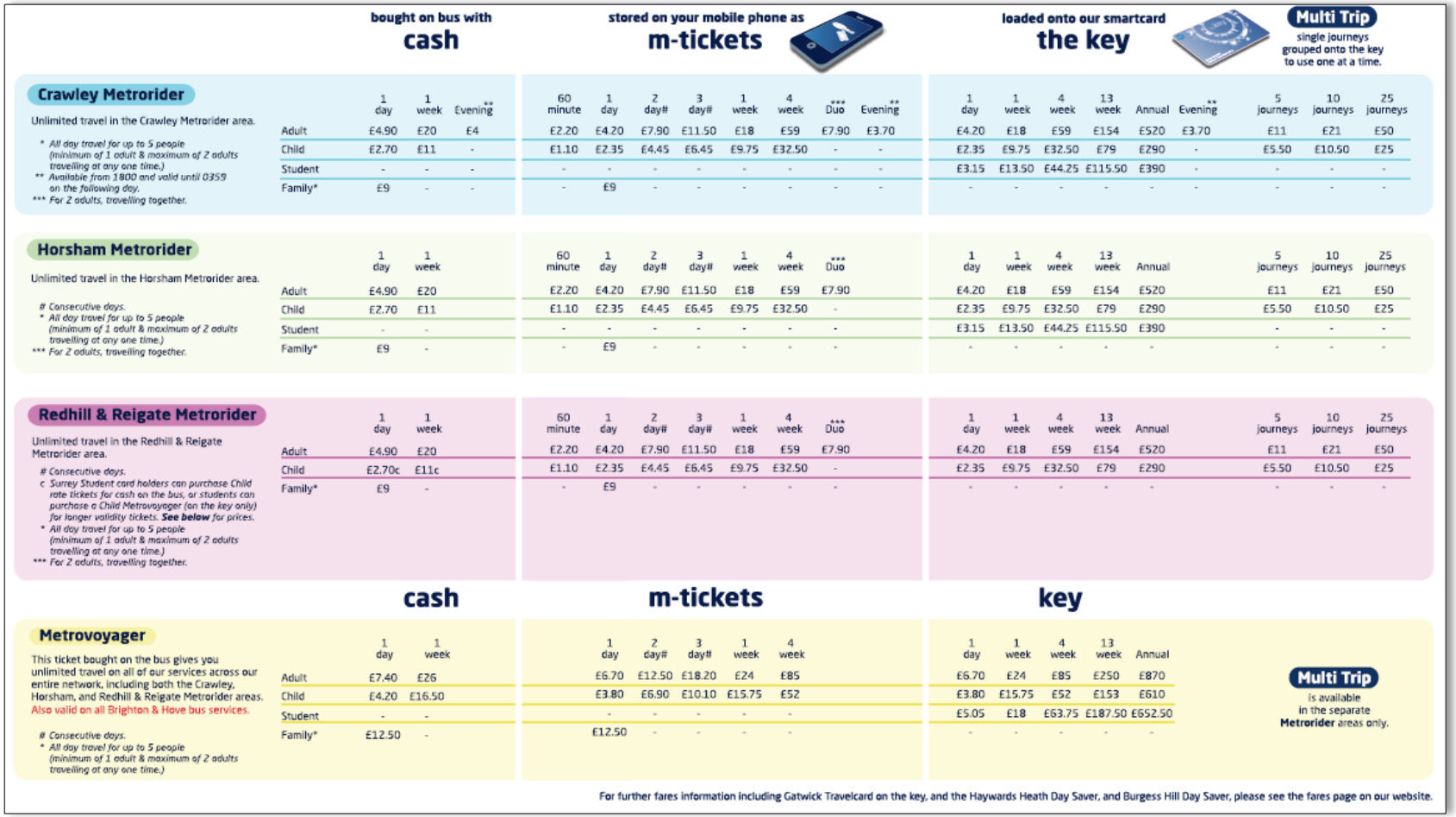
- ***Where?***
  - *At stop | on-board*
- ***Pay How?***
  - *Cash | Card*

Department for Transport

UK Bus Example: Some Period Passes (Day & Season)

Department for Transport

SEASON PASS - Metrorider



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.

	cash: 1 day	cash: 1 week	cash: Evening**	m-tickets: 60 minute	m-tickets: 1 day	m-tickets: 2 day#	m-tickets: 3 day#	m-tickets: 1 week	m-tickets: 4 week	m-tickets: Duo***	m-tickets: Evening**	the key: 1 day	the key: 1 week	the key: 4 week	the key: 13 week	the key: Annual	the key: Evening**	the key: 5 journeys	the key: 10 journeys	the key: 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.

	cash: 1 day	cash: 1 week	m-tickets: 60 minute	m-tickets: 1 day	m-tickets: 2 day#	m-tickets: 3 day#	m-tickets: 1 week	m-tickets: 4 week	m-tickets: Duo***	the key: 1 day	the key: 1 week	the key: 4 week	the key: 13 week	the key: Annual	the key: 5 journeys	the key: 10 journeys	the key: 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.

	cash: 1 day	cash: 1 week	m-tickets: 60 minute	m-tickets: 1 day	m-tickets: 2 day#	m-tickets: 3 day#	m-tickets: 1 week	m-tickets: 4 week	m-tickets: Duo***	the key: 1 day	the key: 1 week	the key: 4 week	the key: 13 week	the key: Annual	the key: 5 journeys	the key: 10 journeys	the key: 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 Metrorider 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.)

	cash: 1 day	cash: 1 week	m-tickets: 1 day	m-tickets: 2 day#	m-tickets: 3 day#	m-tickets: 1 week	m-tickets: 4 week	the key: 1 day	the key: 1 week	the key: 4 week	the key: 13 week	the key: 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.

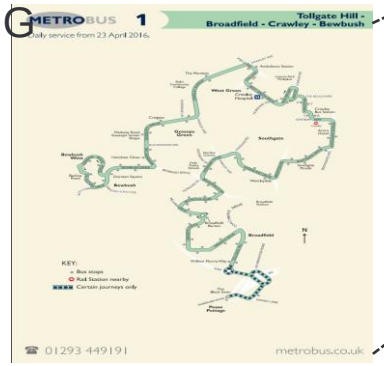
For further fares information including Gatwick Travelcard on the key, and the Haywards Heath Day Saver, and Burgess Hill Day Saver, please see the fares page on our website.

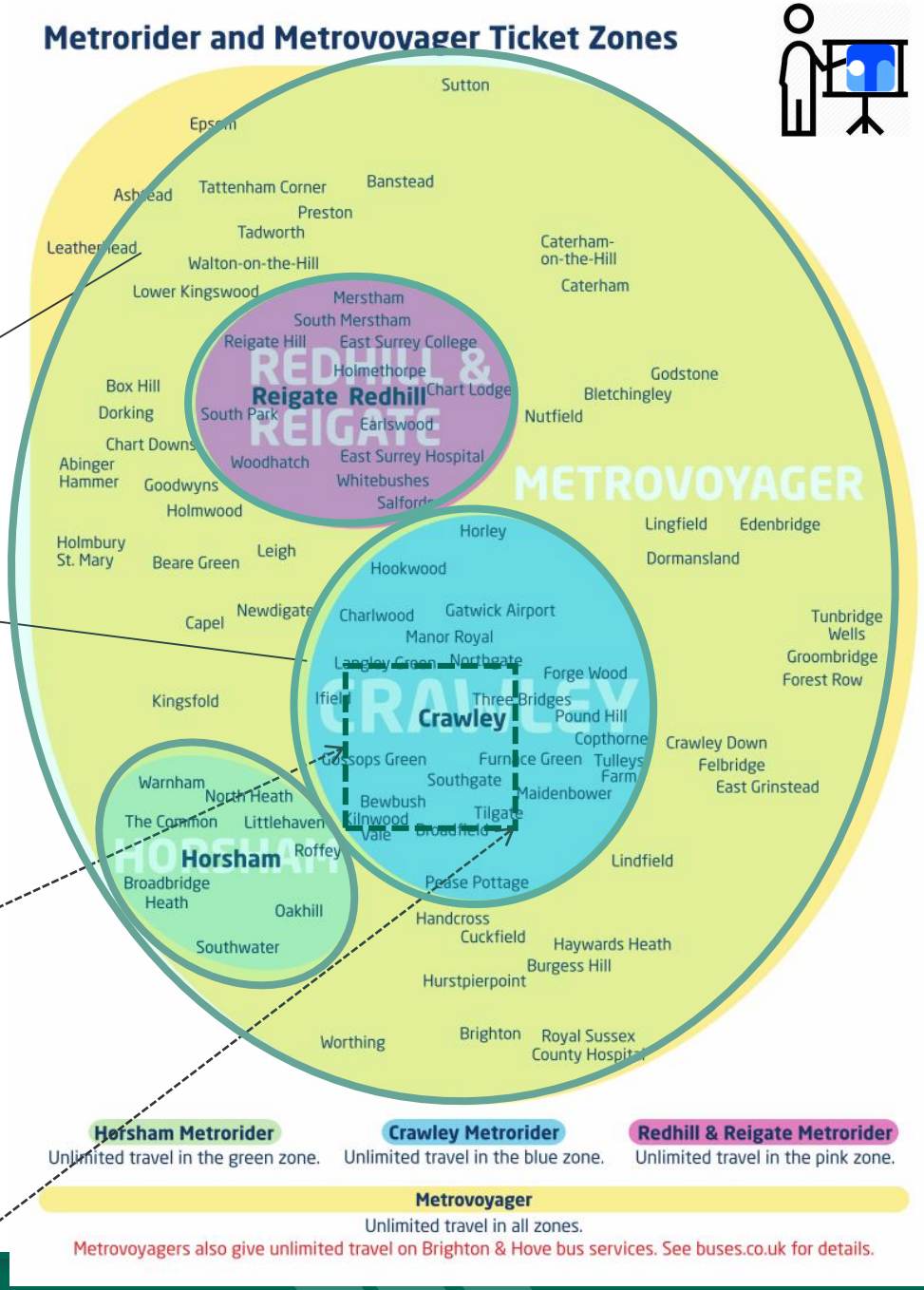
Nested Fare Zones - Metrorider & Metrovoyager

TOPOGRAPHICAL PLACEs

FARE ZONEs

- ZONE topologies e.g
  - **NESTED**,
  - DISJOINT
  - HONEYCOMB
  - OVERLAPPING





Department for Transport

Season Pass (es)

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

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*** 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	£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
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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 Metrorider 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.

Department for Transport

Multitrip Carnet

FARE PRODUCT (Multitrip)

TARIFF

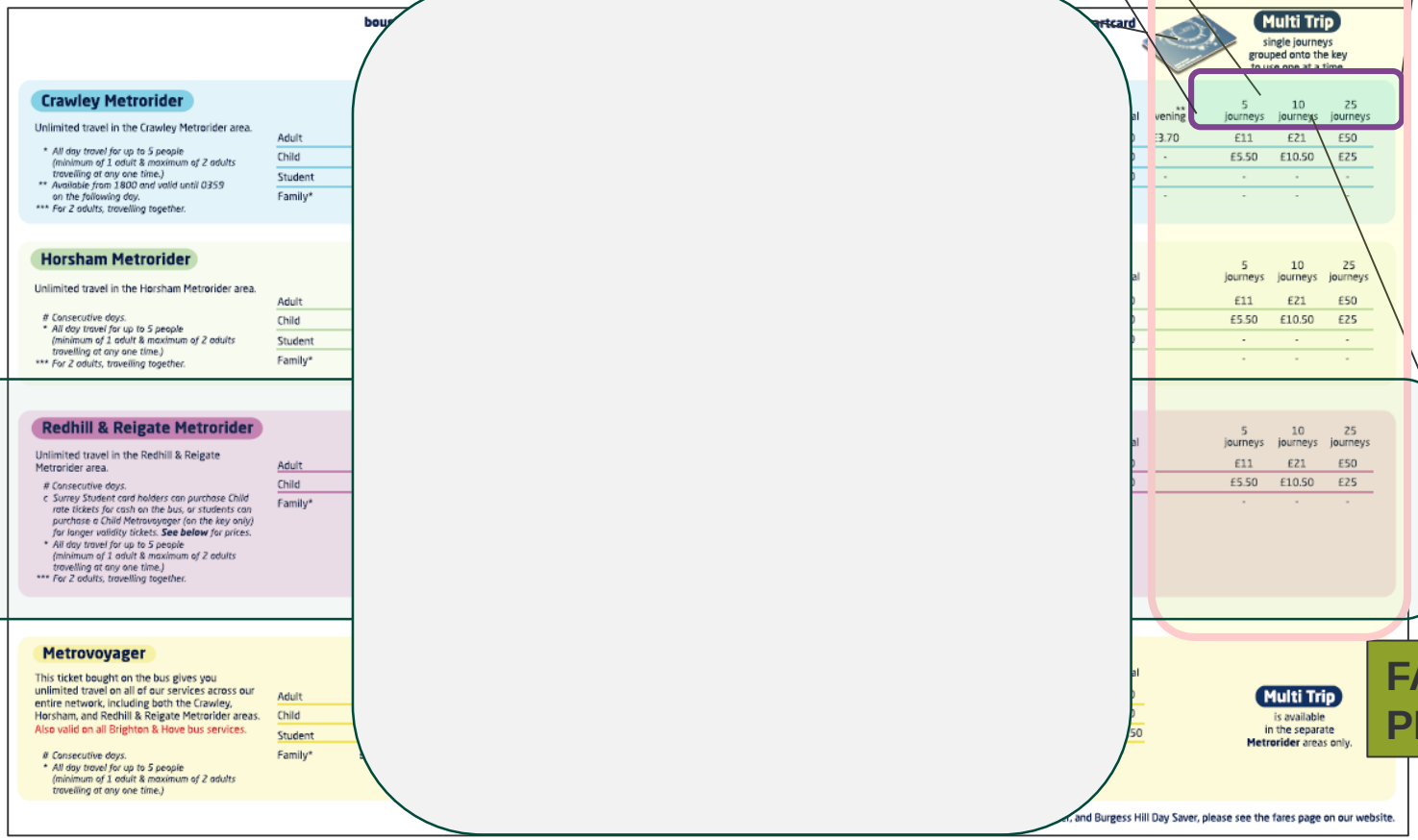
SALES PACKAGEs "cash, m-ticket, the key"

TYPE OF TRAVEL DOCUMENT Smartchard

QUALITY FACTORs

FARE ZONEs

FARE PRICEs

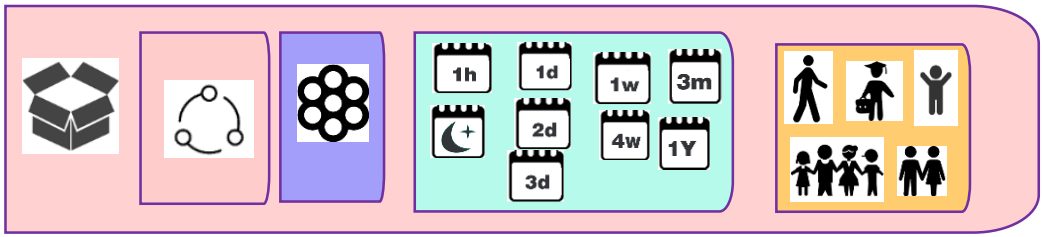


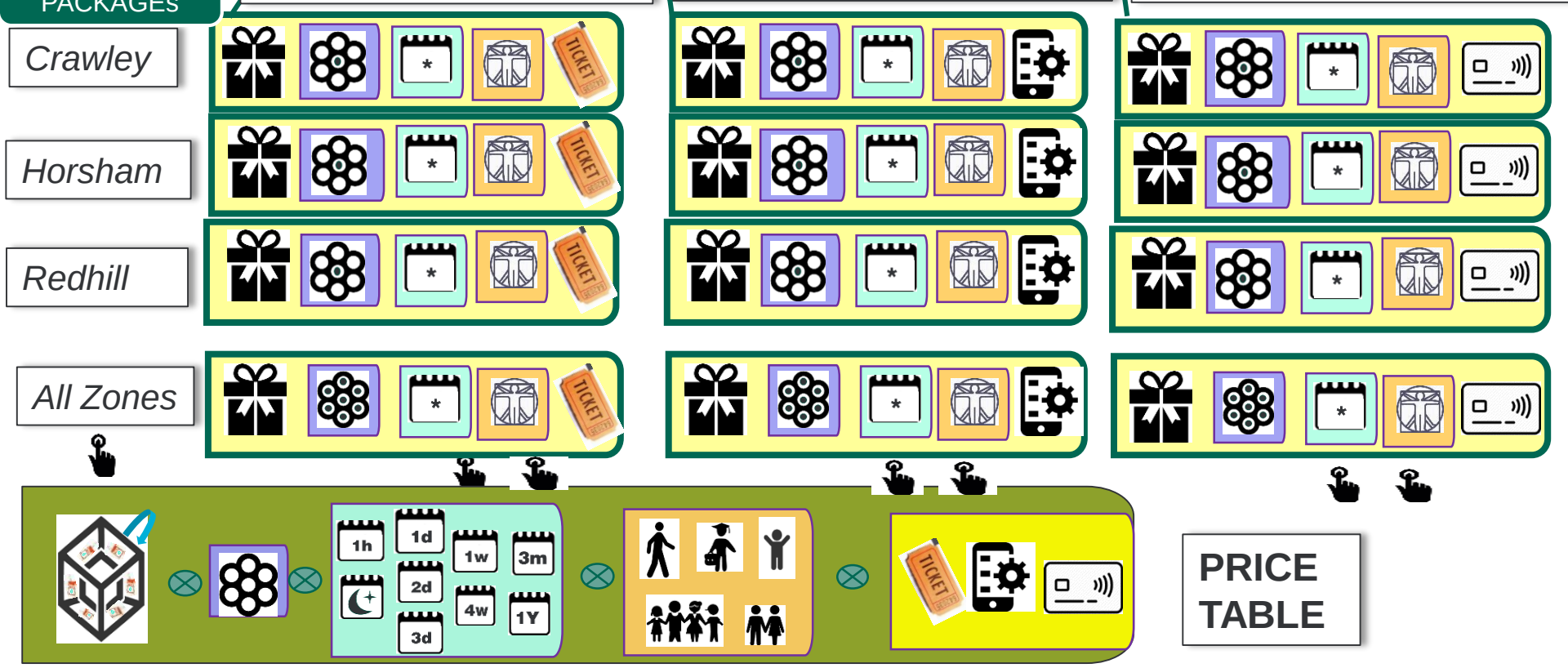
Department for Transport

Analysing the Metrorider offer – Period Passes

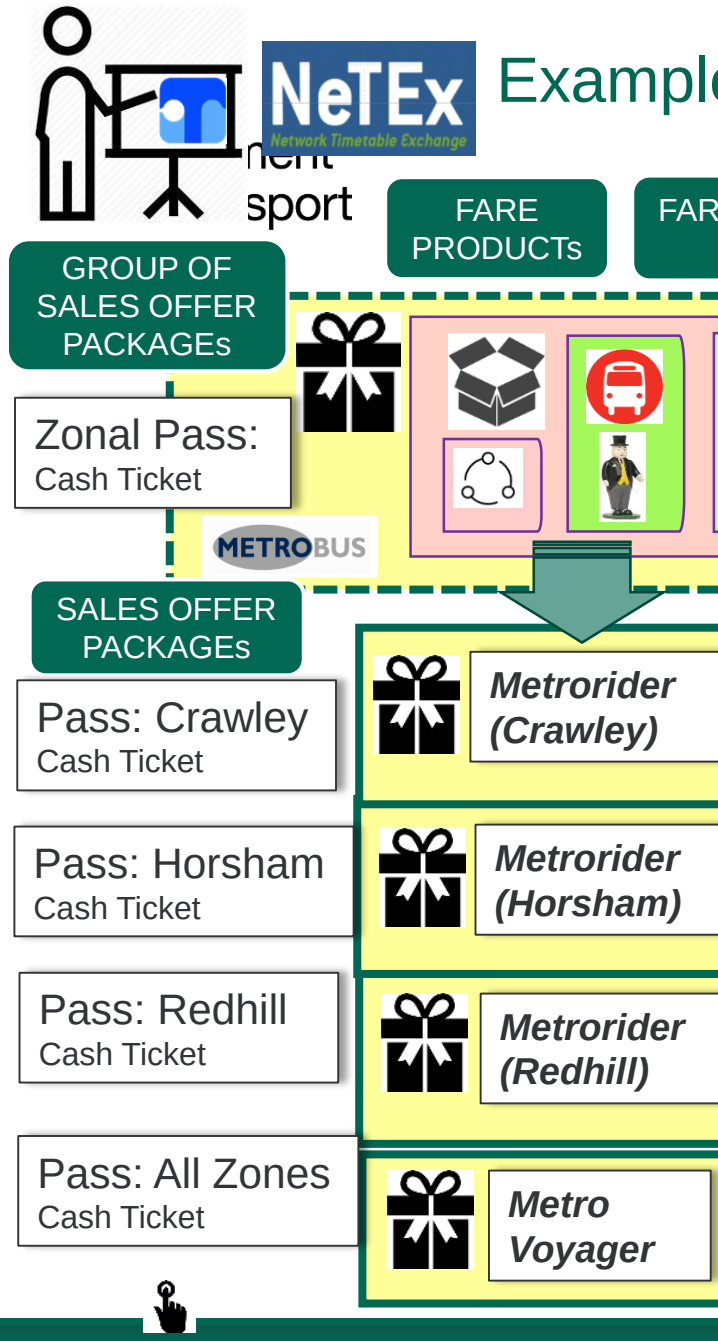
- Access Rights
  - Zones : Single (*Crawley, Horsham, Redhill)* or *All*
  - Durations: *Evening, 1,2,3 Day(s), 1,4 Week(s), Annual*
  - Operator: Metrobus
- Products
  - Single product – a period pass within a specified zone
  - User types: *Adult, Child, Student*
  - Group Tickets: *Family, Duo*
- Sales Offer packages
  - Travel Documents: *paper, app, smartcard*
  - 12 different combinations : 4 zone choices x 3 ticket choices (*paper, app, smartcard*)
  - Minor variations in available pass durations, User types etc between packages
- Pricing
  - Zone x Period x [User Profile|Group Ticket] x Sales Package (per Travel Document)

Example - Period Passes





Example – Period Pass Product: Cash Ticket



Example – Period Pass Product: Mobile App

GROUP OF SALES OFFER PACKAGEs

FARE PRODUCTs

FARE STRUCTURE ELEMENTs

USAGE PARAMETERs

DISTRIBUTION ASSIGNMENT

FARE PRICEs

Pass m-ticket

METROBUS

SALES OFFER PACKAGEs

Pass: Crawley *M-ticket (App)*

Metrorider (Crawley)

Pass: Horsham *M-ticket (App)*

Metrorider (Horsham)

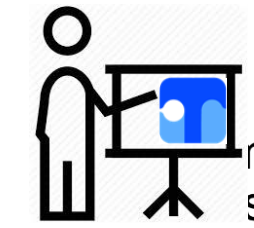
Pass: Redhill *M-ticket (App)*

Metrorider (Redhill)

Pass: All zones *M-ticket (App)*

MetroVoyager

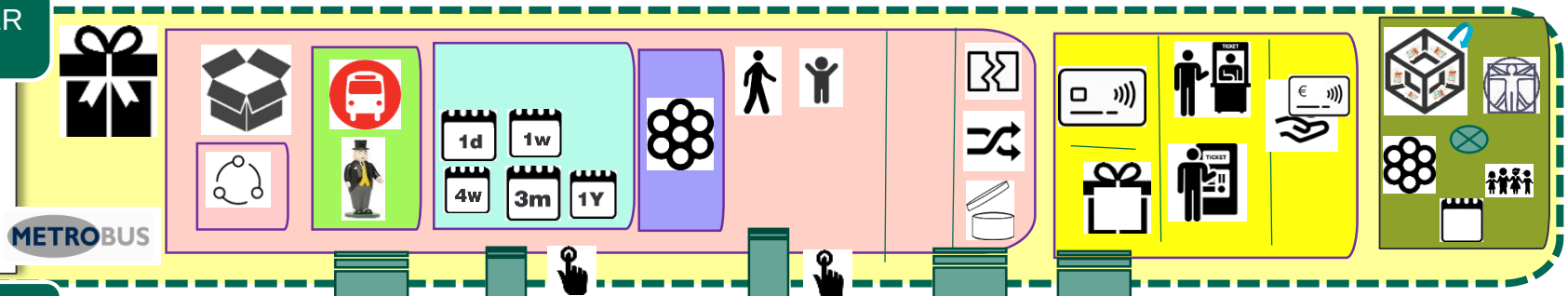
Example –Period Pass Product - Smartcard



NeTEx Network Timetable Exchange

nent sport

GROUP OF SALES OFFER PACKAGEs	FARE PRODUCTs	FARE STRUCTURE ELEMENTs	USAGE PARAMETERs	DISTRIBUTION ASSIGNMENT	FARE PRICEs
Pass Zonal The-key (smartcard)					



SALES OFFER PACKAGEs	
Pass: Crawley *The-key* (smartcard)	***Metrorider (Crawley)***
Pass: Horsham *The-key* (smartcard)	***Metrorider (Horsham)***
Pass: Redhill *The-key* (smartcard)	***Metrorider (Redhill)***
Pass: All zones *The-key* (smartcard)	***MetroVoyager***

Department for Transport

Analysing the Metrorider offer – Carnets

- Access Rights
  - A single zone (*Crawley, Horsham, Redhill*)
- Products
  - Single product – a carnet for a specified number of trips
  - Available quantities: *5, 10, 25*
  - User types: *Adult, Child*
  - Use by date
  - Purchase Window: *Before 21:00 on previous day*
- Sales Offer packages
  - Travel Document: *smartcard only*
  - 3 different combinations : 3 zone choices
- Pricing
  - Zone x Number of Trips x [User Profile]

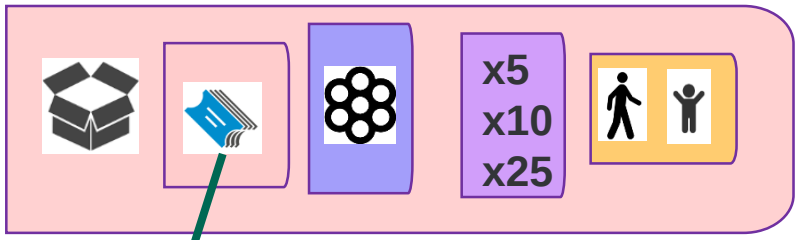
Example – Multitrip (Carnet)

FARE PRODUCTs

SALES OFFER PACKAGEs

Smartcard - Multitrip

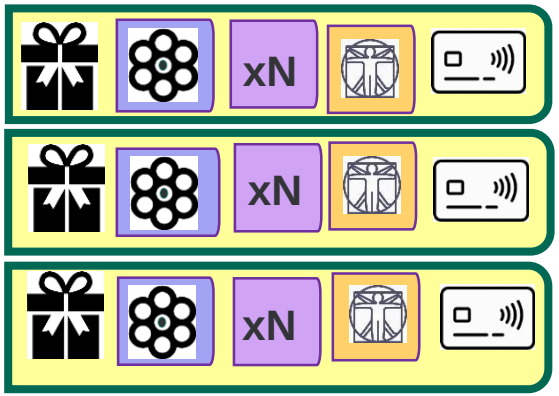
Multitrip Product



Crawley

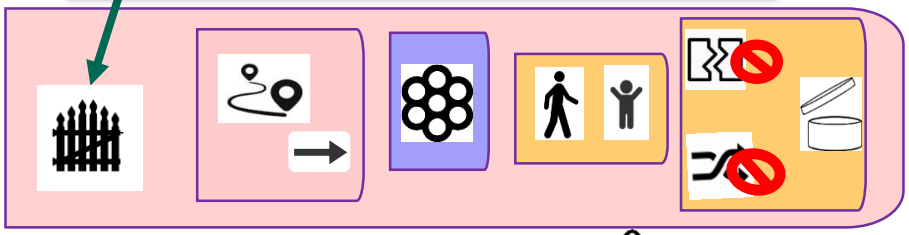
Horsham

Redhill



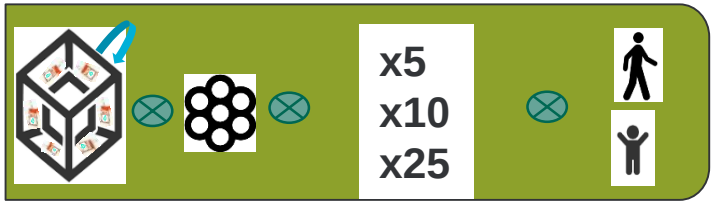
xN

Single, trip 1-zone, Product

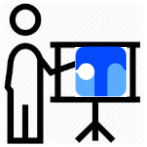


VALIDABLE ELEMENT

Price Combinations



Department for Transport



UK Bus Example: A Unit Section or “Stage” Fare

Department for Transport

Stage /Section Count Fares

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

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:

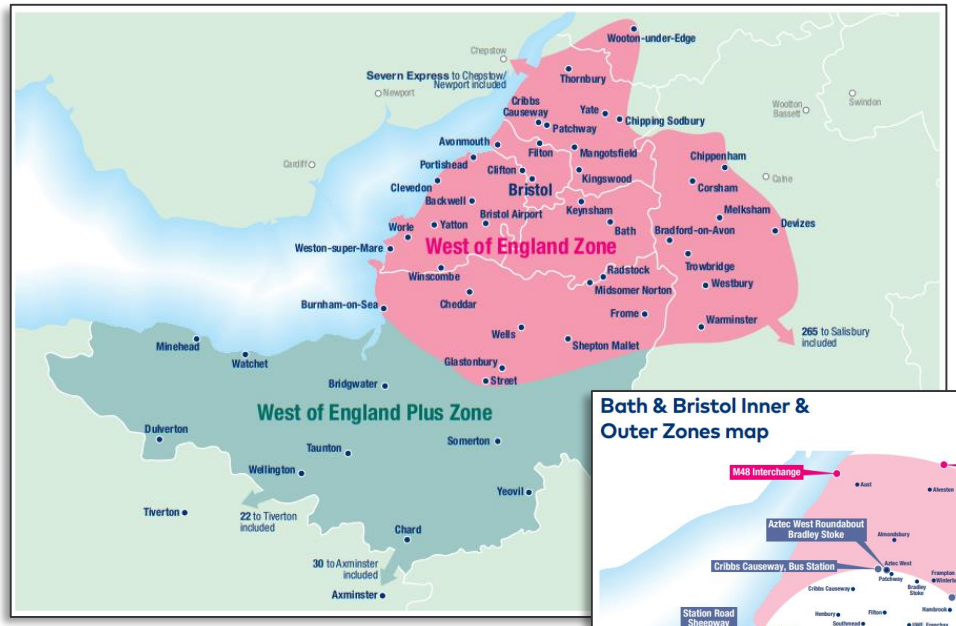
Emersons Green, Sainsbury's to Long Close would be £1.50 as you are travelling in three sections (numbers 1, 2 and 3, Long Close is classed as section 3 in this example as it's where you are getting off the bus).

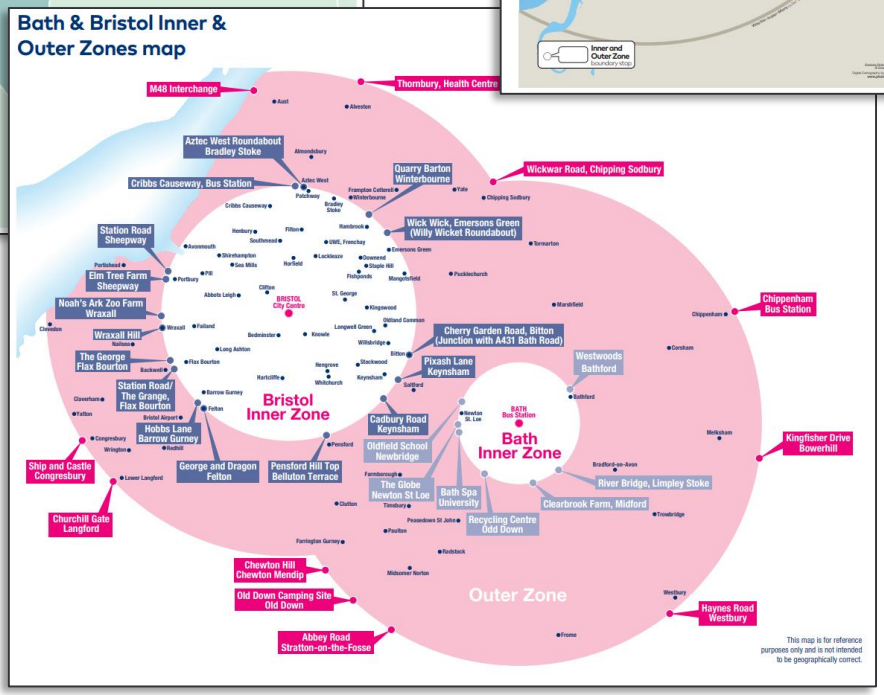
Long Close to Narroways Road would be £2.50 as you are travelling in four sections (4, 5, 6, 7, Long Close is counted as section 4 in this example as it's your boarding point).

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

Department for Transport

Zone Maps





- **Stage fares**
  - West of England Zone
  - West of England Plus Zone
- **Zonal**
  - Bristol Inner Zone
  - Bath Inner Zone
  - Bath and Bristol outer zone
  - Weston-super-Mare Inner Zone

Department for Transport

First West of England Zone Maps

- **Stage fares**
  - West of England Zone
- **Zonal**
  - Bristol Zone
  - Bath Zone
  - Bath
  - Weston-super-Mare Zone

Department for Transport

Analysing the First Bristol offer – Section based trip tariff

- Access Rights
  - Sections : Defined by stages along route
  - Intervals : *1-3, 4-6, 7-9, 10+ Units (Notional miles)*
  - Operator: First
- Products
  - Single product – a single Trip
  - User types: *Adult, Child (5-15) 50%, Student (16-21) 30%*
- Sales Offer packages
  - Travel Documents: *paper, app (m-ticket)*
- Other products available – eg day pass, season pass

https://www.firstgroup.com/uploads/node_images/Fares%20Guide%20%28May18%29.pdf

Department for Transport

Stage Fares

First

GEOGRAPHIC UNIT
1-Section

GEOGRAPHIC INTERVALS

1 2 3	01-03 = £1.50
	04-06 = £2.50
	07-09 = £4.50
	10+ = £5.50

FARE PRICEs

How is your single fare calculated?

Distance-based fares for the West of England

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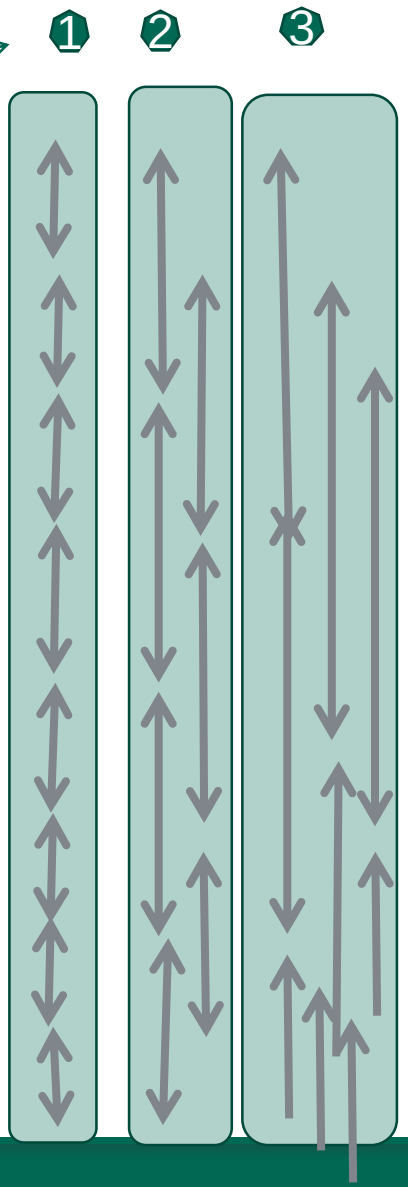
Long Close to Narroways Road would be £2.50 as you are travelling in four sections (4, 5, 6, 7, Long Close is counted as section 4 in this example as it's

Stage Points

Blackl d, The Leap would be £2.50 as you are travelling in four sections (5, 4, 3, 2).

FARE SECTIONs

SCHEDULED STOP POINTs



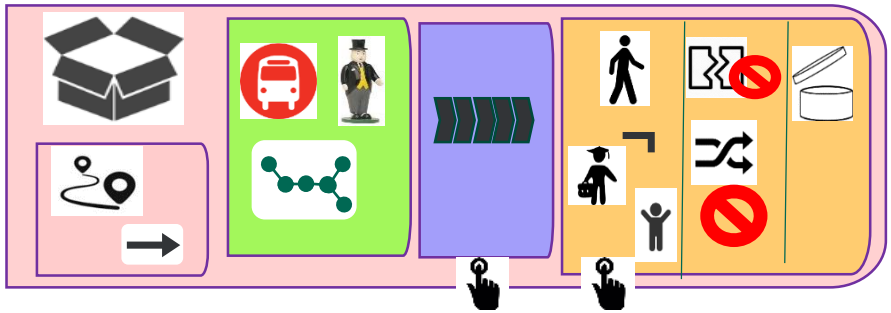
Example – Unit Section Trip Product

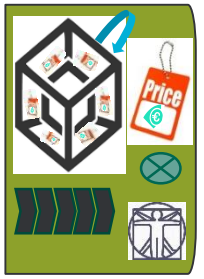
Department for Transport

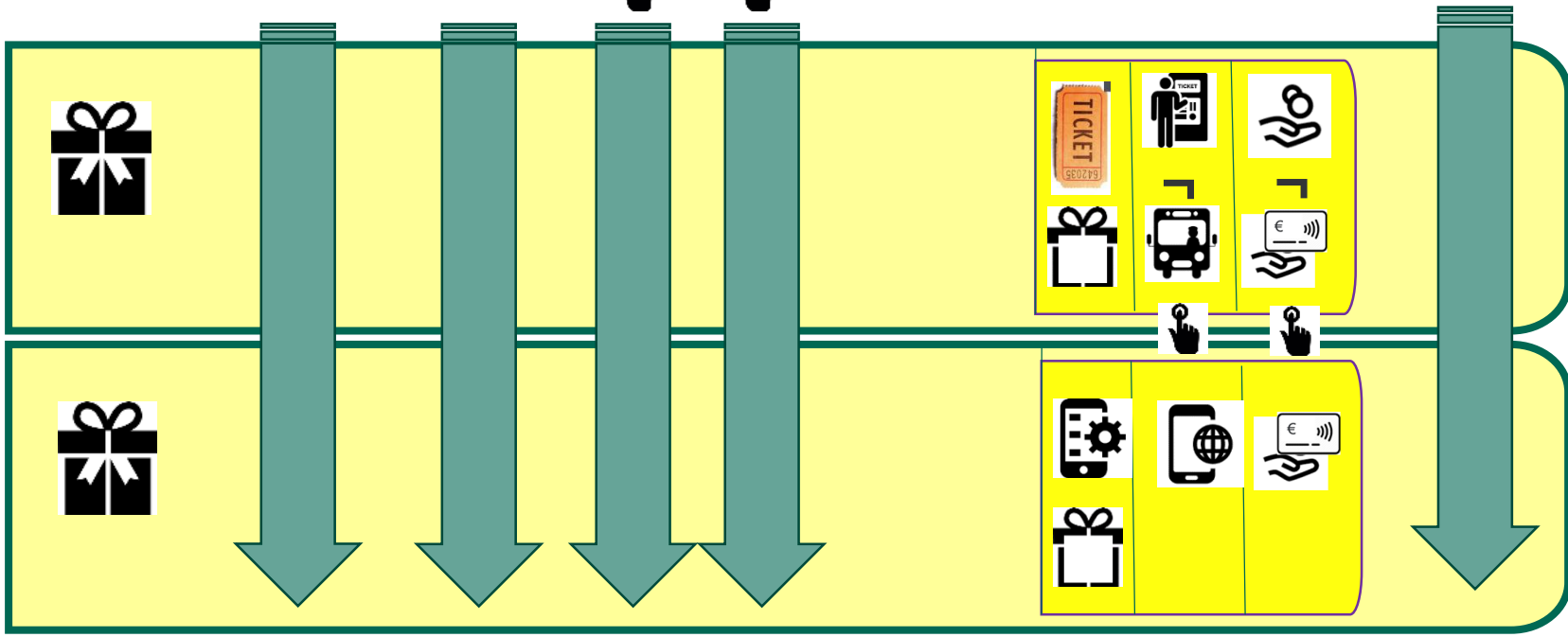
First

FARE PRODUCT | FARE STRUCTURE ELEMENTs | USAGE PARAMETERs | DISTRIBUTION ASSIGNMENT | FARE PRICEs

SALES OFFER PACKAGE



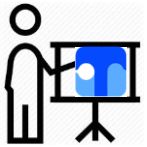




"Cash Single"

"Mobile app Single"

Department for Transport

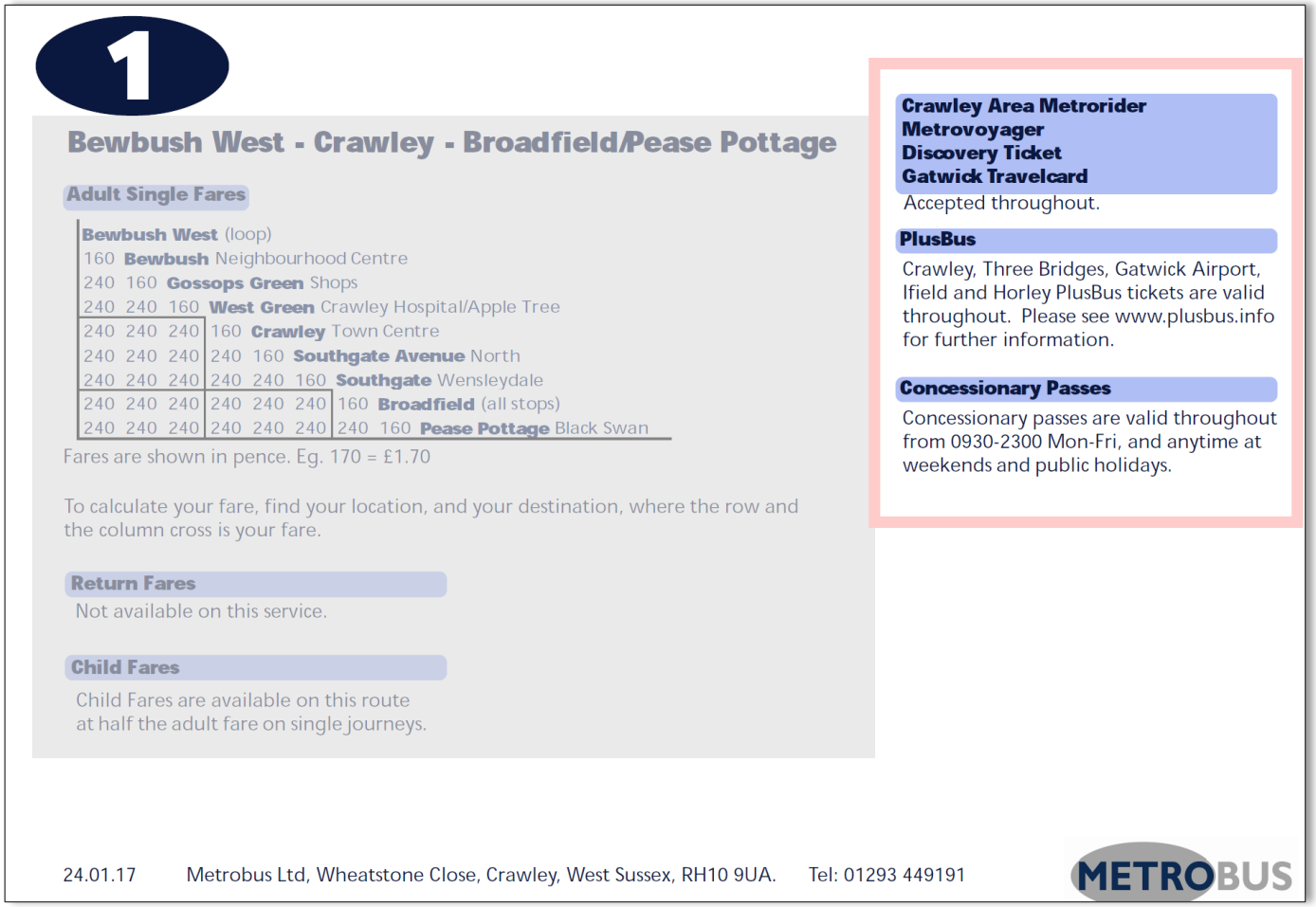


Routes for which multiple Tariffs are applicable?

Products valid on Multiple Operators?

Department for Transport

Metrobus 1 - Other Tariffs



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

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

Metrobus 1 - Other Tariffs

Department for

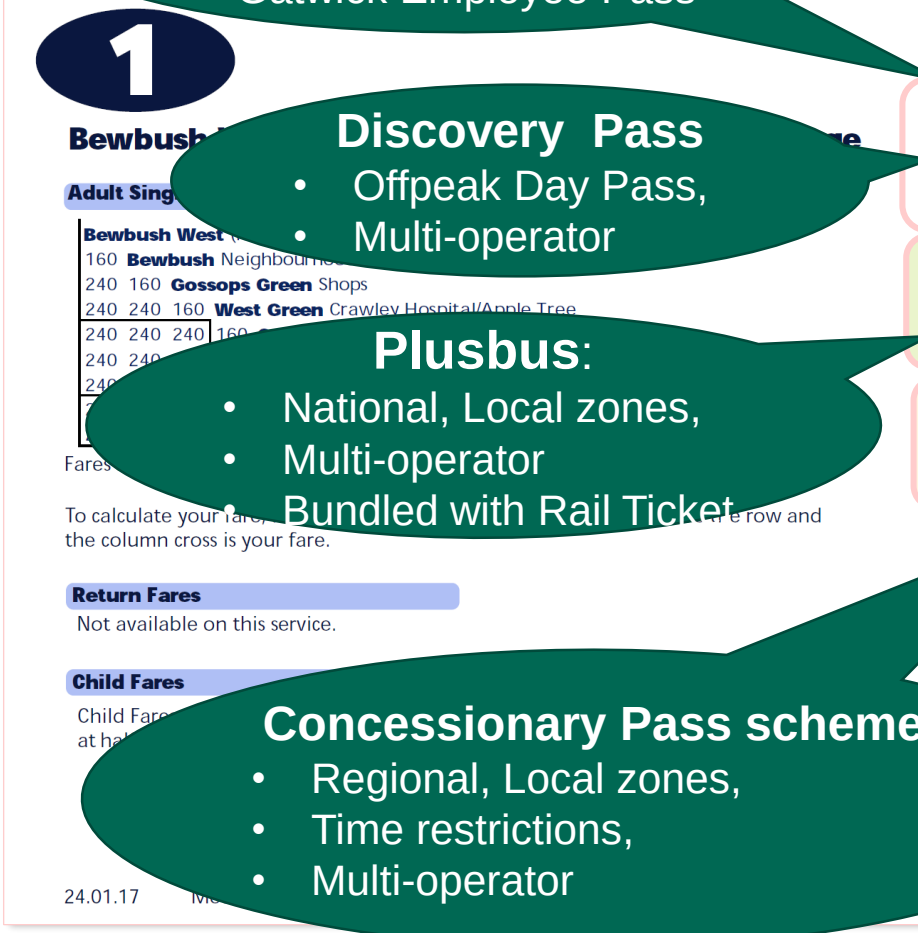
Metrobus Products
- Metrorider / Metrovoyager,
- Gatwick Employee Pass

Discovery Pass
- Offpeak Day Pass,
- Multi-operator

Plusbus:
- National, Local zones,
- Multi-operator
- Bundled with Rail Ticket

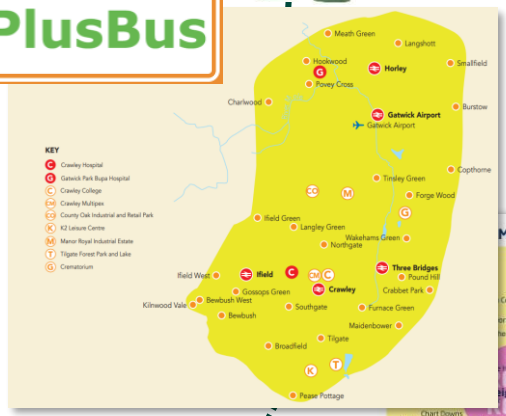
Concessionary Pass scheme
- Regional, Local zones,
- Time restrictions,
- Multi-operator

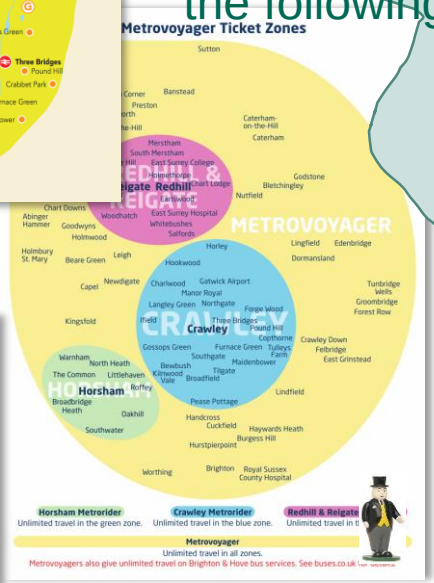
FARE PRODUCTs
(Other day & Period passes)

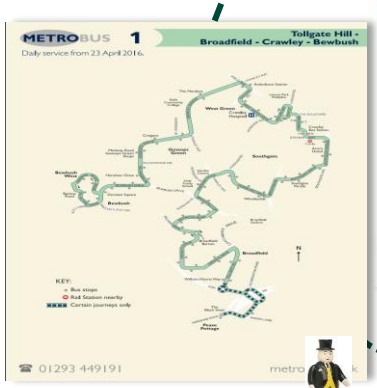


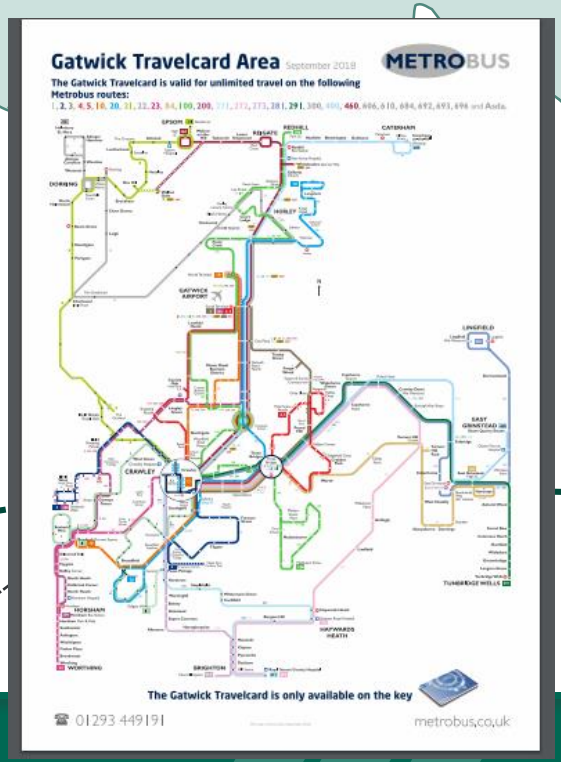
Multiple Tariffs applicable

Discovery Ticket, a one day travel ticket, allowing you to travel unlimited in West Sussex, East Sussex, Surrey, Brighton & Hove, East Hampshire, Kent and Medwy on the following operated services:





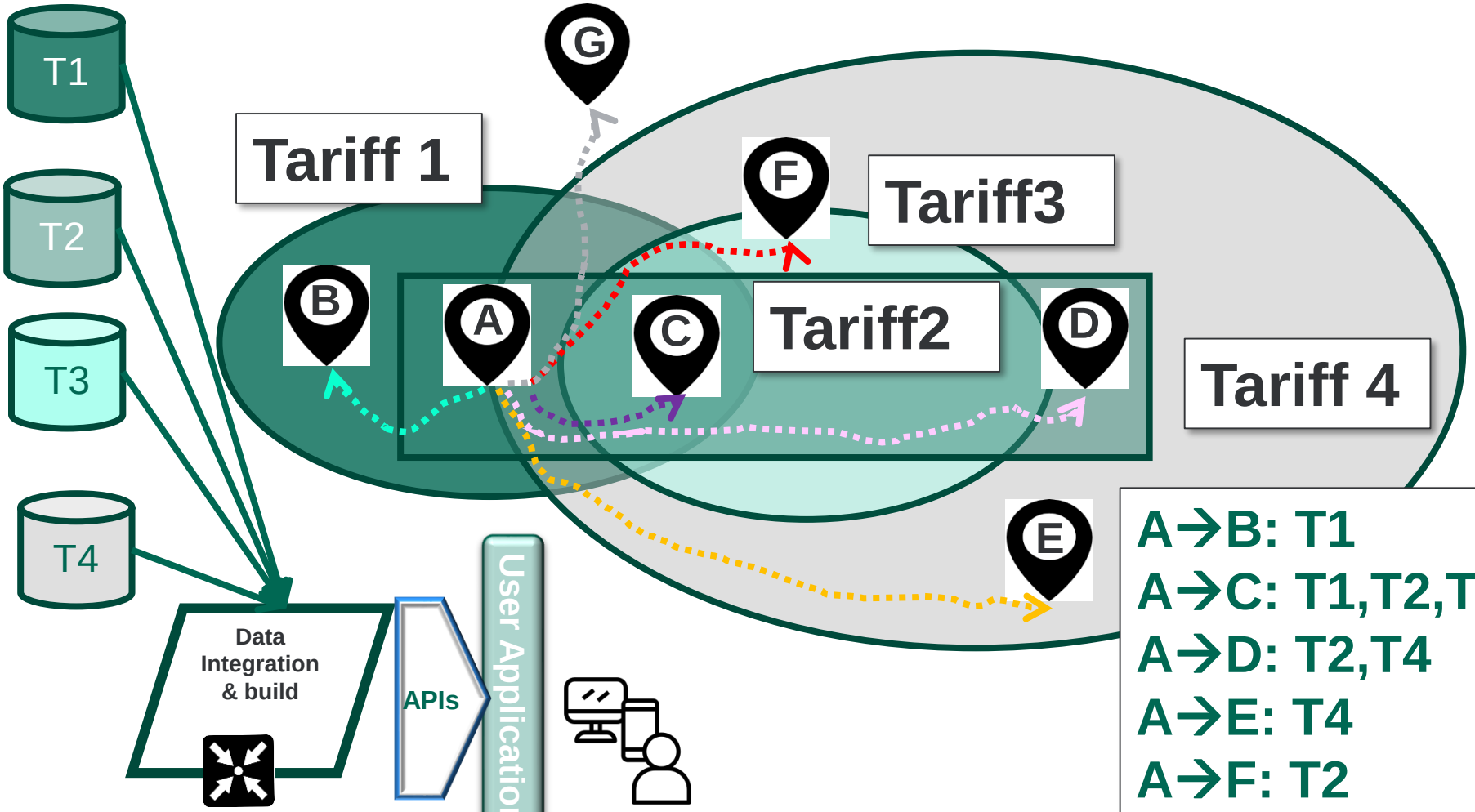




Concessionary Pass Schema

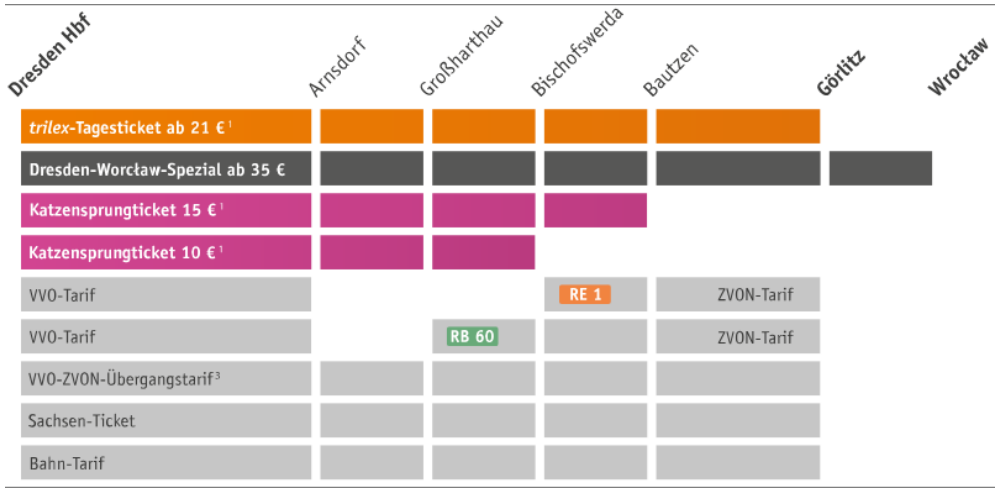
Department for Transport

Each tariff describes itself; it is the trip planner/ fare engine's task to find the applicable, best value fares for given trip



A→B: T1
A→C: T1,T2,T4
A→D: T2,T4
A→E: T4
A→F: T2
A→G: x

Visualisation of Multiple Tariffs: Dresden - Wroclaw



Trilex Tageskarte tariff: is an off-peak flat rate **day pass** available for journeys crossing the region, and also to go to Liberec (CR). Group discounts are available.

Dresden-Wroclaw-Spezial is a special discounted **period return trip** fare valid on a cross-border route between Dresden (DE) and Wroclaw (PL). Group discounts are available.

Katzensprung tariff is an off-peak tariff offering **day passes** at two different rates for different sections; only within Saxony, only for the specified routes.

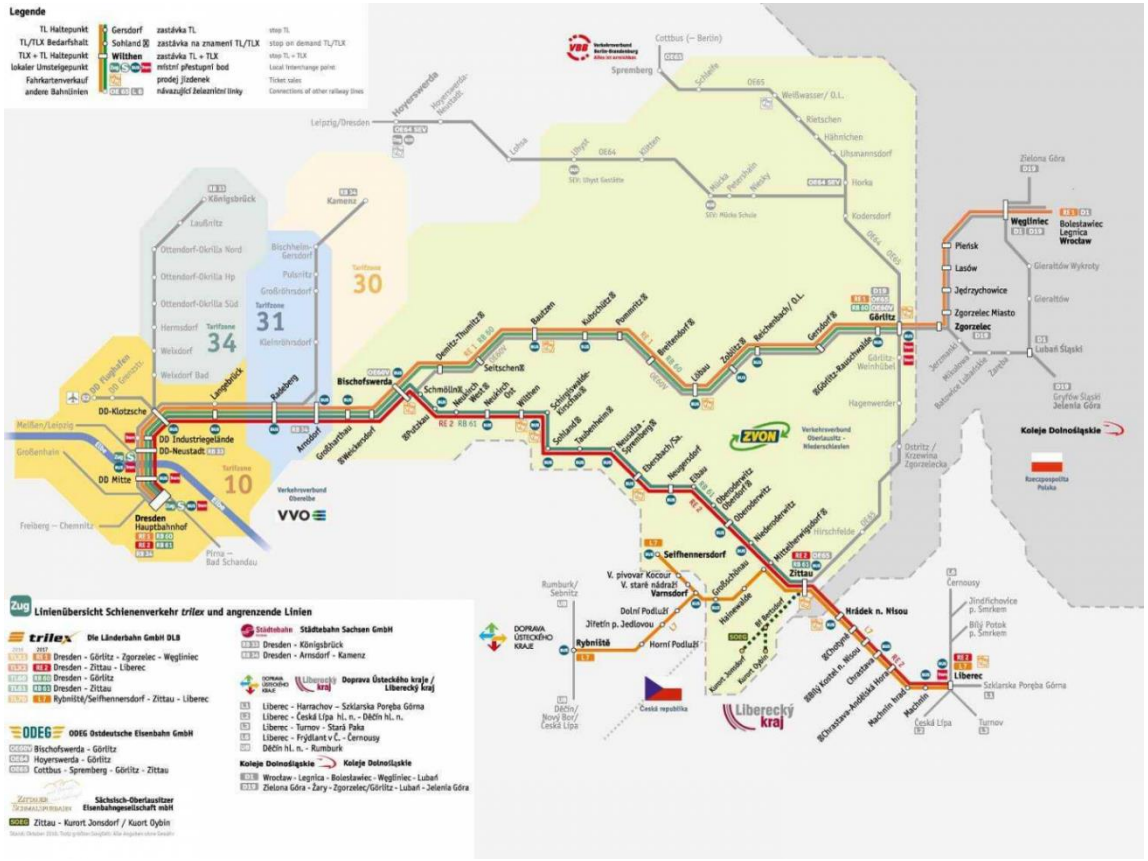
VVO (*Verkehrsverbund Oberelbe*), and ZVON (*Zweckverband Verkehrsverbund Oberlausitz-Niederschlesien*) tariffs are regional P2P tariffs only available on certain parts of the network. Regional expresses (E.g. RE 20, RB61) cost more than regular trains.

Saxony tariff is a regional off-peak day pass offered by Deutsch Bahn and usable as far as the border. Group discounts are available.

Bahn tariffs are standard P2P rail tariffs charged by national rail operators such as Deutsche Bahn and Polish Railways; available for all sections of the journey.

Example #3 - Crossborder routes

- Multiple operators.
- Regional cross border tariffs.
- National and operator specific product sets.
- Point to point fares.
- Fare zones.
- Flat fares.
- Group discounts.
- Express trains
- Derived prices with rule steps showing price derivation.



- **Linie RE1, RB60:**
  - **Dresden** - Bischofswerda - Bautzen - Löbau - Görlitz (-**Wrocław**/Jelenia Góra)
- **Linie RE2, RB61:**
  - **Dresden** - Bischofswerda - Wilthen - Ebersbach - Zittau (-**Liberec**)

Department for Transport

Modelling Prices

Pricing

Department for Transport

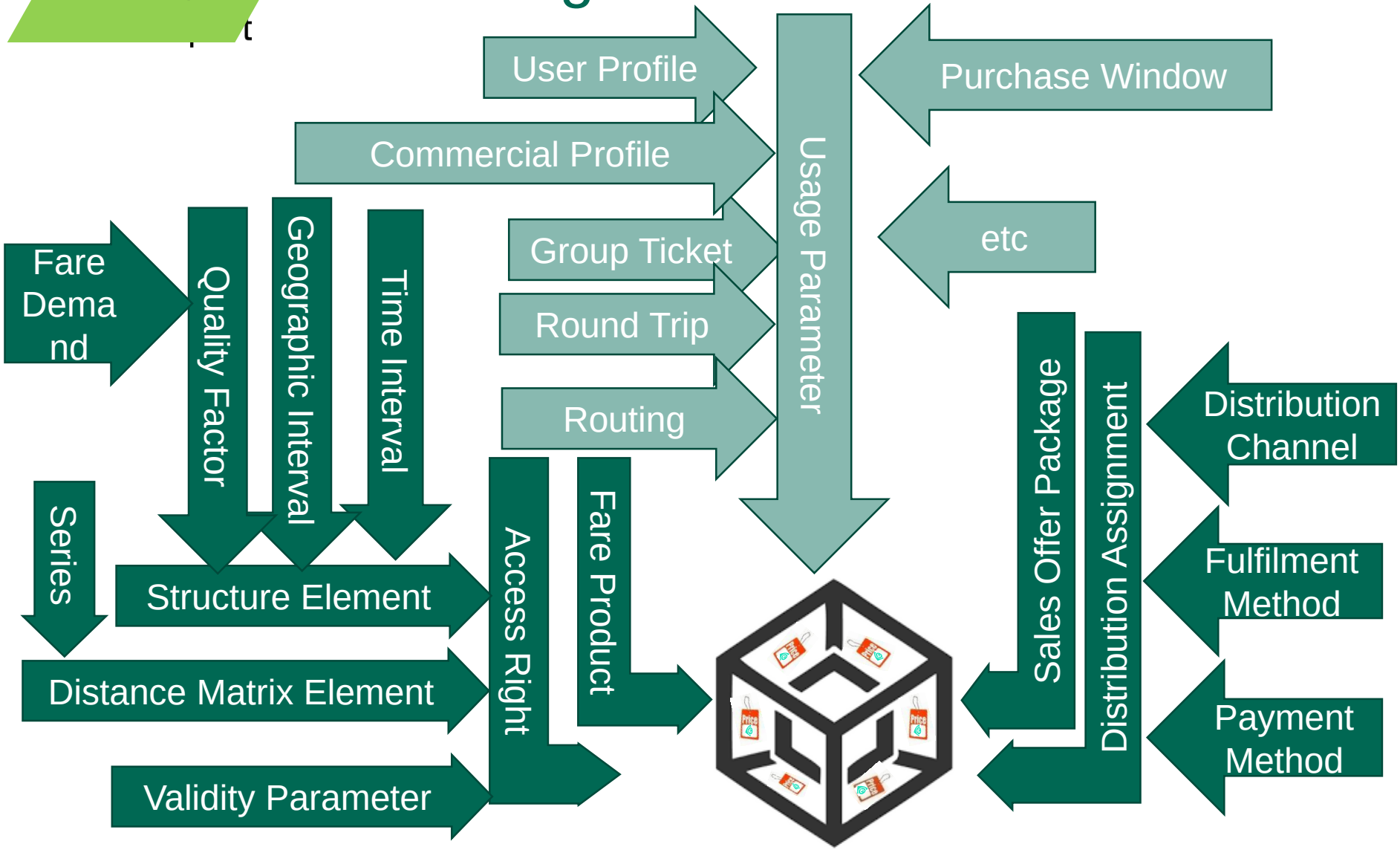
Fare Prices

- Prices are separate from the tariff elements they price.
  - An element may have different prices with different validities.
  - Prices may apply to individual elements or combination of priceable elements

- Different type of prices
  - Static / Base Prices
  - Prices Derived from Base Prices
  - Dynamic Prices (pricing service)
    - Range bands for dynamic prices can be indicated by FARE QUOTA FACTORs

Pricing

Pricing Dimensions



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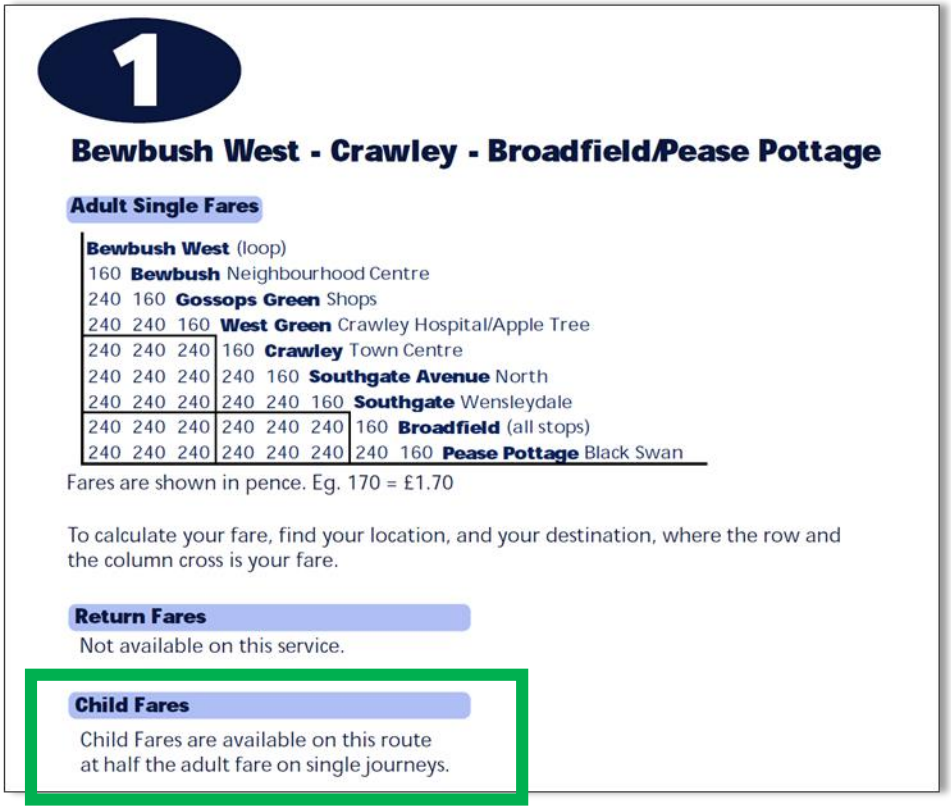
Derived Prices



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.

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

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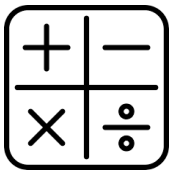
Pricing Rules for deriving prices



- PRICING RULE
  - Any arbitrary named calculation
  - May be chained
- DISCOUNTING RULE
  - Price is a % or absolute discount or addition
- LIMITING DISCOUNTING RULE
  - Discount with absolute minima and maxima
- ROUNDING

Global parameters

  - Round to limit
  - Round in steps

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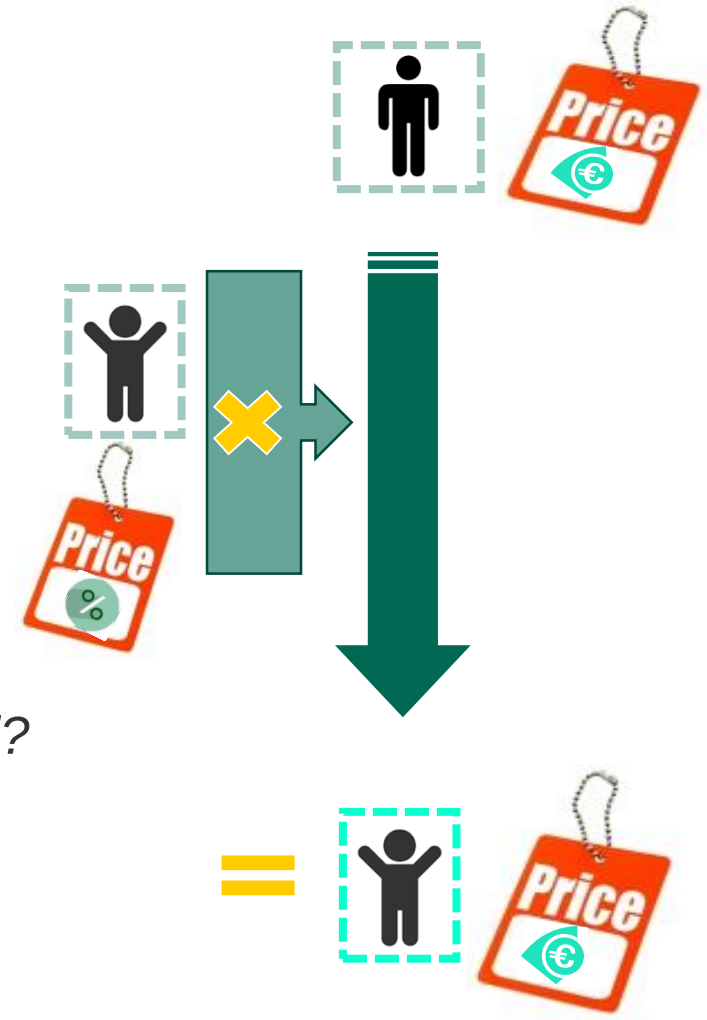
Prices may be absolute or derived

- **Base Price**
  - E.g. *Adult =£1.50*
- **Pricing Rule**
  - Discounting
    - E.g. *Child = 50% of Adult*
  - *Limiting*
    - *Minimum price = 50p*
  - *Cumulative discounts allowed?*
- **Derived Price**
  - *E.g. Child = £0.75*



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Prices may be based on a price group

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

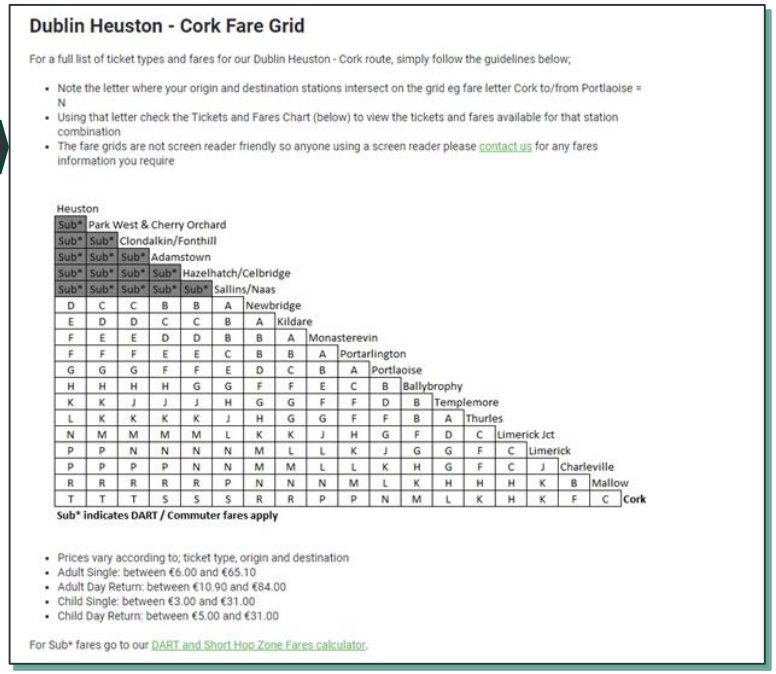
PRICE GROUP

A = £1.60 (= 1 stage?)

B = £2.40 (= 2 or more stages?)

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

Is Metrobus1 really a unit zone count fare?



Dublin Heuston - Cork Fare Grid

For a full list of ticket types and fares for our Dublin Heuston - Cork route, simply follow the guidelines below;

- Note the letter where your origin and destination stations intersect on the grid eg fare letter Cork to/from Portlaoise = N
- Using that letter check the Tickets and Fares Chart (below) to view the tickets and fares available for that station combination
- The fare grids are not screen reader friendly so anyone using a screen reader please contact us for any fares information you require

Heuston																			
Sub*	Park West & Cherry Orchard																		
Sub*	Sub*	Clondalkin/Fonthill																	
Sub*	Sub*	Sub*	Adamstown																
Sub*	Sub*	Sub*	Sub*	Hazelhatch/Celbridge															
Sub*	Sub*	Sub*	Sub*	Sub*	Sallins/Naas														
D	C	C	B	B	A	Newbridge													
E	D	D	C	C	B	A	Kildare												
F	E	E	D	D	B	B	A	Monasterevin											
F	F	F	E	E	C	B	B	A	Portarlington										
G	G	G	F	F	E	D	C	B	A	Portlaoise									
H	H	H	H	G	G	F	F	E	C	B	Ballybrophy								
K	K	J	J	H	G	G	F	F	D	B	Templemore								
L	K	K	K	K	J	H	G	G	F	F	B	A	Thurles						
N	M	M	M	M	L	K	K	J	H	G	F	D	C	Limerick Jct					
P	P	N	N	N	N	M	L	L	K	J	G	G	F	C	Limerick				
P	P	P	P	N	N	M	M	L	L	K	H	G	F	C	J	Charleville			
R	R	R	R	P	N	N	N	M	L	K	H	H	H	K	B	Mallow			
T	T	T	S	S	S	R	R	P	P	N	M	L	K	H	K	F	C	Cork	

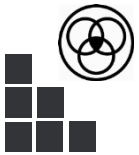
Sub* indicates DART / Commuter fares apply

- Prices vary according to; ticket type, origin and destination
- Adult Single: between €6.00 and €65.10
- Adult Day Return: between €10.90 and €84.00
- Child Single: between €3.00 and €31.00
- Child Day Return: between €5.00 and €31.00

For Sub* fares go to our DART and Short Hop Zone Fares calculator.

Price data - Absolute








OPERATOR	SALES PACKAGE	FARE PRODUCT	O/D	CLASS OF USE	USER PROFILE	CHANNEL	TRAVEL DOC TYPE	Price Amount
BR	Trip+AtCounter	Trip	X→Y	1st	Adult	Counter	Paper	£20.00
BR	Trip+AtCounter	Trip	X→Y	1st	Child	Counter	Paper	£10.00
BR	Trip+AtCounter	Trip	X→Y	2nd	Adult	Counter	Paper	£15.00
BR	Trip+AtCounter	Trip	X→Y	2nd	Child	Counter	Paper	£7.50
BR	Trip+MobileApp	Trip	X→Y	1st	Adult	Mobile	MobileApp	£18.00
BR	Trip+MobileApp	Trip	X→Y	1st	Child	Mobile	MobileApp	£9.00
BR	Trip+MobileApp	Trip	X→Y	2nd	Adult	Mobile	MobileApp	£14.00
BR	Trip+MobileApp	Trip	X→Y	2nd	Child	Mobile	MobileApp	£7.00
	etc							

Separate price given for each possible combination

Price data – Some Derived

OPERATOR	SALES PACKAGE	FARE PRODUCT	O/D	CLASS OF USE	USER PROFILE	CHANNEL	TRAVEL DOC TYPE	Amount Or Rule
BR	Trip+AtCounter	Trip	X→Y	1st	Adult	Counter	Paper	£20.00
BR	Trip+AtCounter	Trip	X→Y	1st	Child	Counter	Paper	→%Adult
BR	Trip+AtCounter	Trip	X→Y	2nd	Adult	Counter	Paper	£15.00
BR	Trip+AtCounter	Trip	X→Y	2nd	Child	Counter	Paper	→%Adult
BR	Trip+MobileApp	Trip	X→Y	1st	Adult	Mobile	MobileApp	£18.00
BR	Trip+MobileApp	Trip	X→Y	1st	Child	Mobile	MobileApp	→%Adult
BR	Trip+MobileApp	Trip	X→Y	2nd	Adult	Mobile	MobileApp	£14.00
BR	Trip+MobileApp	Trip	X→Y	2nd	Child	Mobile	MobileApp	→%Adult
	etc							

Some prices are based on others

Department for Transport

Summary

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
- 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*

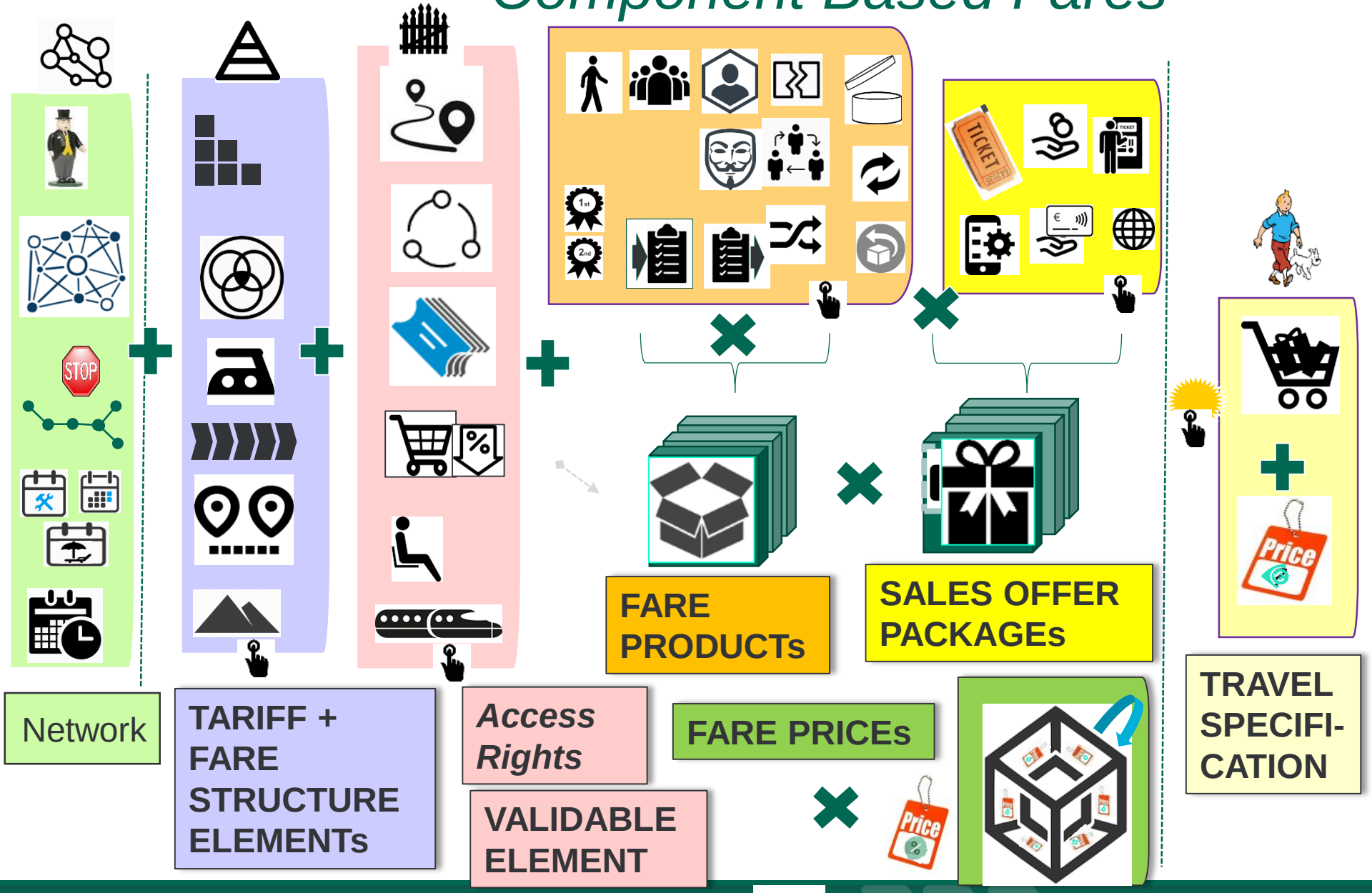
Rights to access & consume services:
- scope and order of use
- validity and usage rules
- *bus trip stop X to stop Y, metro trip 3 zones*

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*

Component Based Fares



Department for Transport

Some principles for Scoping UK bus tariffs

traveline

1. Every price dimension found in UK bus fares needs a corresponding model element
2. There is no single universal way to package fare offers
   - Yet any type of product / offer can be built from a common set of components
3. You can exchange the data elements and parameters, but not how they are used
   - E.g. pricing parameters (discounts, rounding)
   - E.g. Combining conditions on tariffs, products and sales offers
4. Each product should just define its own tariff
   - It is the trip planner / fare engine's task to find all available tariffs

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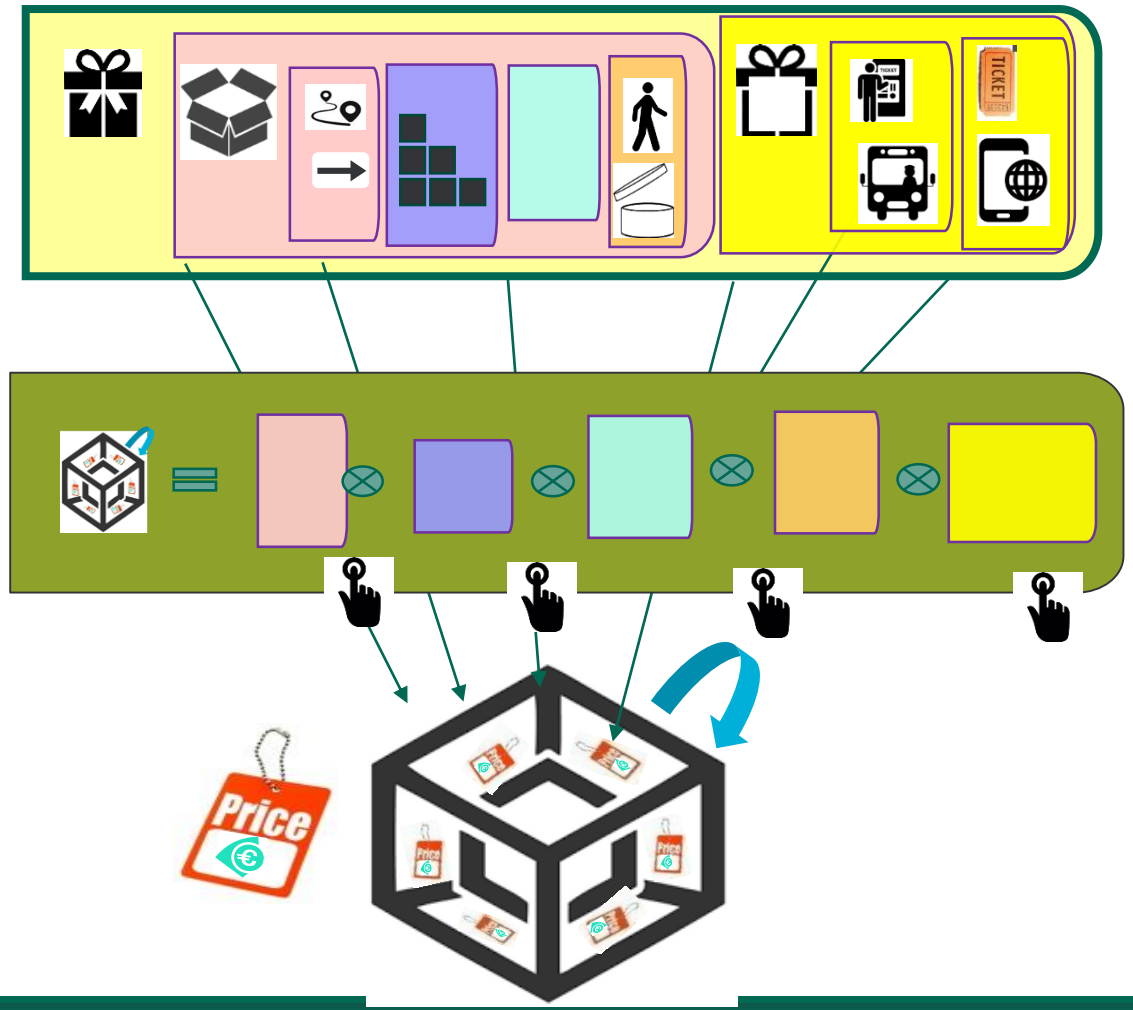
Price dimensions



- 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
- Scope depends on specific tariff structures to be supported

Department for Transport Stage Fares

First

GEOGRAPHIC UNIT
1-Section

GEOGRAPHIC INTERVALS

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

FARE PRICEs

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 (5, 4, 3, 2).

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
Bethy Green
Bromfield Walk
Meadgate 1
Blackhorse Lane
Downend, The Leap
Leap Bridge 2
Four Acre Road
Queensholm Crescent
Wedgewood Road
Quakers Road
Bromley Heath Avenue 3
Cleeve Hill
Long Close
Selbrooke Crescent
Ettricke Drive
Vassal Road
Straits Parade 4
New Station Road
Fishponds, Channon's Hill
Channons Hill
Snowdon Road
Blackberry Hospital
Tenderwood Park 5
Small Lane
River View
Brinkworthy Road
The Chine
Stapleton Church
Glenfrome Road 6
Stapleton Road
Eastville, Eastgate Centre
Eastgate Road
Narroways Road 7
Stafford Road
Sevier Street
Avery Road, Brook Road 8
Denbigh Street
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 Points

FARE SECTIONs

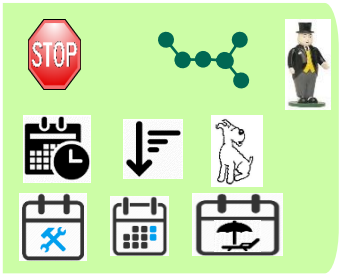
SCHEDULED STOP POINTs

1 2 3

Department for Transport

Benefits of Transmodel / NeTEx Approach to Fares

- **Powerful Component based representation**
  - Allows many different tariff combinations to be described with the same set of atomic components
  - Allows complex conditions to be expressed
  - Allows necessary packaging of products into different offers
  - Gives highly reusable implementations
- **Joined up conceptual model - Reuses existing Network & Timetable elements**
  - Network (Stops, tariff zones, modes, operators, etc)
  - Timetable elements, servicesetc
  - Temporal conditions and day types, validities
- **Robust, Flexible, Extensible Technology**
  - XML allows selective use, validation integrity checking etc
  - UML provides tool supported system documentation
  - Conceptual model for Account Based Ticketing and future developments



Department for Transport

Some Drawbacks to a Component based Approach

- **Skills Investment needed to understand Concepts & Components**
  - Tariff structures, Access rights
  - Uses of different parameters
  - Product and Sales Offer packaging
- **Component based semantics require attention to assembly and compounding behaviour**
  - Exchange of data does not guarantee exchange of behaviour!