## Original question

Hi Wout,

We have a general choreography, we will focus on first block: search and find, for the example of Logistic Service specifically type Transport. We need to know its attributes, we know the following relations. Can you fill in some attributes for an example of each concept? And add for each of them a data constraint on the allowed data? We made some examples.

* Location
  + CountryName constraint: countryCode
  + …
  + …
* Cargo
  + Nature of cargo
  + …
  + …
* Logistical function
  + Corridor start location: constraint: string
  + …
  + …
* Transport means
  + License plate
  + …
  + …
* Equipment
  + Max weight: constraint “<number>kg
  + …
  + …
* Actor
  + RoleName
  + …
  + …
* Product
  + Weight
  + …
  + …

We are currently working on the first box. We need the following information from you.

For each class (location, cargo, etc), we need to know three main attributes. For example, for logistical function subtype corridor, it may have attributes “id”, “length”, “start location”, and “destination”. A water corridor may have an attribute “depth”. Can you add constraints of each attribute? For example, a constraint on weight can be that is has to be formatted as “<number>kg”, we added some examples.

Can you also give two stories of a transporter that has constraints on the location, cargo, transport means, etc that the specific transport can transport? For example, can you give a story of one transporter situated in a specific location, with transport means of a specific type, only using a specific type of corridor. Another example transporter should have a different story regarding what type of products it shares with which kind of transport means. Maybe the first one only ships liquids overseas, and another one only bulk via the road.

With this input we will present a core model for this part of the whole project. We will include the data constraint in a shape graph. For the example stories of the two transporters we will give a shape graph regarding what that transporter ships. We will test the shape graph with a demo data set.

Also another further question that is not really related:

* When is a container cargo and when is a container equipment? Is it an equipment when it’s used for other means like unloading?

Best,

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## Logistics Service - transport

Focus on the Logistics Service – subtype: transport. There are two levels of describing a Logistics Service, namely:

* Specification of the subtype of Logistics Service with its parameters
* Specification of Logistics Services of a particular Logistics Service Provider. Each of these Logistics Services of an LSP will have a name, for instance ‘express services’ referring to the speed and ‘parcel services’ referring to the weight or volume ranges.

Maybe we can think of a classification of transport services like ‘express services’, ‘parcel services’’, ‘national services’ and ‘corridor services’. This will lead to pre-filled choices (see also next examples). A potential classification needs to be discussed with users.

Once we have formulated the parameters of a subtype of Logistics Services (like shown for transport hereafter), we need to have a GUI where an LSP can formulate its Transport Services.

The subtype ‘Transport’ has the following parameters with constraints (still to be matched with a practical example):

* Location – this specifies where a Transport Service can be offered. It is basically a geographical area that can be formulated as for instance:
  + A list of one or more countries with CountryName constraint: countryCode. When one country is given, the service will most probably we called a ‘national transport service’.
  + A list of one or more regions with RegionName constraint regionCode. Examples of regions are North Italy, Bayern (as a state of Germany), Rurhgebied, Rotterdam – Antwerp area, etc. This type of list needs to be specified in collaboration with users.
  + A list of cities with CityName constraint cityCode, where the service is offered. These could be considered city related last mile distribution services. The cityCode can be given by a UN Locode, e.g. NLRTM is Rotterdam, but there might also be other code lists.
  + A list of corridors with CorridorName is corridorCode, where the potential corridors are defined by TEN-T. Examples of corridors: Rhine-Alps, Scan-Med.
* Average duration – the average duration (with a standard deviation) of a transport service. The average duration depends on the size of the parcel and the geographical area covered by the service. (is there an equation for it?)
* Cargo
  + Nature of cargo with constraints: D (Dangerous), R (Reefer), W (Waste), E (Excise). This will be a list; waste can for instance also be dangerous. Excise reefers to customs; it is relevant to for instance liquor and tobacco.
  + Type of cargo. Here the subtypes (and their subtypes) are listed. Values are for instance general cargo, dry bulk, liquid bulk, containerized, ro-ro
  + Weight or volume ranges expressed by a lower – and an upper boundary (e.g. min weight and max weight). These ranges are relevant to pricing structures and to the average duration, where the average duration depends on whether or not a distribution network can be applied, like with parcel services.

A weight or volume needs to be expressed in a SI unit specifier (e.g. kg, m3, and l)

* Transport modality. Potential values defined by a UN/ECE Recommendation on transport modes (e.g. 1: sea, 2:…). There has to be the option to provide a multimodal operation. It can also be a list showing the number of modalities covered by the service. The duration may also depend on the modality, but this will be indicated when an LSP formulates its Transport services.

The transport modality will not actually be used for matching a customer goal with a transport service of an LSP, but will provide an indication of reliability to a customer (road is considered more reliable and agile compared with rail).

* Restrictions. Any restriction that can be formulated by an LSP. These are exceptions that relate for instance to absence of a permit for transport of particular cargo (e.g. no chemicals) or capabilities of a transport means. For the moment, this is some free text.

## Choreography

The choreography consists of a number of phases, where each phase can be decomposed further. The phases and their dependencies are shown in the following figure (see also DTLF I SG2 Final Report).



The following patterns have to be reviewed in the context learnings after writing the DTLF SG2 Final Report

In the choreography, a customer and Logistics Service Provider (LSP) are distinguished.

### Publish, search, and find

One can imagine different versions of this pattern, namely:

* Simple – direct matching of a goal with one Logistics Service
* Chain composition – decomposition of a goal into a chain of Logistics Services, where each service might be provided by a different LSP
* Framework contract – market orientation of potential LSPs with the objective of establishing a framework contract with one or more of them. A framework contract is a contractual relation for a number of years, where customer and service provider agree on volumes, terms and conditions, and prices of logistics operations.

In each case, service providers will have to publish their Logistics Services. There are two ways to publish a Logistics Service, namely:

* Logistics Service – provide instances of for instance the Transport Service shape. Each individual service provider will have many Transport Services.
* Itinerary – a service provider publishes an itinerary of a transport modality between two or more locations. The following variants are foreseen; they mostly function as some type of main transport leg in a transport chain:
  + Voyage – a timed sequence of a number of ports (locations) called upon by a vessel.
  + Flight – periodic (daily or a number of flights per day, weekly or flights at specific weekdays, etc.) of transport capacity by air between two (or three) airports.
  + Timetable – periodic (see flight) transport capacity by rail along a path in the rail network allocated by rail infrastructure managers to a carrier.
  + Charter – a voyage of an inland waterways vessel on a particular river, most probably between a seaport and various inland ports.

This first version concentrates on the simple pattern. It is the publication of Logistics Services by an LSP. These Logistics Services have to be indexed to find them based on a goal. The goal that has to match with for instance a Transport Service should contain the following values:

* Two locations or areas between which cargo has to be transported
* An estimation of the expected duration required for the transport movement
* Cargo: the nature – and type of cargo should be given, including an indication of the weights and/or volumes

### Booking pattern

The booking pattern requires matching of customer goals and one or more logistic services of a logistic service provider resulting in a (framework) contract, cancellation, or direct ordering. A customer itself needs to decide whether or not a booking is submitted to more than one service provider; the pattern only specifies the sharing of booking data between a customer and one LSP. Also, the selection of the logistic service by a customer is based on internal policies of that customer, for example it can be based on price, service quality, duration, or carbon footprint.

Figure 1 shows the specification of the booking pattern.



Figure 1. Specification of the booking pattern.

The following rules specify the minimal data set of each business event (a summary and overview is given later in the document):

* *Booking*. The minimal data requirements for a booking request are instances of properties of at least one business activity expressing a customer’s goal. Thus, the value of the properties, which are called ‘instances’, of a business activity specify the data requirements of a booking. These instances need to give actual values of for instance weights and times, thus allowing a service provider to match the goal with logistic services of at least one activity. The times formulated in a booking request are expected times expressed for instance by a time window or a day.

The properties of a transport activity need to be given, but additionally properties of, for instance, transhipment may be given, thus expressing that cargo should be transported via a particular port.

In a booking for a framework contract, the booking gives estimates of cargo with characteristics like weights and volumes with a frequency expressed by ‘time’ (e.g. weekly, monthly).

In an ad hoc demand booking, all details of the cargo might be given, for example actual number and type of packages like container size and type and container numbers. Whilst activities do not contain any reference to a modality or transport means, a customer is not able to request a specific mode.

* *Offer*. An offer refers to a booking request and contains prices, conditions and planned duration for fulfilling the request goal. The duration may give details on the time window expressed in the booking request.
* *Confirmation*. The confirmation is the agreement of a customer with an offer. In the booking phase, the confirmation refers to the booking and the offer and results in a (framework) contract.

### A.1.2 Ordering pattern

The objective of ordering pattern is to align dates and times for actual service delivery and allow a service provider to allocate resources to that execution (for example trucks, truck drivers, railway wagons). When ordering is part of a framework contract, a reference to that framework contract is given. Otherwise, the reference is to the booking and the order confirms the conditions given by the offer.

Figure 2 shows the specification of the ordering pattern.



Figure 2. Specification of the ordering pattern.

The following rules specify the minimal data set of each business interaction (these rules still need to be formalized):

* *Order*. An order contains the actual cargo details and expected dates/times with reference to the goal expressed in the booking and the conditions given by the offer. The actual cargo details contain the actual packages, containers, etc. with their specifics and physical characteristics, and when available their identifications (e.g. container numbers, barcodes on packages). When cargo has no identification, their marks and numbers printed on the cargo needs to be given.

An order implicitly contains visibility requirements by its itinerary. One could have a generic rule that visibility is provided at acceptance, delivery, and any updates of the ETA are shared.

* *Plan*. A plan submitted by a service provider contains the estimated date/time for execution of the agreed upon goal, potentially splitting the goal in sub-goals (e.g. the cargo is picked up by more than one truck). Each of the sub-goals given by a service provider must be within the conditions agreed upon in the booking pattern. If a goal also encompasses a transport service, one or more transport means are given according to the sub-goals.

A plan may also give additional details of the itinerary in case of service decomposition by the service provider into a chain with different legs, for example it may give pre-carriage to a port, identify the stevedore at transhipment in the port, and the shipping line and vessel for main transport. The itinerary is mandatory when a customer requests reports of all milestones of individual legs. By giving the itinerary, a service provider agrees to report on each activity in that itinerary, which should be confirmed by a customer. Mostly, a customer only requires details like the acceptance, delivery, and any deviations of the ETA and views the service as one leg. A service provider may also have built in slack that is not reported.

In this pattern, a first order will not lead to a cancellation request by a service provider because nothing has been done yet, whereas an update of an order may lead to (drastic) differences with previously agreed conditions, causing a provider to initiate a cancellation before the start of the execution.

### A.1.3 The visibility pattern

The visibility pattern represents not only what is currently known as tracking and tracing, but especially adds sharing deviations from planning like updates of ETA to synchronise physical processes and improve decision support and chain coordination. The execution of an agreed upon goal is reported by a service provider, which can be done with one or more events, for example an event at pick up of a container and at delivery of that container to its destination. An order must contain the level of detail required for visibility, i.e. the itinerary used for visibility.

Figure 3 shows the specification of the visibility pattern. This pattern is the most simplified version and thus the most generic one. One would expect to have it broken down into three events that are shared with the milestones ‘accepted’, ‘ETA’, and ‘delivered’. However, maybe a customer requires additional milestones like ‘border crossing’ and ‘transport document available’ with a reference to a document. A customer might also want to make a more detailed analysis of intermediate events to identify potential patterns that cause delay (although it must be stated that such pattern analysis would be up to the service provider).

Secondly, a transport means will carry more cargo of several customers. Therefore, a milestone of the transport means and the cargo might be applicable to more than one customer. For instance, the ETA of a vessel in a port of call is relevant to all customers that require their cargo to be discharged in that port. The same is applicable to for instance a train with several wagons operated by a Railway Undertaking carrying cargo of several LSPs, where each of them receives an update of for instance changes in the ETA of the train at a particular station or yard.



Figure 3. Specification of the visibility pattern.

An event contains the actual status of the execution of an activity by giving the actual dates/times and locations relevant for the level of detail, potentially giving a transport means, for example the actual date of loading of a container on a vessel in a particular port. A customer can use the name of the vessel and possibly its voyage number to obtain the voyage scheme of that vessel, thus having more visibility on the progress of the vessel to the relevant port of discharge. It also enables a customer to validate that the cargo arrives at a certain time in the port given by a service provider.

The pattern does not yet make a difference between events and their milestones, where milestones can trigger updates of a planning, e.g. an ETA update might trigger an update of planning for the next leg.

In this respect a number of milestones can be distinguished, that can be separated in different classes. Physical, administrative, and sensor milestones are identified, where the sensor milestones provide details of the cargo like the actual temperature or the amount of time the temperature setting was over a maximal threshold. The milestones are given in the annex; they can be applied to any object (e.g. container, truck, pallet, and vessel).

### A.1.4 The cancellation pattern

The cancellation pattern can be triggered for different reasons given in the ‘cancel’ event:

* *Customer initiated cancellation*. There are three reasons identified by which a customer will cancel a business transaction. Firstly, there is no agreement on the condition given in the booking or a customer has selected another service provider to fulfil the business transaction. The booking is cancelled. Secondly, the cargo is too late or will not be available for reaching the agreed goal, for example due to an accident or loss of cargo. Cancellation of the business transaction may have financial consequences, as agreed upon in the booking or offer. Thirdly, a service provider presents a plan with an itinerary that is not according to conditions agreed upon in the booking pattern, implying a service provider does not meet agreements given in the booking and promised in the offer or contract.
* *Provider initiated cancellation*. Due to various reasons, the actual execution is no longer in line with the agreed upon goal of the booking, offer and order, for example expected times and weights of cargo are more or less than those given in the order. According to conditions agreed upon in a contract or provided in an offer and agreed by an order, a provider is able to cancel the execution of a business transaction.

The pattern needs refinement to reflect the difference between the customer who initiated cancellation during the booking - and the order pattern. If an update of a plan submitted by a service provider gives deviations from a contract, a customer might be allowed to cancel an order. In all cases, a customer is only allowed to initiate cancellation if execution has not yet been started, i.e. there is no event shared with the milestone that cargo has been accepted by the service provider. Additionally, a service provider can initiate a cancellation in case of for instance incidents or accidents or deviations from a contractual agreement caused by an update of an order, but only if the execution has not yet started.

Figure 4 shows the specification of the cancellation pattern.



Figure 4. Specification of the cancellation pattern.