



## **SIMULTRA PROJECT**

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### **SIMULATION OF LOGISTICS AND TRANSPORT PROCESSES**

#### **INTELLECTUAL OUTPUT N°3**

##### **Activity 5.8**

##### **Learning materials for the tool “Intermodal platform”**

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## 1. INTRODUCTION

- What “Intermodal transport” means for goods?

The term "intermodal transport" indicates that freight transport that uses multiple modes of transport and that is carried out without a load failure; the container can be a road vehicle or a ITU (container, mobile body, semi-trailer); the cargo unit is not opened during transport, except for customs inspections; the load unit must be transferred from one means of transport to another at least once between origin and destination, as part of a door-to-door transport.

- What is an “Intermodal Platform”?

The infrastructure dedicated to intermodal transport services is the Intermodal terminal (or Platform), which is simulated by the SIMULTRA tool.

The Intermodal Terminal is a node of the intermodal system where the transfer of goods is carried out between different modes of transport. They can be classified according to the mode of transport: (i) road/railway; (ii) ship/road-railway. Substantially, therefore, is an area dedicated to the transfer, stock (both full and empty) and possibly transshipment (single-mode and multimodal) of the cargo units for intermodal transport (ITU) of the goods.

The main components of an intermodal platform are:

- the intermodal road-rail terminal that consists of a railway sub-system (bundles of tracks, rolling stock, operating methods);
- a road system (access road for vehicles, parking lots);
- a sub-system for handling the cargo units (equipment for horizontal and / or vertical loading, storage area, handling equipment).

From an operational point of view, road vehicles can get incoming cargo unit either directly from the trains (direct transfer) or from the stocking and storage areas (indirect transfer). The opposite phenomenon occurs for outgoing cargo units.

Intermodal infrastructures can also be characterized by the presence or not of logistic functions: storage, transformation, breakage and load consolidation (groupage).

- What is a “freight village” instead?

A “freight village” is an intermodal terminal where additional logistic services are offered. Also, commercial and maintenance facilities and customs for import/export procedures can be present.

Indeed, the functions performed within an Intermodal terminal can be:

- operational functions (transfer, collection, distribution, composition, breakdown of the goods, and the needs for parking and parking of vehicles and cargo units);
- management functions (for the meeting of supply and demand) including administrative, fiscal and regulatory requirements;
- safety and control functions (traffic flow, goods transported, vehicles transporting them, besides first aid, police, fire brigade);
- auxiliary function (bank, insurance post),
- assistance functions (both for the vehicle and for the operators, includes cafés/restaurants/medical service/repair service).

## 2. INTERMODAL PLATFORM LAYOUT

Intermodal terminals mainly consist of three types of areas,

- Those dedicated to railway operations (rail tracks);
- those dedicated to the storage of containers;
- those dedicated to the movement of road transport vehicles (road vehicles and cranes).

The allocation / organization of these areas depends on the type and extent of services offered (maritime and rail).

Among other areas, there can be storage areas for broken and waiting for repair or unusable containers, as well as areas for container maintenance.

All areas are reached by other areas dedicated to circulation and therefore to allow the connections from storage yards, holds, loading / unloading tracks and the entrance gate. The traffic areas are used by vehicles but also by cranes.

### 2.1 Storage areas

The storage of containers or other ITUs takes place only in the specifically dedicated areas of the Terminal, called Storage areas (or Storage area).

A "storage area" is defined as a guarded space where cargo units are deposited waiting for the loading or after their arrival to the terminal. Those areas can be uncovered (yards) or covered (warehouses). Regarding the importation of foreign goods, the choice of the storage location of the ICUs depends on the customs condition in which they are found, which in turn determines the storage timing.

#### 2.1.1 A3 Warehouse/yard (temporary storage)

In the warehouse/area A3 the unloaded goods can be stored temporary, for a maximum of 90 days, beyond which:

- either they are introduced in the A4 warehouse,
- they are nationalized,
- they are extracted from the warehouse/area and nationalized in another Customs.

The goods are introduced into the A3 warehouse when, for example, a document is missing or when it is being processed. There, the goods are in suspension of duties and VAT (for a maximum of 90 days). This warehouse offers the Importer Customer the advantage of not paying duties and VAT as long as the expected documents are not processed. The A3 area differentiates from A3 warehouse as the goods are not unloaded but remain inside the containers.

#### 2.1.2 Warehouse/yard A4 (permanent storage)

In the warehouse/area A4 the goods can stay for an unlimited time and remain in suspension from Iva and duties until it is nationalized. This certainly brings an advantage to the Importer Customer, who is not required to pay as long as the goods are not imported. Once the goods have been introduced into the A4 warehouse, this can be fully or partially cleared.

The import process, is completed when the Importer Customer pays the duties and VAT payments. The duty is the tax that is collected by the Customs if goods are imported from a non-EU country with which

there are no preferential agreements. This form of taxation allows the circulation of goods within the European Union. VAT is instead the Value Added Tax and is applied to goods and raw materials placed on the market of a state of the European Community. The Customs Office asks the Customs Agent, as a guarantee, to open a current account (deposits deposited) from which the Agent will draw to pay for the release of the containers and the rights. The same guarantee is also requested from the Intermodal Operator if he has an authorized warehouse with goods still in the foreign state. Thanks to the guarantee, the Intermodal Operator guarantees the goods until the customs clearance.

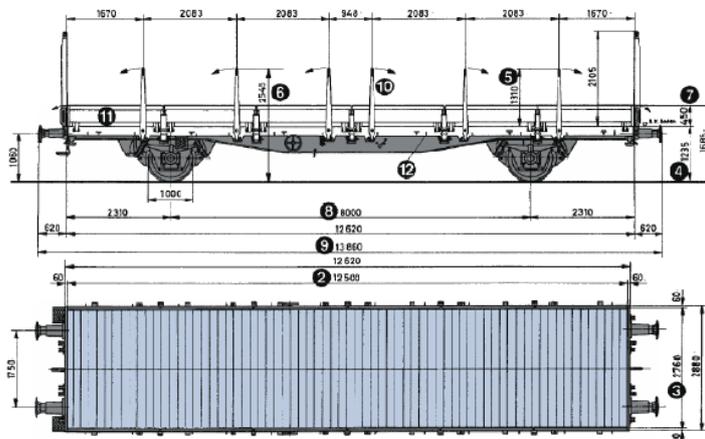
### 3. INTERMODAL TERMINAL EQUIPMENT

#### 3.1 Rolling stocks

The Railway Wagon is the name used in the railway literature and in the current language to indicate the railway vehicles towed by a locomotive and intended for the transport of goods or for service uses.



The cargo wagon, specifically, is properly used for the transport of cargo units (containers and swap bodies), together with goods and vehicles in other non-intermodal containers. It has not mobile parts and the loading is possible only vertically.



A railway wagon is also composed of a twist or a coupling device for the container and is located on a container wagon, necessary to its fixation. Twists can be moved, they can be easily adapted to carry containers of different sizes.



The information box on the side of a railway wagon shows a series of useful information including: the capacity of the wagon, the maximum speed, the arrangement of the containers. The capacity of a wagon varies according to the planned route of the train. The gross weight of a wagon is calculated as: the tare weight of the wagon, tare of the container, and the net weight of the container.

### 3.2 Cargo units

Cargo units may be differentiated:

- for external handling (mechanized handling) are divided into ITU (Intermodal Transport Unit) and Pallet. ITU are, basically, containers.
- for manual handling: parcels.

The most common Cargo Unit is the container. Container is a special box used for shipping purposes: it is reinforced, stackable and that can be handled horizontally or vertically.

- Dimensions: The standardized dimensions are 10'x8'x8.6'', 20'x8'x8.6'', 30'x8'x8.6'' and 40'x8'x8.6''. Larger containers are called "high cube" containers whose size is 40'x8'x9.6'' or 45'x8x9.6''.
- Typologies: Standard (Box), Open Top, Reefer, High Cube, Flat track, Flat track collapsible. The most used typology is the standard one (also called "general container") who include the following subtypes:
  - o closed with a door at one end side;
  - o with an open roof;
  - o with an open-end side;
  - o with a roof and an open-end side;
  - o with a roof, an open-end side and an open lateral side.
- Classification: A container can be classified according to the following technical regulations:
  - o ISO - an acronym for International Organization for Standardization - (mainly for maritime traffic);
  - o UIC (mainly for combined road / rail traffic).
- Acronyms: The alphanumeric abbreviations shown on the container indicate:

- the container owner,
- number and digit code,
- ISO code: the ISO code represents size and type: length, height, construction features. (ISO measures have allowed the definition of TEU (Twenty Feet Equivalent Unit), reference unit for of vessel container traffic and their capacity (expressed in number of 20' containers).
- technical characteristics.



Full containers are provided with a special seal for the safeguard of the goods stored within. The seal, located on the container closing lock, is absent in case of empty container.



Large containers (and some medium-size containers) are equipped:

- (on the 4 lower corners) with: a special corner part, whose standard characteristics enable their fixation both on container wagons and road vehicles;
- (on the 4 upper corners): with a special corner part with standard characteristics enabling vertical loading and coupling with terminal attachment systems. The handling of the cargo unit is done through the Handling Units (HU) which are be able to hook the cargo units through appropriate fixing systems. This coupling is carried out using specific equipment that constitutes the interface of all Handling Units. The fastening between the equipment and the cargo unit is made with standardized pins whose specific features enable their automatized control.

### 3.3 Handling units (HU)

Handling units represent the equipment dedicated to the handling of the cargo units. Those operations consist in the loading, moving and unloading of containers (or others cargo units). Those operations are

carried out with special equipment, whose typology depends on the type of cargo unit and type of transport service.

Handling operations are both vertical and horizontal:

- Vertical loading: on a flatbed wagon (swap bodies and container), on a "poche" type wagon (semi-trailers);
- Horizontal loading (on a railway wagon or on an ultra-low wagon – "Sea highways").

most common types of units are:

- Straddle Carrier: A straddle carrier or straddle truck is a freight carrying vehicle that carries its load underneath by "straddling" it, rather than carrying it on top like a conventional truck. The advantage of the straddle carrier is its ability to load and unload without the assistance of cranes or forklifts.



Rubber Tired Gantry: is a mobile gantry crane used in intermodal operations to ground or stack containers



Front-End Loader (o forklift) Front-End Loader is a front-mounted crane that uses coupling systems in the upper part of the container



Rail Mounted Gantry: it is a crane built over a portal, which is a structure used to climb over an object or a workspace. They are also called gantry cranes, the "portal" is the empty space straddling the gantry



- Reach Stacker: a reach stacker is a vehicle used for handling intermodal cargo containers in small terminals or medium-sized ports. Reach stackers are able to transport the container short distances very quickly and stack them in various rows depending on its access.



## 4. GLOSSARY

Please find following an explanation of some terms used in the SIMULTRA Intermodal Terminal simulator.

### 4.1 Rail Plan

Is the list of arriving and departing trains, together with their schedule (arrival hour =MAD; departing hour = HRL).

The drafting of a new work program for a railway Terminal or an update of it takes into account the Client's requests, the availability of the train tracks on the national railway network (railway timetable), and the existing work plan of the Terminal (previous Rail Plan) and the availability of traction locomotives used by the shunting operator to pick up the trains from the arrival station and introduce them at the terminal. Each scheduled train has its own limit of length and total weight, railway track and destination contracted with the customer.

### 4.2 Train List

A list with all information of an incoming/outgoing train, showing: the date, the train number, the train wagons identification, the wagons serial number, the containers serial number, its length, whether it is full or empty, the customer, the tare of the wagons, the weight of the net containers, and then the weight of the containers.

### 4.3 Stowage list

The stowage list is the document that differentiates the incoming containers in groups according to the type of goods contained and, in each group, indicates the order of picking and therefore of stocking.

The stowage list is sent by the Customer before the arrival of the train. It may occur that the stowage logics are known, in that case the stowage proceed in a standard manner. Stowage logics provide a first distinction in storage of land units and storage of maritime units. The stowage of land units takes place according to the logic dictated by the needs of the Customer and the Terminal. The Customer may also have the need to separate the containers based on the type of goods contained or the final destination of each container or according to other criteria. The Terminal may need to place certain holds in more or less comfortable positions inside the Terminal based on the distance from the tracks and from the entrance gate of the vehicles or based on the amount of containers that make up a certain hold or on the basis of logics of the length of the routes of the cranes or vehicles arriving. In summary, the holds of terrestrial containers are distinguished by customer and according to the optimal criterion which takes into account the specific needs of the Customer and the Terminal. In general, the logic is that of a warehouse. The stowage of maritime units takes place according to the logic of a maritime Terminal: the first major distinction is between full and empty containers; the second is belonging to a given maritime company, while the third is the size of the container and its type. The holds can have different heights. The maximum stacking height is assigned based on geographic position, orography and seismic risk. As a result, the maximum working height of a crane is obtained, and suitable cranes are chosen. Consequently, the stowage capacity of a terminal is obtained and an indication of the maximum theoretical volume of containers that can be sorted in a specific period of time (day, year).

### 4.4 MAD and HIL

MAD and HLR are performance indicators (KPIs) of the terminal, it is important their respect.

- MAD (Mise à disposition): Date and time of availability of the train in the terminal;
- HLR (Heure Limite de Remise): Date and time of exit of the train from the terminal.

#### 4.5 Transport Document (Delivery Note)

In the context of the SIMULTRA simulator, DN indicates the delivery accounting document issued in relation to the movement of goods by VAT subjects, who accompanies a shipment of goods and lists the description, and quantity of the delivered goods. A copy of the delivery note, signed by the buyer or consignee, is returned to the seller or consignor as a proof of delivery.

The transport document must contain the following information: date and number; details of the parties involved in the transaction (transferor, assignee, eventual company in charge of transport); description of the nature, quality and quantity of the goods sold. The indication of the quantity of the same can be performed in figures, without it being necessary to report it in letters.

With particular reference to information the personal details of the parties involved in the transaction, the company name (name and surname in the case of natural persons), residence or address of the same must be indicated (location of the permanent establishment for the non-residents) and, for the issuer, VAT number.

The document must also include the identities of the third party in charge of transport, indicating all data of the company in charge (not of the individual who physically carries out the transport). As regards, then, the issue of the transport document, the latter is issued at least in duplicate (further copies of the document can then be prepared for the other parties involved), one for the transferor and one for the assignee, and in "free form" (that is, without form, size or track restrictions), before the beginning of transport or delivery (the same can also be issued in electronic format).

Finally, any other document (vehicle document, etc.) is equivalent to the Transport Document, as long as it contains all the information listed above.

In international transport there are also other types of documents, not included in the simulator but described below and specialized for mode of transport:

- Bill of lading is a "representative" document of goods loaded on a specific ship (ship) under a rental contract or a transport contract. The representative term means that the (legitimate) owner of the document has the right to have the goods delivered on arrival. It allows you to transfer the ownership of the goods one or more times during the journey and until arrival at the destination.
- International waybill or Air Waybill (AWB) is the typical document for air freight transport that is issued for goods loaded both on aircraft exclusively for loading goods (all-cargo or Freighters ) and within the holds of aircraft involved in passenger traffic.
- Waybill (CMR) is a document introduced with the 1956 Geneva Convention and ratified by Italy in 1960. The acronym stands for Convention Merchandises Routierres. The International Road Union (IRU) has developed a standard international consignment note based on the convention, generally also called by CMR extension. To facilitate use in international transport, the model fields are labelled in three different languages and on the back are the translation into three additional languages of all fields. The international consignment note is issued by the sender or, often, by the shipper, as the consignor of the transport, at the request of the carrier. The waybill form must be completed when

the goods are loaded by the sender and the carrier, each for the parts of its competence. This document has the role of guaranteeing the relationships between the parts of the transport contract.