



Transmodel

***Functional domains :
Fare Collection, Operations Monitoring &
Control, Management Information***

***TAIEX Workshop on public transit travellers
information systems***

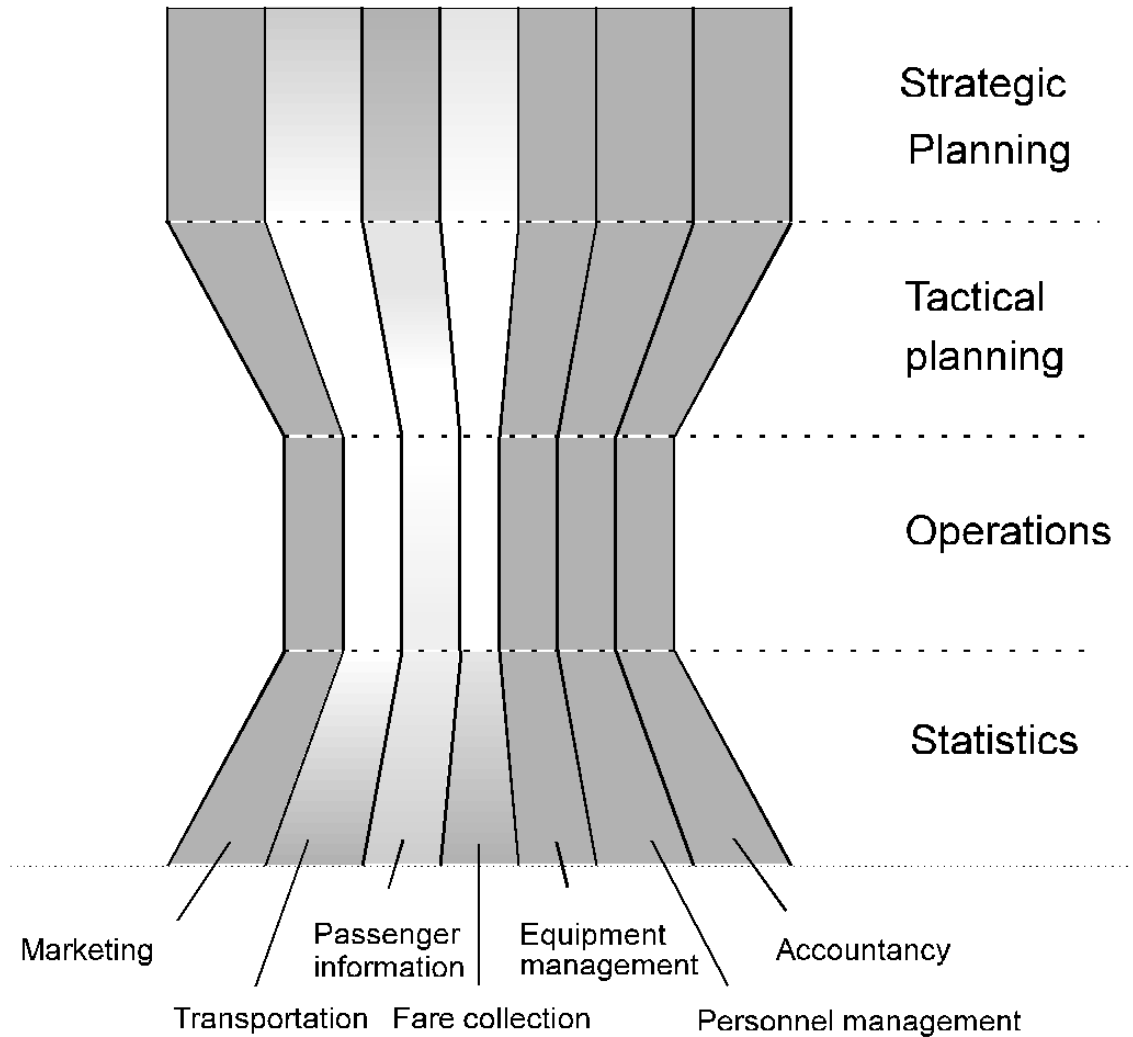
Tel-Aviv, 22-23 September 2008



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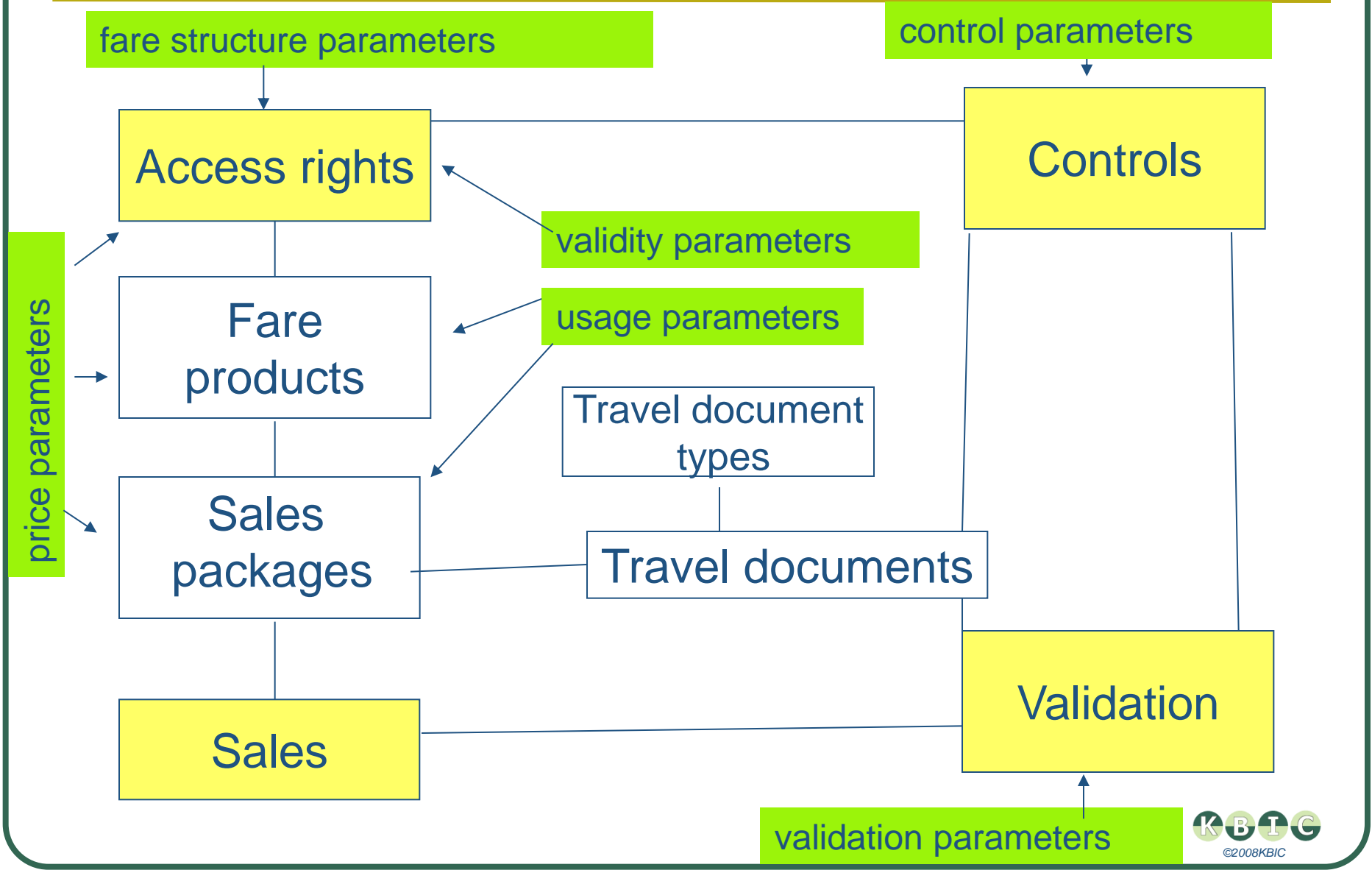


Transmodel Functional Areas





A « map » of the Fare Collection model





The Fare Collection Model in Brief

- ❖ Starting point: **access rights** defined through the **elements of a fare system**
- ❖ The fare system elements being defined through a range of **parameters** (quantitative parameters, validity parameters, usage parameters, ...)
- ❖ Combined into **fare products**
 - Materialized as **travel documents**
 - Grouped into **sales packages** to be sold to the customers...
- ❖ The **controls** are applied to the access rights mentioned on the fare media in order to be able to
 - **validate** the use of the access rights
 - or to identify an offence to be reported on **blacklists**
- ❖ The **prices** to be paid by the customers may be calculated taking into account elementary price elements linked to the access rights, fare products and sales packages.



Access rights

CONTROLLABLE
ELEMENT

The smallest controllable element of public transport consumption, all along which any VALIDITY PARAMETER ASSIGNMENT remains valid.

FARE STRUCTURE
ELEMENT

A sequence or set of CONTROLLABLE ELEMENTs to which rules for limitation of access rights and calculation of prices (fare structure) are applied.

VALIDABLE
ELEMENT

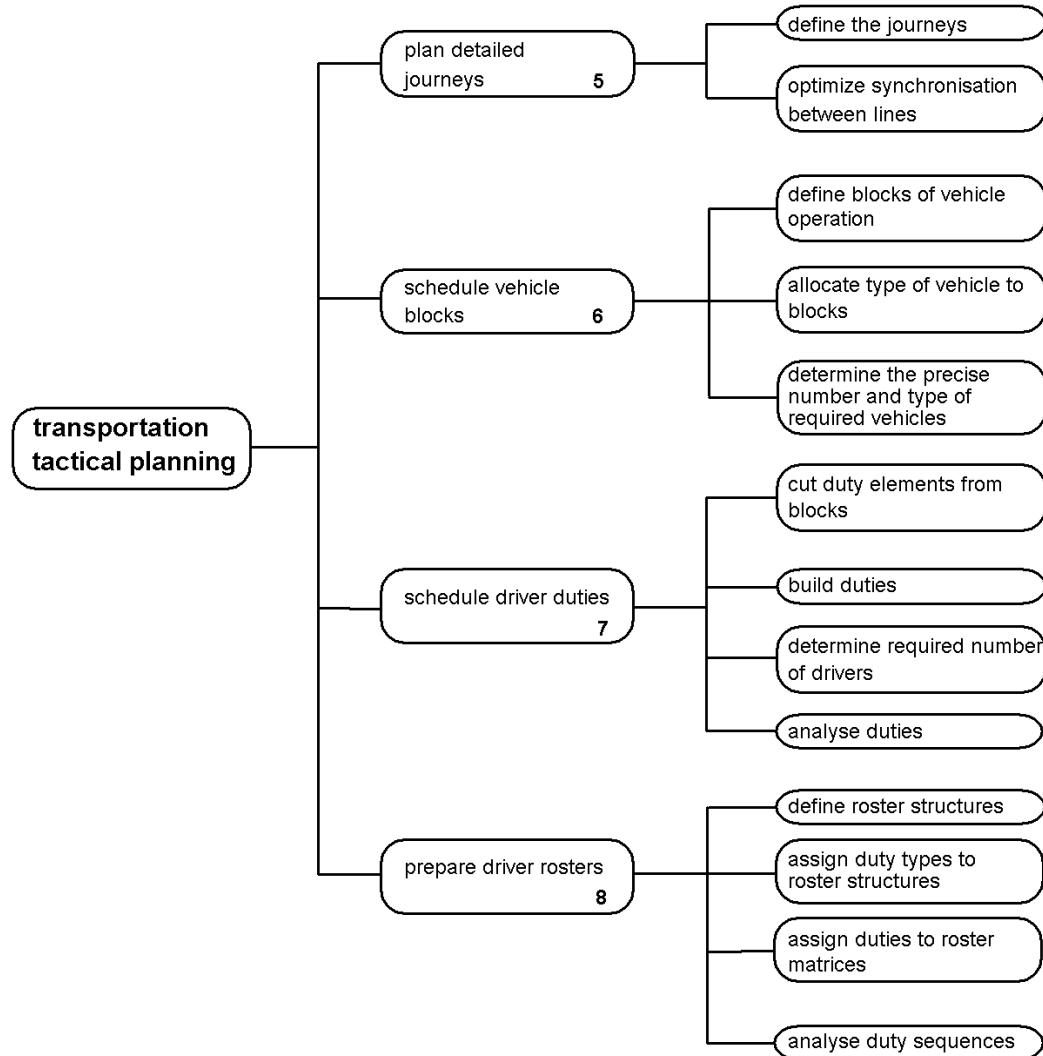
A sequence or set of FARE STRUCTURE ELEMENTs, grouped together to be validated in one go.

FARE
PRODUCT

An immaterial marketable element (access rights, discount rights etc), specific to a CHARGING METHOD.



Tactical Planning





❖ Vehicle Scheduling

- work of the vehicles: **blocks**
- different points linked to it: **relief, parking**, etc
- link of the work of the vehicles with **vehicle requirements**

❖ Driver Scheduling

- work of the drivers: **duties** and its components (**duty parts, stretches, spells**), **breaks, pauses**, ...
- Link between the blocks and duties: **resource plan**

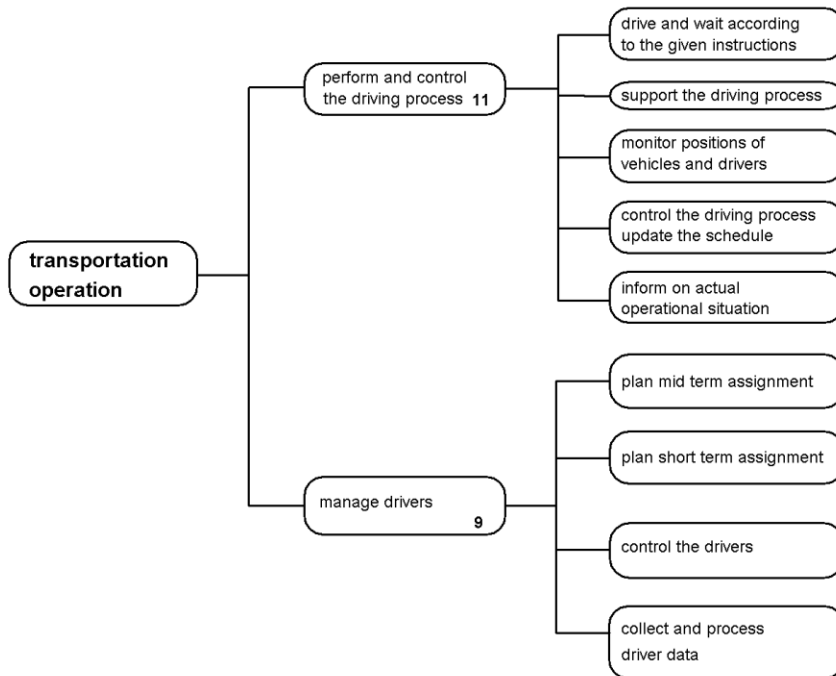
❖ Schedules : driver and vehicle schedules

❖ Rostering (normative only for specific rostering methods)



Operations Monitoring & Control

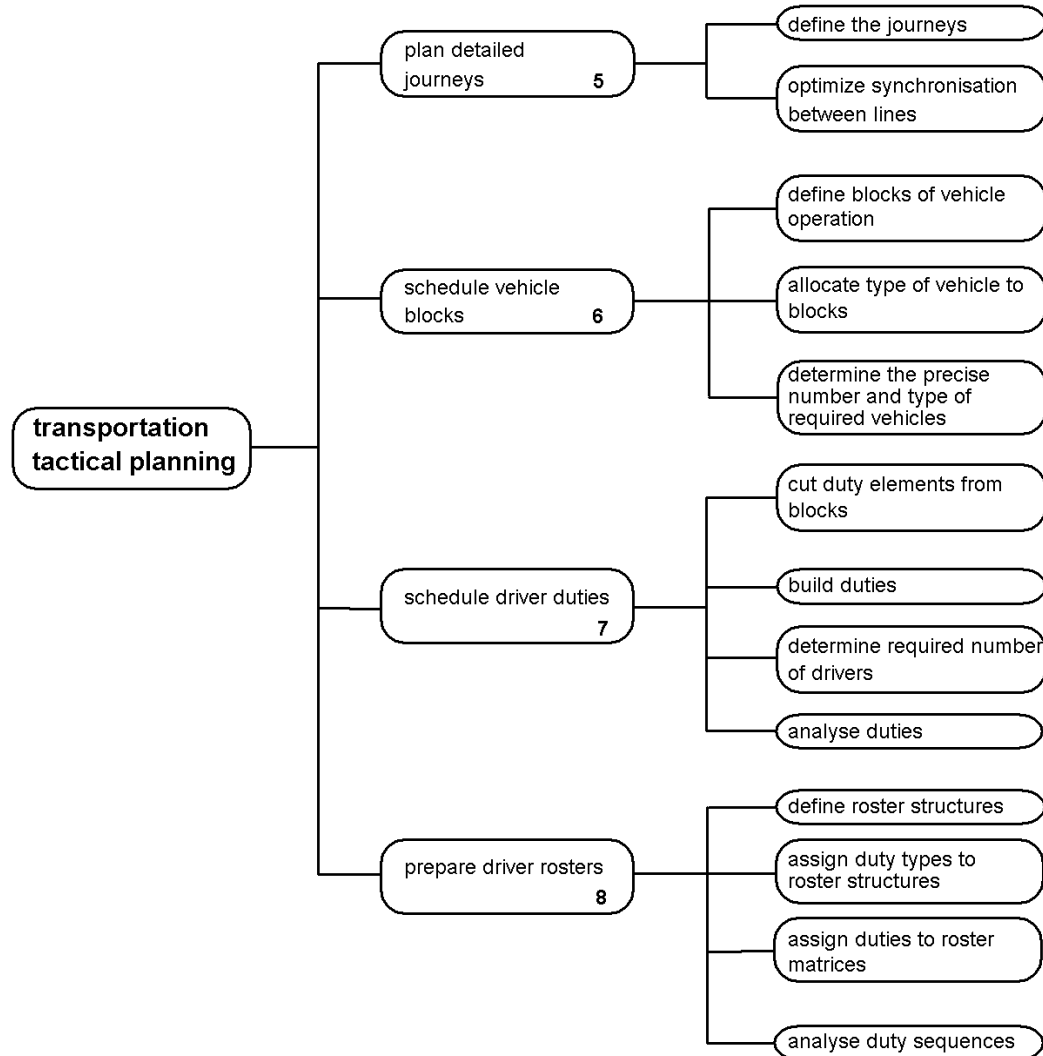
DATA DOMAINS



- Dated Production Components
- Production Plan
- Detection and Monitoring
- Control Actions
- Events
- Messages

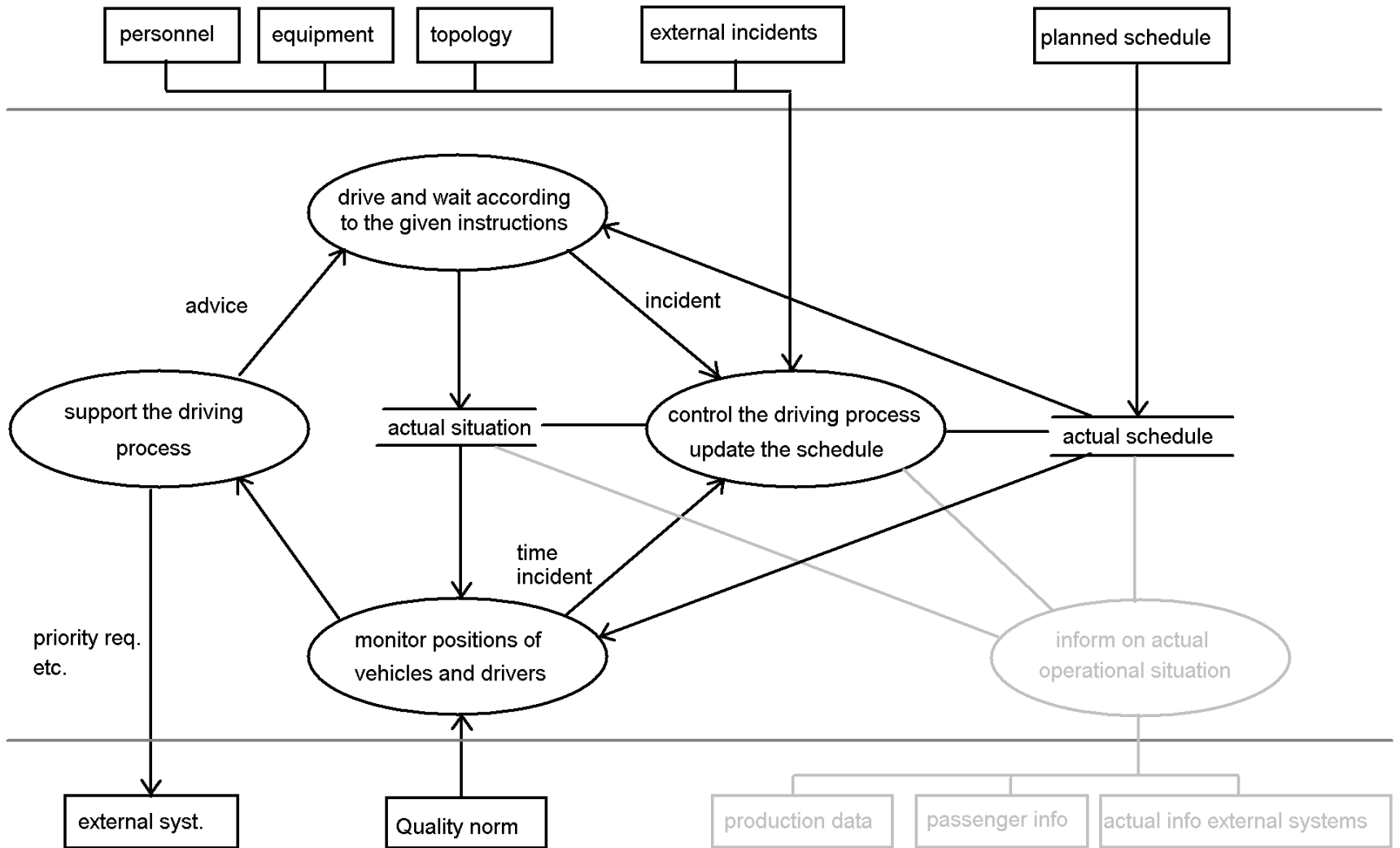


Tactical Planning



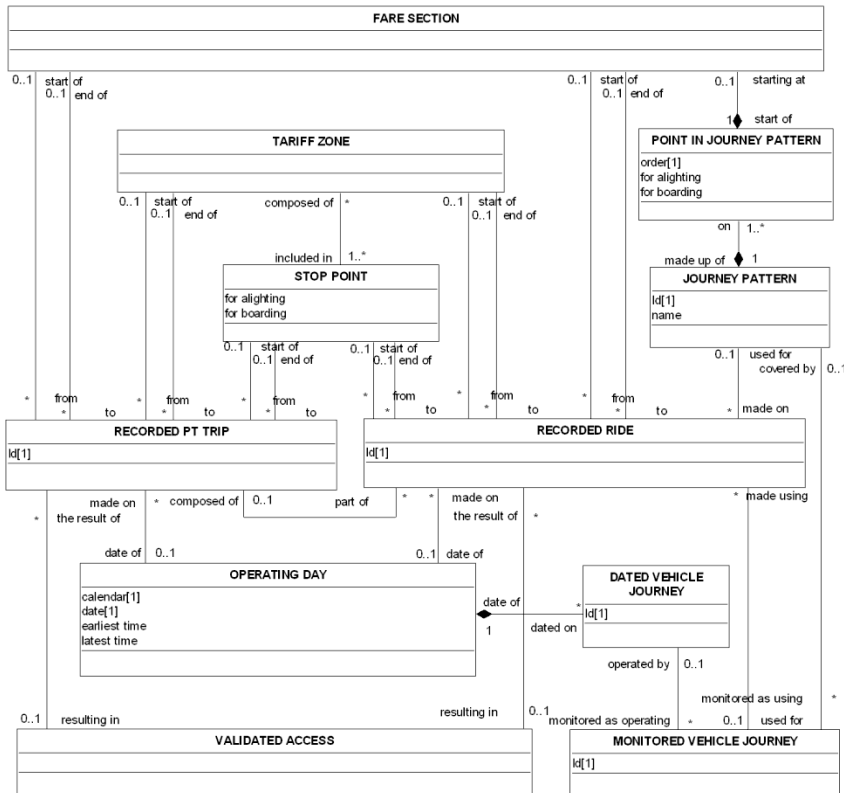


Operations Monitoring & Control





Management Information: Recorded Use of Services (trips, validated accesses, ...)



- ❖ A RECORDED PT TRIP is an actual trip undertaken by a passenger, from a certain origin place to a certain destination place, on a specific OPERATING DAY.
- ❖ In many cases, the origin and destination places will be expressed as STOP POINTs
- ❖ they will be sometimes described with less precision, as TARIFF ZONEs or FARE SECTIONs

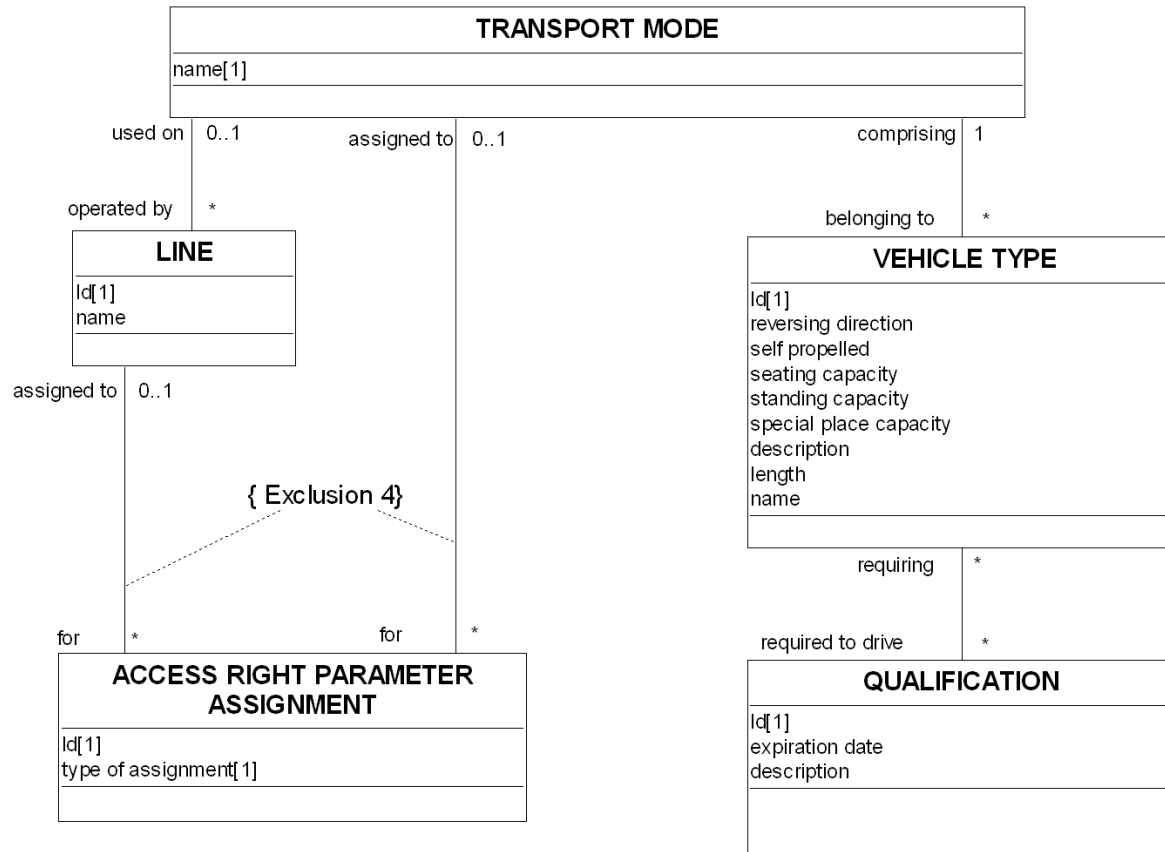


Multi-modal operation

- ❖ A multi-modal public transport environment may be defined as the co-operation of technically different transport systems, as regards planning, operation or passenger information.
- ❖ Such an environment is not only characterised by the juxtaposition of several transport modes, but as well by their integration in various ways.
- ❖ The most significant needs addressed by the model are dealing with:
 - network description;
 - resource management;
 - operations;
 - passenger information;
 - fare collection.

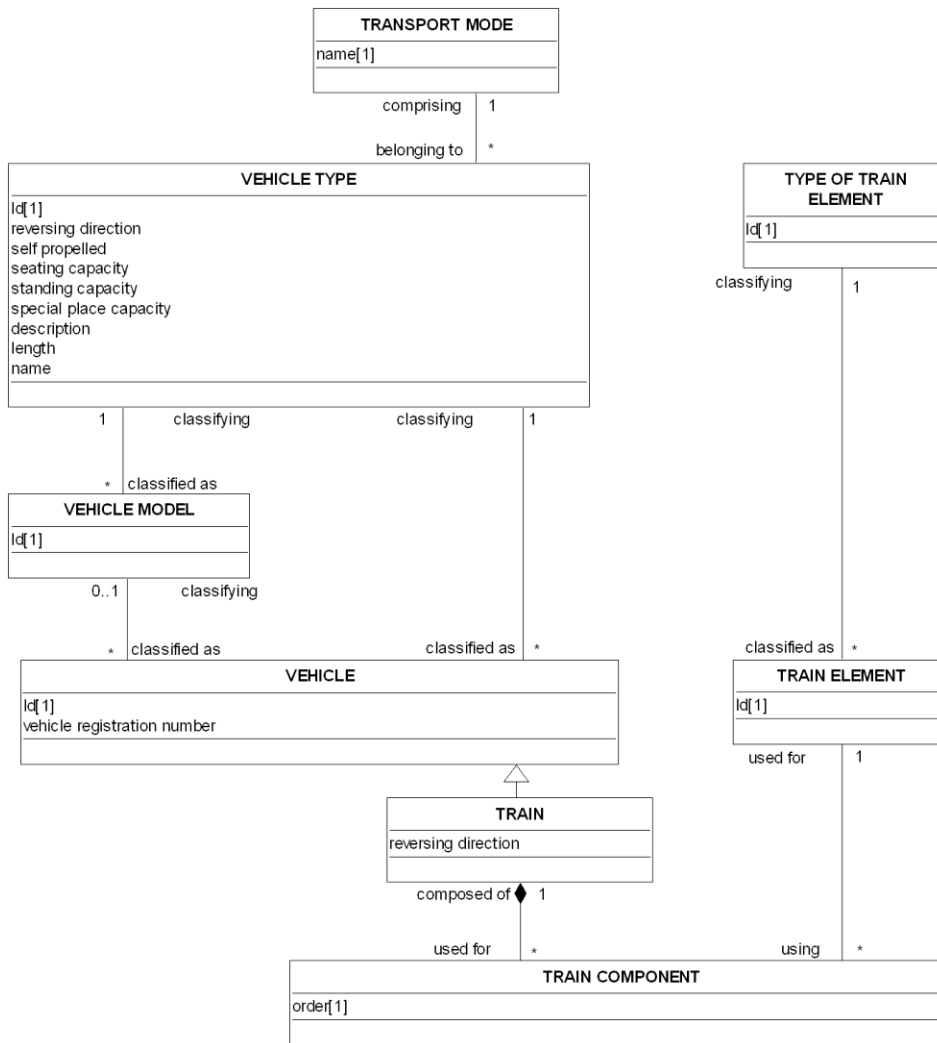


Multi-modal operation: Transport Modes



The classification of vehicles reflects operational or organisational concerns rather than technical differences between vehicles,

Multi-modal operation: Trains

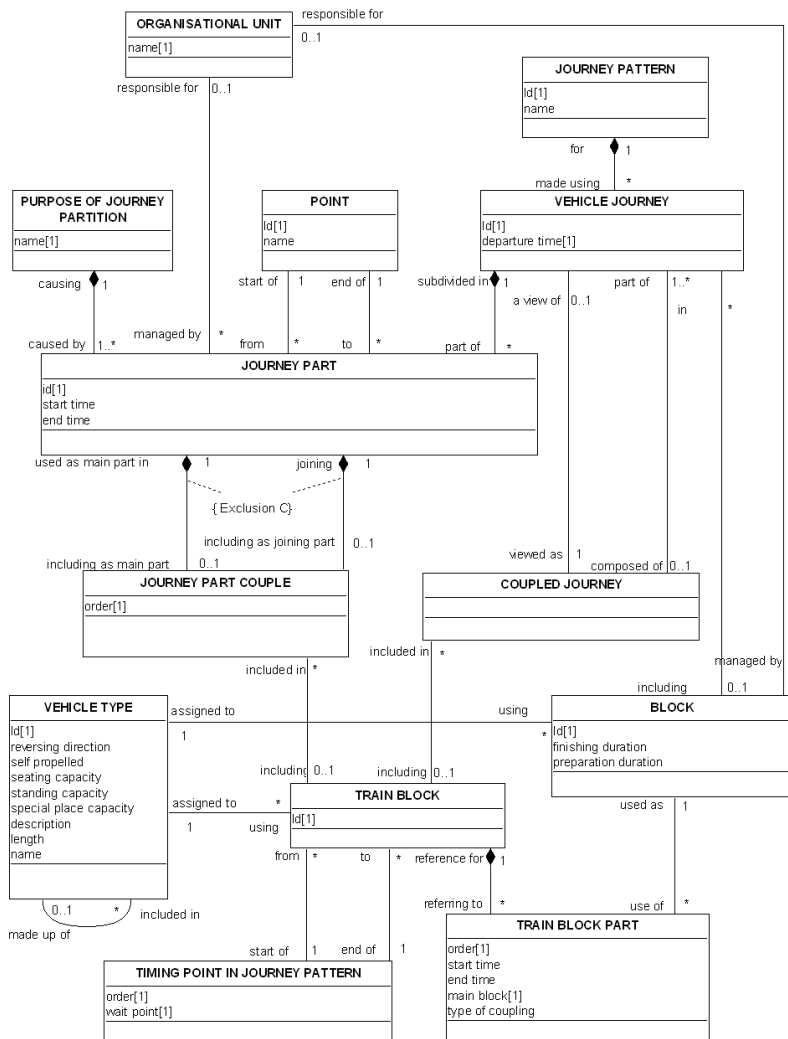


A TRAIN consists of TRAIN ELEMENTs assembled together.

The composition of the TRAIN is provided by a TRAIN COMPONENT, giving the order of the TRAIN ELEMENT in the TRAIN.



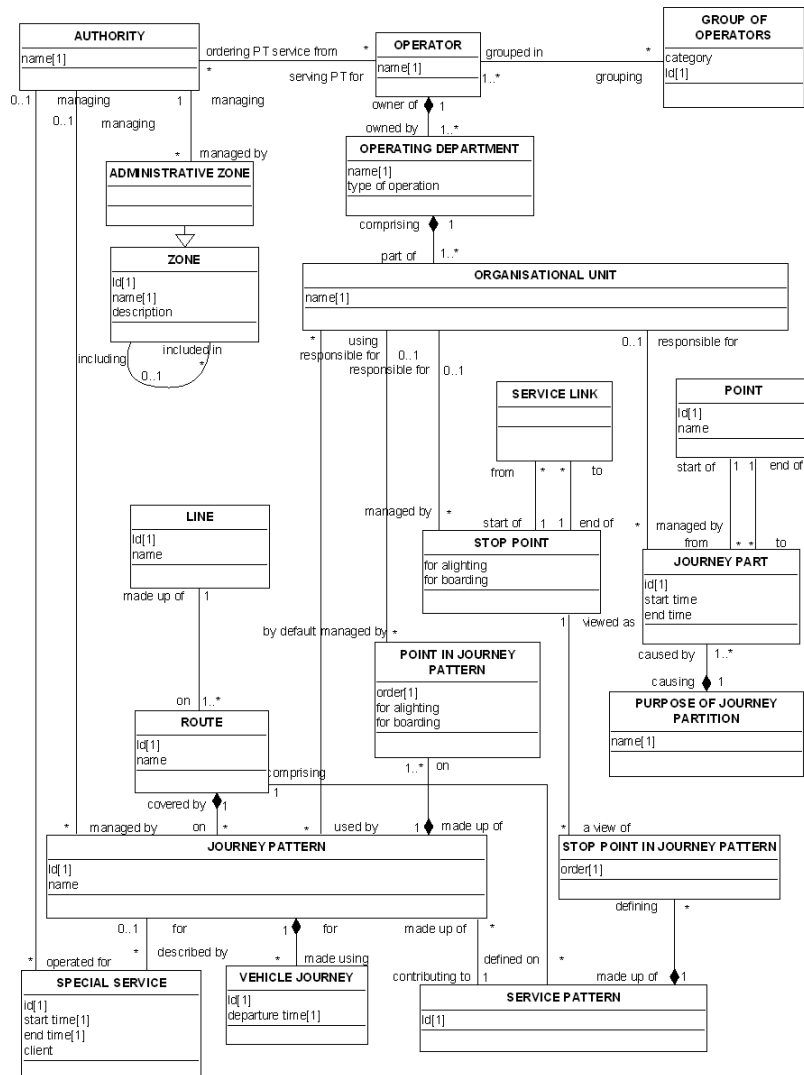
Multi-modal operation: Vehicle Coupling



- ❖ A train may be separated in two (or more) parts at a particular branching point
- ❖ Conversely, two short trains coming from different feeding routes may be scheduled to meet at one interweaving point, where they are coupled to continue their service as one long train on a common route.



Multiple operators' environment : Responsibility for Services

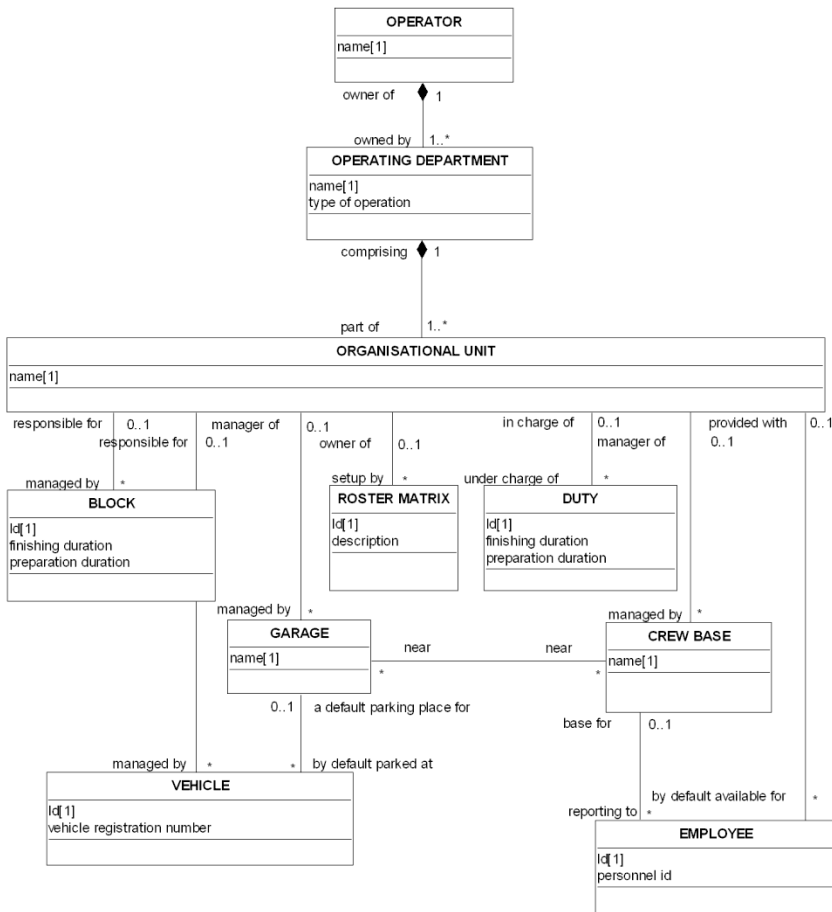


❖ The **AUTHORITY** often imposes or controls the journey patterns served by an operator. In most cases, only **SERVICE JOURNEY PATTERNS** will be concerned by this control, which is expressed by a relationship between **AUTHORITY** and **JOURNEY PATTERN**. In addition, an **AUTHORITY** may order some **SPECIAL SERVICES**.

❖ In many cases, the **AUTHORITY** control will concern all **JOURNEY PATTERNS** of a **LINE** together. In such a case, the implementation may be simplified with a relationship from **AUTHORITY** to **LINE**.



Multiple operators' environment : Responsibility for Resources



- ❖ A GARAGE is a place where VEHICLES are parked and managed. A GARAGE is usually under the responsibility of an ORGANISATIONAL UNIT of a particular OPERATOR.
- ❖ The ORGANISATIONAL UNITS also manage physical VEHICLES.
- ❖
- ❖ organisational structures and practices may well vary considerably across companies and time
- ❖ all relationships describing the organisation are optional.



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Thank You!

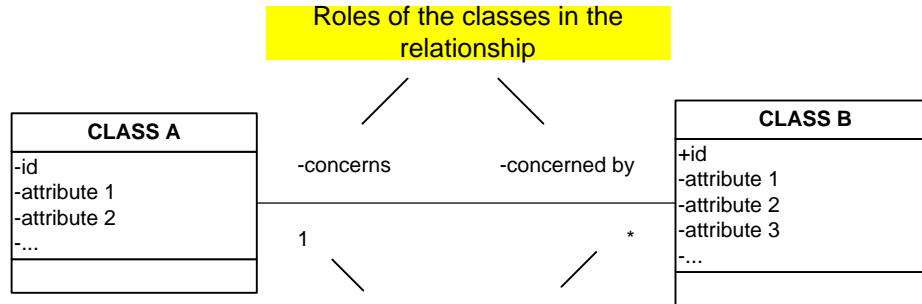
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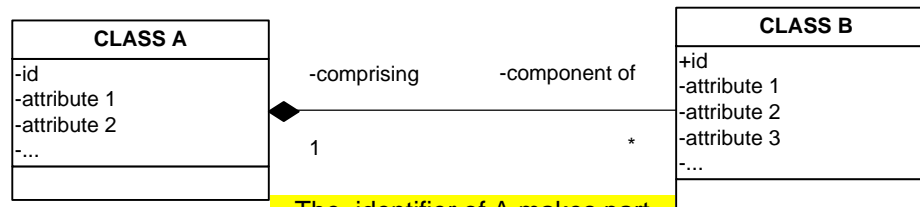
Main elements of the UML formalism used

Relationships



Cardinality of the relationship

- 1 one and only one
- 0..1 zero or one (optional)
- * many
- x..y between x and y



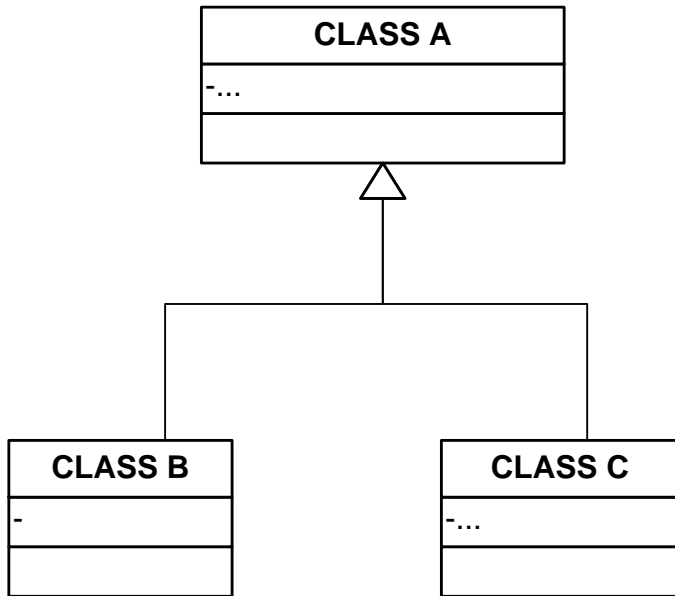
The identifier of A makes part of the identifier of B
« B is Identified by A »



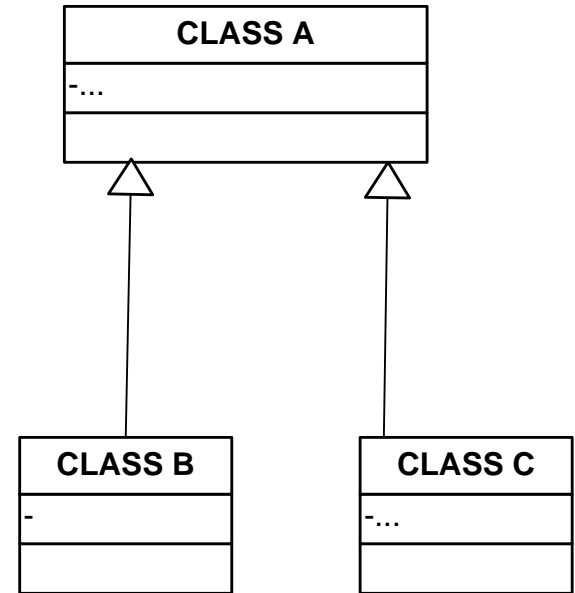
Main elements of the UML formalism used

Inheritance

CLASS A: parent class
is called « generalisation of B,C »



Exclusive inheritance



Non-exclusive inheritance

CLASSEs B, C: children
inherit attributes from the parent class a
have own attributes
are called « specialisations of A »