University of Ljubljana
Faculty of Maritime Studies and Transport

Summer Logistics School

# VET Level 4 in Logistics and Transport – Teaching Material

- Summer Logistics School
- 9 – 14 September, 2019
- University of Ljubljana,
  Faculty of Maritime Studies and Transport
  Portorož, Slovenia

Erasmus+

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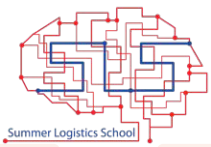


Developed as a part of the Summer Logistics School (SLS) project.

The SLS has been funded by the European Commission, Erasmus +.

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# SLS programme

| Day | Time | TM & Unit | | Lecture room | Trainer | Observer |
|---|---|---|---|---|---|---|
| Monday, 9 September 2019 | 08:00 - 08:30 | **Official opening of the SLS** | | Room no. 205 | / | / |
| | 08:30 - 09:15 | **TM1_Unit 1** (Group 1 - 18 participants) | Rowing boat (Group 2 - 18 participants) | Nautical simulator/ "boathouse" | Androjna A. | Jurkovič V. Bajec P. |
| | 09:15 - 10:00 | | | | | |
| | 10:00 - 10:15 | break | | | | |
| | 10:15 - 11:00 | **TM1_Unit 1** (Group 2 - 18 participants) | Rowing boat (Group 1 - 18 participants) | Nautical simulator/ "boathouse" | Androjna A. | |
| | 11:00 - 11:45 | | | | | |
| | 11:45 - 14:00 | lunch | | | | |
| | 14:00 - 14:45 | **TM1_Unit 2** (36 participants) | | Room no. 205 | Beškovnik B. | |
| | 14:45 - 15:30 | | | | | |
| | 15:30 - 15:40 | break | | | | |
| | 15:40 - 16:25 | **TM1_Unit 3** (36 participants) | | Room no. 205 | Eleonora Tu | |
| | 16:25 - 17:10 | | | | | |
| Tuesday, 10 September 2019 | 08:30 - 09:15 | **TM1_Unit 3** (Group 1-18 participants) | Business on the move (Group 2 - 18 participants) | Computer room no. R3/ Room nr. 203 | Eleonora Tu | Jurkovič V. Bajec P. |
| | 09:15 - 10:00 | | | | | |
| | 10:00 - 10:10 | break | | | | |
| | 10:10 - 10:55 | **TM1_Unit 3** (Group 2-18 participants) | Business on the move (Group 1 - 18 participants) | Computer room no. R3/ Room nr. 203 | Eleonora Tu | |
| | 10:55 - 11:40 | | | | | |
| | 11:40 - 14:00 | lunch | | | | |
| | 14:00 - 14:45 | **TM4_Unit 1** (36 participants) | | Room no. 203 | Koneke S./ Bajec P. | Beškovnik B. Vuk Ž. |
| | 14:45 - 15:30 | | | | | |
| | 15:30 - 15:40 | break | | | | |
| | 15:40 - 16:25 | **TM4_Unit 1/Unit 2** (36 participants) | | Room no. 203 | Koneke S./ Bajec P. | |
| | 16:25 - 17:10 | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Wednesday, 11 September 2019 | 08:30 - 09:15 | **TM4_Unit 2** (36 participants) | | Room no. 203 | Koneke S./ Bajec P. | Beškovnik B. Vuk Ž. |
| | 09:15 - 10:00 | | | | | |
| | 10:00 - 10:10 | break | | | | |
| | 10:10 - 10:55 | **TM4_Unit 2** (36 participants) | | Room no. 203 | Koneke S./ Bajec P. | |
| | 10:55 - 11:40 | | | | | |
| | 11:40 - 14:00 | lunch | | | | |
| | 14:00 - 14:45 | **TM4_Unit 3** (Group 1-18 participants) | Case study (Group 2-18 participants) | Computer room no. R1/ Room nr. 203 | Koneke S./ Bajec P. | |
| | 14:45 - 15:30 | | | | | |
| | 15:30 - 15:40 | break | | | | |
| | 15:40 - 16:25 | **TM4_Unit 3** (Group 2-18 participants) | Case study (Group 1-18 participants) | Computer room no. R1/ Room nr. 203 | Koneke S./ Bajec P. | |
| | 16:25 - 17:10 | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Thursday, 12 September 2019 | 08:30 - 09:15 | **TM2_Unit 1** Room no. 202 | **TM3_Unit 1** Room no. 203 | **TM5_Unit 1** Room no. 206 | TM2 - Bajec P.<br>TM3 - Rogić K.<br>TM5 - Poredoš M. | TM2 - Šoštarič K., Tu E.<br>TM3 - Rožanski Fidler K., Androjna A.<br>TM5 - Koneke S., Beškovnik B. |
| | 09:15 - 10:00 | | | | | |
| | 10:00 - 10:10 | break | | | | |
| | 10:10 - 10:55 | **TM2_Unit 2** Room no. 202 | **TM3_Unit 2** Room no. 203 | **TM5_Unit 1/Unit 2** Room no. 206 | TM2 - Bardi A.<br>TM3 - Rogić K.<br>TM5 - Poredoš M. | |
| | 10:55 - 11:40 | | | | | |
| | 11:40 - 14:00 | lunch | | | | |
| | 14:00 - 14:45 | **TM2_Unit 3** Room no. 202 | **TM3_Unit 3** Room no. 203 | **TM5_Unit 2/Unit 3** Room no. 206 | TM2 - Bardi A.<br>TM3 - Bajor I.<br>TM5 - Poredoš M. | |
| | 14:45 - 15:30 | | | | | |
| | 15:30 - 15:40 | break | | | | |
| | 15:40 - 16:25 | **TM2_Unit 4** Room no. 202 | **TM3_Unit 4** Room no. 203 | **TM5_Unit 3** Room no. 206 | TM2 - Bardi A.<br>TM3 - Bajor I.<br>TM5 - Poredoš M. | |
| | 16:25 - 17:10 | | | | | |

| | | |
|---|---|---|
| Friday, 13 September 2019 | 08:30 - 09:15 | **VISIT TO THE PORT OF KOPER** |
| | 09:15 - 10:00 | |
| | 10:00 - 10:10 | |
| | 10:10 - 10:55 | |
| | 10:55 - 11:40 | |
| | 11:40 - 14:00 | lunch |
| | 14:00 - 14:45 | **POST-TEST FOR TEACHERS & STUDENTS**<br>Computer room nr. 1 and 3<br><br>**DISTRIBUTION OF CERTIFICATES**<br>Room no. 205 |
| | 14:45 - 15:30 | |
| | 15:30 - 15:40 | |
| | 15:40 - 16:25 | |
| | 16:25 - 17:10 | |

| | | |
|---|---|---|
| Saturday, 14 September 2019 | 08:30 - 09:15 | **DISCUSSION AND CONCLUSION** Room no. 205 |
| | 09:15 - 10:00 | |
| | 10:00 - 10:10 | |
| | 10:10 - 10:55 | |
| | 10:55 - 11:40 | |
| | 11:40 - 14:00 | lunch |
| | 14:00 - 14:45 | **FREE TIME** |
| | 14:45 - 15:30 | |
| | 15:30 - 15:40 | |
| | 15:40 - 16:25 | |
| | 16:25 - 17:10 | |

# TM1: Maritime and intermodal management

**Date:** 9 – 10 September, 2019

**Units & lecturers:**

| Unit title | Trainer | Classroom |
|---|---|---|
| **Unit 1:** Assessing the main navigation parameters | Andrej Androjna | Nautical simulator<br>Boathouse |
| **Unit 2:** Recognising the main infrastructures and vehicles of maritime ports | Bojan Beškovnik | 205 |
| **Unit 3:** Coordinating the arrival and departure of freight trains | Eleonora Tu | 205/R3<br>203 |
| **Unit 4:** Managing the storage of transport units at the rail-road terminal | Eleonora Tu | 205/R3<br>203 |

**Observers:** Violeta Jurkovič & Patricija Bajec


Erasmus+

**TM1**
MARITIME AND INTERMODAL MANAGEMENT

Unit 1: Assessing the main parameters for navigation

September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

## Agenda

- **Introduction to the Automatic Radar Plotting Aid (ARPA)**
- **Introduction to the Electronic Chart Display and Information System (ECDIS)**
- **Integrated Navigation Systems (INS)**
- **Advantages of ARPA and ECDIS**
- **Practical demonstration, exercises and individual work on simulator**
- **Wrap-up session**

Project is funded by the European Commission, Erasmus +.

## LOs Unit 1: Assessing the main parameters for navigation

### Purpose:

- **to increase participants' understanding on the advantages of Electronic Chart Display and Information System (ECDIS) and Automatic Radar Plotting Aid (ARPA) for safe conduct of navigation.**

### Objective:

- **By the end of this unit, participants will be able to:**
  - **recognize the benefits of *„an anti-grounding system"* - ECDIS and *„an anti-collision system"* - ARPA for safe conduct of navigation;**
  - **monitor information on ECDIS for safe navigation;**
  - **understand progress in e-navigation.**

Project is funded by the European Commission, Erasmus +.

## RAdio Detection And Ranging (RADAR)

**What do we need to know?**

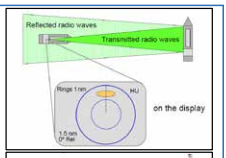
- **How we get a Radar piture**
- **Understand the picture**
- **Use Radar information for better decisions**
- **Be aware of the limitations of Radar**

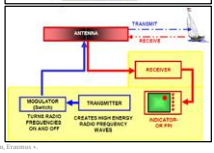
Project is funded by the European Commission, Erasmus +.

## RADAR – How it works

- **DETECT**
  - **by transmiting microwave pulses and receiving reflections from contacts**
- **RANGE**
  - **Measure time for a pulse to hit contact and return to receiver.**
  - **Distance = (Speed x Time) / 2**
- **BEARING**
  - **The angle of the rotating scanner (24 rpm)**

- **Radar may show you things you cannot see!**

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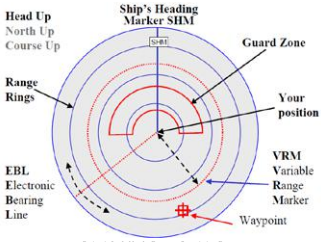
## Understanding the RADAR picture

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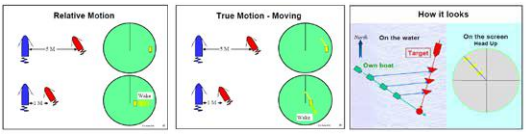
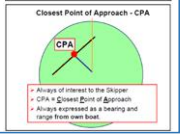
## the RADAR picture – Relative/True motion




Project is funded by the European Commission, Erasmus +.

## The Automatic Radar Plotting Aid (ARPA)

- **A marine radar with automatic radar plotting aid (ARPA) capability can create tracks using radar contacts.**
- **The system can calculate the tracked object's course, speed and closest point of approach (CPA), thereby knowing if there is a danger of collision with the other ship or landmass.**
- **Summary:**
- ***Calculates and displays Target's Bearing, Range, True Course and Speed, CPA, TCPA.***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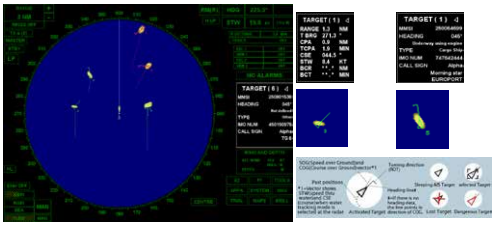
## ARPA + Automatic Identification System (AIS)



Project is funded by the European Commission, Erasmus +.

## Electronic Chart Display and Information System(ECDIS)

- computer-based navigation system- complies with IMO
- can be used as an alternative to paper navigation charts
- integrates a variety of real-time information
- automated decision aid - continuously determining ship's position in relation to land, charted objects, navigation aids and unseen hazards

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## ECDIS

- includes electronic navigational charts (ENCs)
- integrates position information from a Global Navigation Satellite Systems (GNSS) – typically the Global Positioning System (GPS)
- integrates other navigational sensors, such as radar, fathometer and automatic identification systems (AIS).
- it may also display other navigation-related information, such as sailing directions and navigational aids detail.

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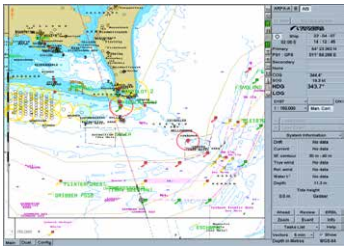
## ECDIS with AIS Overlay



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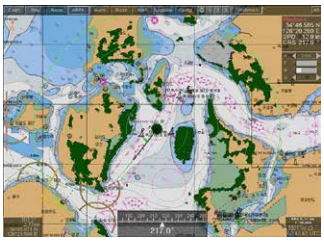
## ECDIS with Radar Overlay



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## AIS and Radar Overlay on ECDIS
**(Integrated with Compass, Depth and other sensors)**

**Advantage:**

**The ECDIS becomes the ultimate "Magic Box" that is an extremely valuable tool for the well-trained navigator *when positioning input is accurate*.**

***(Moskoff 2012)***

## E- navigation

**E-navigation is the harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance berth to berth navigation and related services for safety and security at sea and protection of the marine environment.**

***MSC 94 (IMO, 2014)***

Project is funded by the European Commission, Erasmus +.

## Integrated Navigation Systems

Project is funded by the European Commission, Erasmus +.

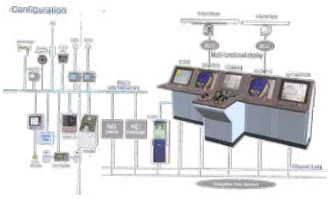
## Ship's E-Nav Bridge Equipment

**Sophisticated Technology**

- ECDIS (Electronic Chart Display and Information System)
- AIS (Automatic Identification System)
- Radar (Radio Direction and Ranging)
- ARPA (Automatic Radar Plotting Aid)
- Compass (Gyro, Fluxgate, GPS and others)
- Steering (Computerized Automatic Steering System)
- VDR (Voyage Data Recorder – "Black Box")
- GMDSS (Global Maritime Distress and Safety System)
- Numerous other advanced units and systems

Project is funded by the European Commission, Erasmus +.

## Integrated Navigation Systems





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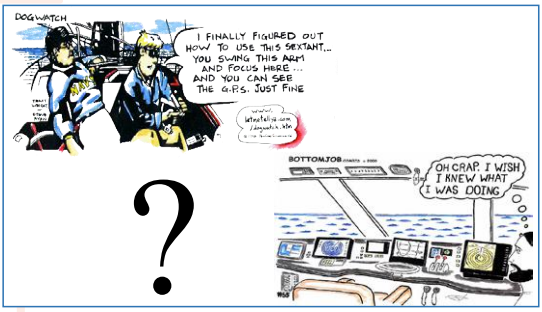



## Practical Training Session

- Practical presentation/demonstration of ARPA & ECDIS on nautical simulator
- Individual/Team work on nautical simulator

Project is funded by the European Commission, Erasmus +.

**TM1**
MARITIME AND INTERMODAL MANAGEMENT

Unit 2: Recognizing the main infrastructures and vehicles of maritime ports

September 2019, Portorož, Slovenia

## Recognizing the main infrastructures and vehicles of maritime ports

- **Introduction (*p. 3-6*)**
- **Port infrastructure and terminal sepcifics (*p. 7-30*)**
- **Inbound and outbound procedures in maritime logistics and documentation (*p. 31-54*)**

## Introduction

- **Port system is a complex system, with different terminals and substystems**
- **Port's role changed from:**
  - **loading/unloading service (*till 1960s*) to**
  - **industrial port (*till 1980s*) and to**
  - **logistics/supply chain port (*presently*)**
- **Technology in use differ according to terminal and cargo specifics**
- **The number of stakeholders is increasing due to the complexity of logistics chains through the port.**
- **Ports are becoming smart => smart infrastructure and equipment**

## Introduction

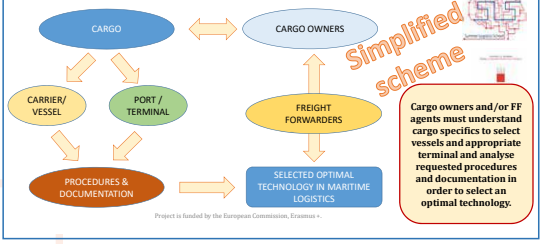
- **Port system is:**
- **A node where the processes of one or more transport industries are in contact, with the basic purpose of moving the cargo,**
- **An open system because there are continuous communication processes that interact with the outside surroundings.**
- **Dynamic system, because processes are changing continuously and is difficult to predict future requests and needs from the market.**
- **In most cases, there are stochastic systems, because arrivals and departures are not entirely planned (new technologies randomly limit, but never completely) and vessel's/cargo arrivals are often random.**

## Introduction

- **Maritime logistics is a new approach to present shipping needs where:**
  - **Vessels and cargo must be connected to ports and cargo owners with minimal costs and time with low emissions.**
  - **Optimisation of all processes to unload the vessels as fast as possible, short storage of unit/cargo on terminal, efficient planning of land vehicles and load cargo as fast as possible for inland transport.**
  - **Data transfer by handling of documentation and where possible switch to data digitalisation.**
- **Important role of ship agents and freight forwarders in lean maritime logistics processes (*connecting carriers with cargo owners and administration offices*)**

Project is funded by the European Commission, Erasmus +.

## Introduction




Project is funded by the European Commission, Erasmus +.

## Port infrastructure and terminal sepcifics

Project is funded by the European Commission, Erasmus +.

## Port infrastructure

- **The port infrastructure serves the vessel, cargo and land transport vehicles, with an aim to overcome space and time.**
- **The infrastructure is primarily adapted to the characteristics of ships and the quantity of cargo**

**Ships => shape of the berth, length, depth of berth + shipt to shore equipment (*berth cranes*),**

**Cargo and its quantity => storage places, warehouses, number of rail tracks, truck gates + handling equipment**

- **Handling equipment: it is deifferent for cargo type and cargo quantity (*continuous technology as elevators, pipelines etc. or interrupted technology as forklifts, berth cranes, gantry cranes, trucks with trailers*)**

Project is funded by the European Commission, Erasmus +.

## Port infrastructure

- Maritime terminals have 3 subsystems:
- **Berth subsystem** (*vessel accommodation and unloading/loading*);
- **Yard subsystem** (*cargo/unit storage*);
- **Delivery zone for inland vehicles** (*outgoing/incoming rail + road vehicles*).
- They have different infrastructural characteristics and use different manipulation equipment.
- Berth subsystem has a **priority status** in work planning to shorten vessel's stay in the port as at this specific point entire costs of carriers, vessels, cargo and port are the highest (*just vessel' costs are about 40.000 EUR per day*).

Project is funded by the European Commission, Erasmus +.

## Port infrastructure

- Terminals:
- **General cargo** (*for cargo on pallets, in bundles, steel coils, project cargo etc.*)
- **Dry bulk terminal** (*coal, iron ore, industrial minerals, agri bulk etc.*)
- **Liquids** (*oil, chemicals, etc.*)
- **Car and RO-RO/ferry terminals** (*cars, trucks, machinery*),
- **Containers** (*standard containers and special equipment as reefer container, flat-rack container, container platform, tank container*)
- **Livestock terminal** (*different live animals*)

**Cargo characteristics => different ships & different technologies per sub-system on the terminal**

Project is funded by the European Commission, Erasmus +.

## General cargo terminal

- Accomodation of general cargo vessels with packed items (*cargo on pallets, bundles, in reels etc.)* – no special pressure for infrustructure.
- Vessels do not pose special requests to the port based on their size.
- They can have their cranes (*deck cranes*) otherwise berth cranes are used.
- Cargo loaded and unloded with hook and wire principle.
- Different warehouses according to cargo specifics: open and covered yards, closed warehouses (*possible with temp. regime*).
- Additional services: lashing, marking, labelling, bagging, weighing, cleaning, sampling, repackaging, binding, palletizing, wrapping palletized goods and others.

Source: Port of Koper www.luka-kp.si

Project is funded by the European Commission, Erasmus +.

## Dry bulk terminal

- Accommodation of **different ship size** - special pressure for berth infrastructure.
- Very large quantity of cargo per vessel = longer stay in the port => higher berth occupancy.
- Cargo loaded and unloaded with integral grab (*open top, with two-piece hinged bucket*) or continuous unloader (*vertical and horizontal conveyor system*).
- Conveyor systems are used for cargo transfer berth-yard-berth or by classic trucking.
- Large open and limited covered warehouses (*covered are used for weather sensitive cargo*).
- Additional operations: water spraying, pulp spraying to protect pollution of cargo dust.

Source: Port of Koper www.luka-kp.si

Project is funded by the European Commission, Erasmus +.

## Dry bulk terminal

- Vessels:
- Small Handy size vessels 20.000–28.000 DWT,
- Seawaymax, 28.000 DWT with 225 m length, 23,8 m wide and draft 8 m; vessel that can traverse the St Lawrence Seaway,
- Handy size vessels with capacity of 28.000–40.000 DWT,
- Handymax vessels with capacity of 40.000–50.000 DWT,
- Panamax with capacity limit of 52,000 DWT full (*294 m length, 32 m wide, draft 12 m*) that can go through the Panama Canal,
- Neopanamax with capacity 120.000 DWT, with dimensions of upgraded Panama locks (*366 m length, 55 m wide, 18 m draft*),
- Suezmax with 160.000 DWT (*unlimited length, 50 m wide, 20,1 m draft and height up to 68 m*) – ship that can transit Suez canal,
- Capesize with over 200.000 DWT and must go around the Cape of Good Hope and Cape Horn.

Source: www.maritime-connector.com

Project is funded by the European Commission, Erasmus +.

## Dry bulk terminal

- Carrier's expectations:
- Berth subsystem must secure:
  * *berth length per selected vessel/cargo quantity = 226 m to over 370 m per vessel*
  * *berth depth per selected vessel = 8 to over 20 m.*
  * *No. of dedicated cranes and conveyor system for high productivity loading/unloading manipulations*
- Yard subsystem must secure:
  * *static cargo capacity of 30.000 to over 200.000 ton per vessel*
- Delivery zone subsystem must secure:
  * *enough operational rail tracks for train/wagon accomodation*
  * *enough truck loading positions and capacity for road transport.*

Source: http://www.seatrade-maritime.com

Project is funded by the European Commission, Erasmus +.

## Terminal for liquids

- Accomodation of specialised tanker vessels that transport only one kind of liquid or even more per vessel.
- No need of elevators but pumping systems with different capacity and made of different materials.
- Special warehouses = different tank/reservoirs (*capacity, material, heating/cooling system etc.*)
- Wagon and truck loading/unloading stations.
- Tank specialisation for specific cargo (*construction material, protective materials).*
- Long-time contractual agreements for tank rent.
- Additional services: filtering, blending, cargo sampling and examination, frequent tank celeaning, cargo heating.

Source: Port of Koper www.luka-kp.si

Project is funded by the European Commission, Erasmus +.

## Terminal for liquids

- Technology on the terminal depends on:
- vessel's cargo specifics: crude oil tankers, chemical tankers, product tankers and gas tankers.
- vessel's capacity: Seawaymax, Panamax, Aframax, Suezmax (*200.000 DWT*), VLCC (*Very large crude oil carriers*) with 300.000 DWT and ULCC (*Ultra large crude oil carriers*) with capacity till 500.000 DWT.
- Cargo and tanker size define infrastructural and suprastructural elements at the terminals and operational procesures.

Terminal specialisation

Source:: www.marineinsight.com

Project is funded by the European Commission, Erasmus +.

## Terminal for liquids

- Main **operational procedures** on the terminal:
- Ship arrival and connection of lines with flanges and valves between the ship and terminal,
- Pressure Valve Operations (*ventialtion of vessel's tanks*),
- Start up the pumps on the terminal or on the vessel,
- Proper handling and control of generated pressure,
- Operational discharging procedures,
- Pipeline cleaning and de-instalation,
- Pipeline blow-out with compressed air,
- Cargo control/inspections,
- Cargo storage in dedicated tanks,
- Operations on the vessel (*cleaning of the tanks…*).

Source: www.portofrotterdam.com

Project is funded by the European Commission, Erasmus +.

## Car and RO-RO/ferry terminals

- Accomodation of **specialised vessels as ferry vessels**, PCC (*Pure Car Carrier*) vessels, PCTC (*Pure Car/Truck Carrier*) vessels.
- Minor pressure on infrastructure elements on the terminal (*depth is usually not a problem*),
- **Hihgher pressure on yard** subsystem (*accomodation of unloaded vehicles and storage of vehicles to be loaded => peak time with short time stay of vehicles).*
- Warehouses = **open or covered large storage areas** or multi-floor garage houses.
- No need for handling equipment – self driven cars (*RO-RO technology => roll on-roll off*).
- Educated/trained working power.
- Additional services: inspections, car maintenance, washing, repairs, painting, car processing etc..

Source: Port of Koper www.luka-kp.si

Project is funded by the European Commission, Erasmus +.

## Car and RO-RO/ferry terminals

- Traditional ferry vessels are smaller vessels
- RO-Pax vessels can carry up to 1.000 cars and passengers;
- RO-RO ferry vessels usually use just one loading / unloading ramp.
- PCC/PCTC vessels are large vessels, called also Deep Sea Car Carriers with capacity of over 8.500 CEU (*car equivalent units*)
- These vessels have:
- multi decks (*up to 14 decks*)
- manipulation ramps on both sides (*6,5 m wide*) and on the stern (*12 m wide*).
- Vessels dimensions: length 200 m, width 41 m, draught 10,3 m.


Source: www.hoeghautoliners.com

Project is funded by the European Commission, Erasmus +.

## Car and RO-RO/ferry terminals

- Berth subsystem must provide safe berthing (*strong winds can cause problems due to the vessels construction*),
- Yard subsystem must provide large areas for static storage capacity,
- Special hail protections are installed on the open storage area to prevent vehicle damage,
- Multi-floor garage houses are in use in very large car terminals (*expensive investments*).
- The distance between berth and yard should be minimal in order to shorten loading/unloading processes and min. crossings with internal transport ways (*to avoid accidents and transport delays*).

Source: Port of Koper www.luka-kp.si

Project is funded by the European Commission, Erasmus +.

## Car and RO-RO/ferry terminals

- Main processes and procedures:
- vessel's berthing and planning of needed workers,
- Unlashing cars on the vessel and quality control,
- Unloading the vessel (*transportation of workers on the vessel*)
- Positioning/parking the car at planned storage place (*long stay, short stay, work on cars*),
- Scanning car position,
- Eventual works on the car (*according to pre-agreed or case-specific received orders*),
- Positioning of cars for road or rail delivery out of the terminal.
- Car inspection with truckers or rail carrier.
- In case of rail transport organising loading on the wagons.

Source: Port of Koper www.luka-kp.si

## Container terminals

- Accomodation of specialised cellular container vessels of different capacity.
- Vessel's capacity and dimensions directly influence terminal's infrastructural and suprastructural elements.
- Intermodal units are transported and handled – ISO containers (*different containers in size and purpose*).
- Large open storage areas are needed for static capacity with multi-level stacking of containers (*full and empty*).
- Special berth and yard handling equipment is needed.
- Very strong pressure also on delivery zone subsystem due to direct manipulation in intermodal chains.

Source: Port of Koper www.luka-kp.si

Project is funded by the European Commission, Erasmus +.

## Container terminals

- Containers:
- Standard containers: 20', 40', 40' HC & 45' HC
- Special containers: open top container, flat rack container, tank container, reefer container, container platform,

- For different cargo,
- Different loading/unloading technology,
- Securing the goods,
- Monitornig containers and goods

www.oceancontainer.com

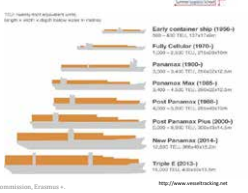
Project is funded by the European Commission, Erasmus +.

## Container terminals

- Container vessels:

- Vessels are becoming larger with capacity over 21.000 TEU,
- ULCV vessels of + 14.000 TEU are used on direct lines,
- Feeder connections use smaller vessels 2.000 to 7.000 TEU capacity.

Terminals must secure infrastructure and suprastructure for all kind of vessels, usually working at the same time.




Project is funded by the European Commission, Erasmus +.

## Container terminals


http://www.cnport.com.hk

- Three subsystems
- Berth sub-system can have different berths with different cranes (*height, capacity etc.*)
- Yard equipment can be completely automated.
- Gantry cranes can be used or just reachstaker with lower productivity.
- Number of rail tracks, truck gates and number of handling equipment.

Project is funded by the European Commission, Erasmus +.

## Container terminals

- Handling equipment – factors in selecting an appropriate one:

- the size of the ships,
- the anticipated annual throughput of the container terminal,
- the size of the container terminal area,
- the required storage density of containers per area,
- geographical restrictions on the territory,
- environmental impacts (*eg. weather effects*),
- the proportion of empty containers and special container (*reefer containers, out-of gauge cargo*),
- connections with hinterland terminals (*rail, road, water*) and their ratio, etc.

https://container-mag.com

Project is funded by the European Commission, Erasmus +.

## Container terminals

- Handling equipment – yard equipment:
- gantry cranes: RTGC – rubber tired gantry cranes or RMGC – rail mounted gantry cranes,
- Container reachstakers – container manipulator for easy movements on the terminal area,
- Container forklifts: classic or with container spreader,
- Straddle carriers: container transfer,
- AGV – automated guided vehicles on CT: automated trailers for container transfer berth-yard and vice-versa.
- Equipment uses diesel engines or electric power supply (*greener technology*).

https://port.today/kalmar-launches-agv-li-ion-battery

Project is funded by the European Commission, Erasmus +.

## Container terminals

- Handling equipment – container cranes (STS – ship to shore cranes):
- Small size cranes,
- Panamax: handling Panamax size vessels with outreach 30-40m, height 24-30 m and troley speed 50-125 m/min,
- Post-panamax: handling port-panamax vessel size, with outreach 40-45 m, height 30-35 m and troley speed 60-125/m,
- Super-post panamax: handling ULCV with outreach 46-70 m, height 30-49 m and troley speed 70-175 m/min.

On bigger vessels up to 9 cranes can work simultaneously.

www.theguardian.com

Project is funded by the European Commission, Erasmus +.

## Container terminals

- Container cargo stuffing and un-stuffing processes:
  - Container delivery to a covered warehouse,
  - Cargo stuffing or un-stuffing (*direct manipulation or handling pallets/reels/big bags*),
  - Warehousing and cargo control,
  - Cargo palletisation (*in case requested*),
  - Truck/wagon positioning close to the warehouse (*manipulation area or manipulation rail tracks*),
  - Cargo stuffing on truck/wagon (*usually by forklifts*),
  - Exit the port/container terminal area with transportation to the final destination.

http://www.ptdufour.fr/logistics-services

Project is funded by the European Commission, Erasmus +.

## Port infrastructure and terminal sepcifics

- Questions for self-checking knowledge
  - *Specify port's subsystems and their difference.*
  - *Why berth subsystem has a priority status in processes and workforce planning?*
  - *Describe vessel's characteristics in dry cargo transport for vessels type Seawaymax, Panamax and Suezmax.*
  - *Specify main operational procedures on the terminal for liquids.*
  - *Describe main processes at car or RO-RO terminals.*
  - *What kind of equipment is used on modern container terminals?*
  - *What is the difference between RMG and RTG cranes on container terminals?*
  - *Specify factors in selecting an appropriate handling equipment on a container terminal.*

Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

**Main content:**

- Container vessel pre-arrival processes and documentation
- Container vessel arrival in the port and berthing
- Container/cargo release – carrier/agent releases the container to the consignee
- Organising inland transport by truck or by rail
- Container or cargo inspection in the port
- Import Customs clearance or issuing transit customs documents
- Other eventual specific processes in maritime container transport

Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

- **Container vessel pre-arrival**
- Cargo details and vessel's details are pre-communicated with the port according to vessel's E.T.A. – Estimated Time of Arrival in the port.
- Shipping agent announces to the port vessel's E.T.A. and planned E.T.D (*Estimated Time od Departure*).
- Communicates requested loading/unloading services and prepares electronic order for manipulation „vessel-yard".
- Port/terminal gives „operational window" for the vessel.
- Agent sends 24 h pre-advice to the Slovenian Marit. Admin. (*vessel's details, crew, cargo...*) .
- Agent sends electronic delivery of cargo manifest to Customs authorities.

Project is funded by the European Commission, Erasmus +.

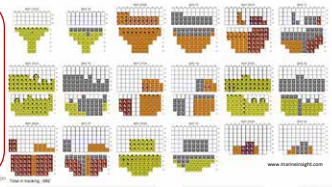
## Inbound and outbound procedures in maritime logistics and documentation

- **Container vessel pre-arrival**
- Port/terminal plans needed workforce per subsystem (*berth crane manipulations, truckers, yard workers, controllers etc.*).
- Port plans container yard locations for full standard container and container locations for special equipment,
- Port plans reefer work for new inbound containers and planned loading.
- Loading plan (*outgoing/export containers*) coordination and confirmation per vessel's bay-plan between agent/carrier/port-terminal.
- Port/terminal obtains all electronic orders through PCS for manipulations „yard-vessel".
- Agent sends advice to cargo owners/consignees about vessel' arrival, enabling them to prepare cargo/container pick-up.

## Inbound and outbound procedures in maritime logistics and documentation

- **Vessel's bay-plan**

- To every outgoing container a location on the vessel is assigned (*bay, row and tier*).
- Location is assigned according to weight, cargo, final destination or transhipment port.
- The terminal provides loading according to confirmed positions.



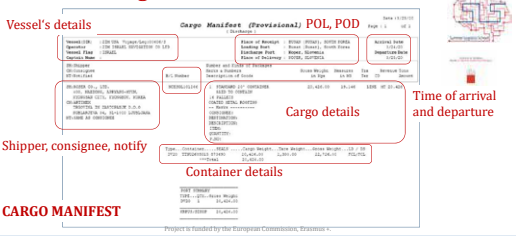

## Inbound and outbound procedures in maritime logistics and documentation

- **CARGO MANIFEST**
- A shipping document produced by Ocean line or shipping agent.
- Contains data about all BLs (*Bill of Lading*) with data about:
  - Shipper, consignee, notify,
  - container details, seal number, cargo description, weight, volume.
  - vessel's details,
  - loading port, port of discharge, final destination.
- **FREIGHT MANIFEST**

- The same data as in cargo manifest with additional data about freight and all surcharges, payment terms, etc.

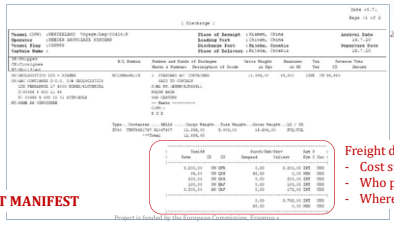
Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation




Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation




Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

- **Container vessel arrival**
- **Vessel's pilotage to the berth.**
- **Berthing and inspection by police department and customs authority – obtaining „free berth".**
- **Starting unloading operations according to bay-plan/container positions on the vessel.**
- **Direct manipulation for container delivery to the warehouses (*reefer container, urgent cargo etc.*) or directly on the truck.**
- **Hatch covers removal to unload containers under the deck.**
- **Container storage at predefined positions on the terminal (*based on next operations as exit by road, by rail, delivery to the warehouses etc.*).**

Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

- **Container vessel arrival**
- **Reefer container plug-in to the electricity and temperature monitoring.**
- **Control of damaged containers and report preparation.**
- **Container loading on the vessel (*export containers*) full or empty evacuation according to agreed bay-plan.**
- **Work coordination between agent/carrier/port according to planned E.T.D.**
- **Vessel's departure after work completed and after obtained approval by the police and customs office.**
- **Agent prepares cargo and freight manifest in carriers system.**
- **Agent issues and hands over original BL to shipper against all cost payment.**

Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

- **Container/cargo release**
- Shipping agent sends advices about container arrival.
- Shipping agent sends invoices according to freight manifest and local charges (*container release, issuing certificates, container inspection etc.*)
- Consignee must present original Master BL for container pick-up (*in case of express release the container is automatically released by the agent*).
- Consignee must check whether House B/L has been issued by freight forwarder /NVOCC – Non Vessel Operating Common Carrier as HBL could be needed for container pick-up,
- Agent issues electronic release through the PCS (*Port Community System*).

**Consignee/Freight forwarder can pick-up the container at the terminal.**

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## Inbound and outbound procedures in maritime logistics and documentation



## Inbound and outbound procedures in maritime logistics and documentation

- **BILL OF LADING**
- Contains the same data as cargo manifest (*can be also freighted*),
- Is a proof to get the container/cargo,
- It is a commercial document,
- Contains conditions for carrier's liability during the voyage,
- Usually issued 3 originals and 3 copies,
- At least 1 original must be presented when addressed to consignee's name, in case „To order" all 3 originals must be presented.
- In case of loss of original BL a deposit/bank guarantee of 200-600% CIF cargo value must be arranged to takeover the container.
- In case a HBL is issued this document must be presented to NVOCC operator.

Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

- **Organizing inland transport**
- Can be organized in **carrier's haulage** or **merchant haulage**

- Container line organizes inland transport as manifested till destination terminal or door-delivery.
- In case DAT parity all charges of transport are already paid by the shipper.
- Consignee can ask the carrier for transport arrangement in case not manifested and paid by the shipper.

- Cargo owner organizes inland transport by truck or rail independently.
- He picks up the container in the port.
- He arranges and pays the transport to trucking or railing company till agreed final destination.
- Freight forwarder is usually doing it according to received order.

Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

- **Organizing inland transport by truck**
- Selection of trucking company based on commercial offer and truck availability.
- Issuing loading order for manipulation terminal-truck (*in electronic way via PCS system*) and by this the trucker can enter into the port.
- Organising customs clearance and eventual inspections,
- Issuing CMR (*transport document*) once the container has been loaded on the truck,
- Advising consignee about truck/container arrival at final destination,
- Issuing invoice for trucking service,
- Obtain the payment once the service is completed.

Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

- **Organizing inland transport by rail**
- Commercial calculations and wagon specifics (*according to cargo/container specification*).
- Analysing rail services to destination terminal (*departures, frequency, space availability...*).
- Booking with rail operator for selected service end E.T.D. (*accepting transport price and conditions of carriage*).
- Ordering wagon positioning to the rail company (*at Koper to Slovenian Railways - SŽ*),
- Preparing electronic order to the port/terminal for container manipulation yard-wagon in PCS local system.

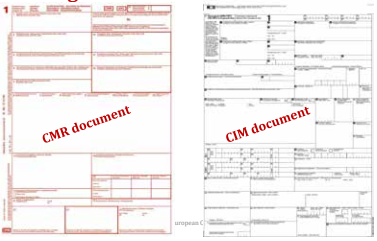
Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

- **Organizing inland transport by rail**
- Giving orders for issuing CIM document (*transport document when carriage by rail*) of freight forwarder can issue CIM document by them self directly.
- Advising consignee about expected arrival of the train at the destination terminal to pick-up the container
- When agreed organising door-trucking from the terminal to the consignee's address.
- Wagon/container arrival at destination terminal or door-address: unloading operations, cargo/container release, transport cost payment etc.
- In case treansport in suctoms transit closing customs T1 document.

Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation



## Inbound and outbound procedures in maritime logistics and documentation

- **Container/cargo inspection in the port/terminal**
- According to cargo specifics cargo inspection can be done by phytosanitary inspectors, veterinary inspectors, customs office.
- The agent must ask the port for container positioning on requested place for cargo inspection,
- Inspectors can take samples for inspection and they issue certificates for imports to the EU,
- Customs officer inspect containers when the content or shippers/consignees are suspicious (*according to analysed data in cargo manifests*)
- In case of discrepancies the cargo is stopped/confiscated and later might be destroyed or sent beck to the sender.

Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

- **Customs clearance of cargo in the port**
- For inbound containers to the EU the customs clearance can be done immedialtelly in the port or later at the final destination
- The freight forwarder must present copy of BL, commercial invoice, packing list, certificate of origin and if requested other certificates and must fulfil the customs declaration.
- In case of cargo specific customs duty must be paid
- VAT must be paid
- Freight forwarder can have open and valid customs guarantee to simplify the entire process
- AEO status – freight forwarder can have AEO (*Authorised Economic Operator*) that simplifies customs formalities as the agent is confirmed by the customs office.

Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

- **Transit customs procedure**
- In case cargo will be customs cleared at the final destination a transit customs document (*T1*) must be prepared by the Freight forwarder.
- No customs duty or VAT is paid at the port of entry into EU.
- The transport operator must provide correctly completed CMR document (*transport document for carriage by road*).
- T1 document and customs guarantee is released when T1 is confirmed by the final destination customs office, meaning that the customs duty and VAT will be paid locally.
- Freight forwarding agent guarantees with its own guarantee when issuing T1 document.

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## Inbound and outbound procedures in maritime logistics and documentation

- **Other eventual processes**
- Container repair in case of small damages
- Container washing in case stinks of previous cargo
- Special lshig and securing of cargo inside the container
- Special constructions for cargo stuffing into containers (*construction for cars, inflatable bags etc.*)
- Transport of IMO (dangerous) cargo – container labelling, certificates, inspections
- Transport of cooled/frozen cargo – reefer container use, temperature settings, use of gen-sets for inland transport to maintain temperature.
- Over-size cargo transport – special containers, lashing and loading on the vessel.

Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

Project is funded by the European Commission, Erasmus +.

## Inbound and outbound procedures in maritime logistics and documentation

- **Questions for self-checking knowledge**
- ***Explain main activities of the agent in vessel's pre-arrival activities.***
- ***Explain port's/terminal activities in vessel's pre-arrival activities.***
- ***What kind of data are included in cargo manifest and what is the difference compared with freight manifest?***
- ***Why cargo owners need Bill of Lading and to whom they must present it?***
- ***What is the difference between Master B/L and House B/L?***
- ***What is the difference in merchant or carrier's haulage of inland transport from the port to the consignee?***
- ***What are the main processes in organizing inland transport by rail? What transport document is issued?***

Project is funded by the European Commission, Erasmus +.

**TM 1**
Maritime and Intermodal Transport Unit

Unit 3 and Unit 4: Simulation/Simulators

September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

## Objectives of TM1 – Unit 3 & 4

Learning outcomes:

- Coordinating the **arrival and departure of freight trains**
- Manage the **storage of UTIs into the rail-road terminal**

Project is funded by the European Commission, Erasmus +.

## Contents

- Pre-testing of knowledge (web or paper based)
- Introduction to freight transport
- Modal choice
- Intermodalism
- How do we move cargos?
- Transport Terminals
- Incoterms
- Use of SIMULATORS (in computer room)

SLS is a project funded by the European Commission, Erasmus +.

## Introduction

Project is funded by the European Commission, Erasmus +.

## Transport in history

Relief portraying a Phoenician merchant ship, IV century BC

Two Phoenician coloured glass vessels. 5th-3rd century BCE. (Museum kunst Palast, Dusseldorf)

Glass double head pendant, 5th century B.C. (MET Collection, NYC)

Pair of gold earrings with cage and ball pendants,7th–6th century B.C. (MET Collection, NYC)

Project is funded by the European Commission, Erasmus +.

## Freight transport

- Transport makes it possible for people and goods to move from where they are to where they wish or should be.
- Thanks to transport, people become more useful and good increase their value

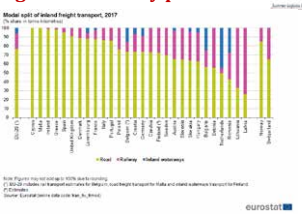
→ Resources increase their value

- We have transport demand because the allocation of goods and services is non-homogeneous
- For this reason, we have transport infrastructures: ports, roads, tunnels, bridges, canals, airports etc.

Project is funded by the European Commission, Erasmus +.

## Freight transport generates many problems

- Freight transport continues to grow and road freight transport is projected to increase by around 40% by 2030 and by little over 80% by 2050.

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## Differences between passenger transport and freight transport


- Board, get off and transfer without assistance.
- Process information and act on it without assistance.
- Make choices between transport modes without assistance but often irrationally.
- Require travel accommodations related to comfort and safety.


- Must be loaded, unloaded and transferred.
- Information must be processed through logistics managers.
- Logistics managers meet choices between transport modes rationally.
- Require accommodations related to storage.

In this course, we deal with **FREIGHT TRANSPORT**

Project is funded by the European Commission, Erasmus +.

## Freight transport planning

- We can plan transport only if we know:
  - Origin (O) and Destination (D)
  - Distance between O and D
  - Type of good
  - Costs
  - Time

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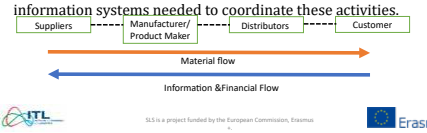
## Supply chain management

- Active management of supply chain activities to maximize customer value and achieve a sustainable competitive advantage.
- Supply chain activities cover everything from product development, sourcing, production, and logistics, as well as the information systems needed to coordinate these activities.

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## Logistics

- Management of the flow of goods between the point of origin and the point of consumption in order to meet some requirements;
- The resources managed in logistics can include physical items, such as food, materials, animals, equipment and liquids, as well as abstract items, such as time, information, particles, and energy.
- The logistics of physical items usually involves the integration of information flow, material handling, production, packaging, inventory, transportation, warehousing, and often security.

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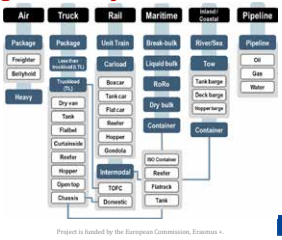
## Modal choice

Project is funded by the European Commission, Erasmus +.

## Main Freight Modal Options




Project is funded by the European Commission, Erasmus +.

## Air

- Air packages are generally carried in unit load devices, either on dedicated freight planes (freighters) or in the bellyhold of scheduled passenger flights.
- Heavy loads, such as vehicles, require specialized cargo planes and are commonly used by the military and for emergency deliveries.

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## Air Unit Load Device

- Unit load devices (ULD) come in several dimensions and are designed to fit the bellyhold of a jet plane, particularly wide-bodied aircrafts.
- The number of containers that can be fitted is a function of the length of the cargo area and the sizes of the ULDs.
- The loading of ULDs is rather simple as it involves rolling in the container

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## Trucks

- Trucks are highly flexible vehicles able to carry almost every type of cargo
- Over short to medium distances;
- Urban freight distribution (package trucks)
- Less than truckload (LTL) carriers usually consolidate and deconsolidate loads coming from different customers, which is common in the parcel carrying business.
- Full Truckload (FTL) transportation carries large volumes that have been broken down into the largest possible truck load unit; several truckloads are required to fulfill an order.
- The variety of modal options is related to the technical requirements to carry specific cargoes such as bulk, liquids or containers.
- Trucks using chassis are able to carry domestic (usually 53 feet in North America) and ISO containers (20 and 40 feet).

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## Rail

- A unit train carries the same cargo between one origin and one destination, with several carload configurations possible depending what is being carried.
- There can be unit trains for coal, grain, cars or containers; they carry a single commodity.
- Trains can also be assembled with different carloads servicing different customers, origins and destinations. This is however more costly and time consuming.
- *Containerization* had significant impacts on rail transportation and spurred the development of intermodal rail services.
- Unit train are common for the transport of containers between large gateways and inland centers.

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## Maritime

- Through the application of the principle of economies of scale maritime shipping has developed specialized ships to carry break bulk, dry bulk, liquids, vehicles (RoRo) and even liquid natural gas.
- Container shipping has also become a dominant maritime modal option supporting commercial transactions with multiple origins, destinations and cargo owners.
- The standard ISO containers of 20 and 40 feet are the main unit sizes, which has been adapted to carry refrigerated goods (reefers) and even liquids (tank containers).
- The dry maritime container is the most dominant container cargo unit.

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## Inlaind and coastal

- Inland (fluvial) or coastal maritime services are prevalent where there are:
  - major river systems reaching deep inside a continent
  - where a country is an archipelago (e.g. Japan, Indonesia, Philippines)
  - with long coastlines
- Containerization has also incited the design of specialized container barges that carry container between major coastal ports and inland destinations.

Container barge. The above self-propelled barge is the largest being used on the Seine basin with 2,300 deadweight tons, a length of 105 meters and a width of 9.5 meters.

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## Pipelines

- Represent a completely separate system of freight distribution where liquids can be pumped over long distances
- Mainly oil and gases

The Trans-Alaska Pipeline System was constructed between 1975 and 1977 to move oil from the oil fields of northern Alaska to the northernmost ice-free port of Valdez, Alaska. Eleven pumping stations maintain the oil flow along the 1,300 km pipeline, which can carry up to 2.1 million barrels per day.

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## Complementing modes

•**Different geographical markets**. It is clear that if different markets are involved, modes will permit a continuity within the transport system
•**Different transport markets**. The nature of what is being transported, such as passengers or freight, often indicates a level of complementarity.
•**Different levels of service**. For a similar market and accessibility, two modes that offer a different level of service will tend to complement another. The most prevailing complementarity concerns costs versus time.

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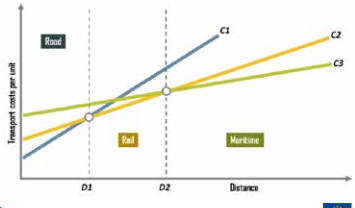
## Modal Competition (1)




Project is funded by the European Commission, Erasmus +.

## Modal Competition (2)

- There is modal competition when there is an **overlap in geography, transport and level of service**.
- Each mode has its own price/performance profile, the actual competition between the modes depends primarily upon:
  - **Cost**
  - The distance traveled,
  - the quantities that have to be shipped and
  - the value of the goods.

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## Modal choice Criteria

- Costs (fixed and variable)
- Speed
- Security of cargo
- Reliability
- Convenience

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## Intermodalism

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## Problems of freight transport

- Problems (EU policy perspective)
  - negative consequences of transport (pollution, climate change, noise, congestion and accidents)
- Problem (for operators)
  - How do we move goods in a convenient and fast way?

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## Intermodalism

- Transportation systems are often **segmented and un-integrated;**
- **Modalism** was also favored by the technical difficulties of transferring goods from one mode to another:
- Integration was not convenient because it meant additional **terminal costs and delays**, mainly because the load unit needed to be changed, which is common for bulk transportation.



## Intermodal Transportation (1)

- The movements of freight from an origin to a destination rely on several modes of transportation.
- Each carrier is issuing its own ticket (passengers) or contract (freight).
- The movements from one mode of transport to another is commonly taking place at a terminal specifically designed for such a purpose.
- Intermodal transportation (literally) ***Exchange of passengers or freight between two transportation modes***
- The term has become more commonly used ***for freight and container transportation across a sequence of modes***.



## Intermodal Transportation (2)

- Intermodalism involves the organization of a sequence of modes between an origin and destination (including the transfer).
- Its main goal is to connect transportation systems that could not be connected otherwise because they are not servicing the same markets areas (due to their technical characteristics).
- Each segment is subject to a separate ticket (for passengers) or contract (for freight) that must be negotiated.



## Multimodal Transportation

- The movements of passengers or freight from an origin to a destination relying on several modes of transportation using one ticket (passengers) or contract (freight).
- Technically the same than intermodal transportation, but represents an evolution requiring a higher level of integration between the actors involved such as carriers and terminal operators.
- Multimodalism is simply an extension of intermodalism where all the transport and terminal sequences are subject to a single ticket or contract (bill of lading) that can be assumed by a single integrated carrier.

## Multimodal Transportation Network

- A logistically linked system using two or more transport modes with a single rate.
- Modes are having common handling characteristics, permitting freight (or people) to be transferred between modes during a movement between an origin and a destination.
- For freight, it also implies that the cargo does not need to be handled, just the load unit such as a pallet or a container.

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## Transmodal transportation (1)

- The movements of passengers or freight within the same mode of transport.
- Although "pure" transmodal transportation rarely exists and an intermodal operation is often required (e.g. ship to dockside to ship), the purpose is to insure continuity within the same modal network.
- Transmodalism tries to reconcile different modal services on the same network. There is no specific term if transmodalism takes place as a single or separate ticket or contract.

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## Transmodal Transportation (2)

- Transmodalism is common for air transportation since a passenger can easily book a ticket between two locations, even if it involves transiting through an intermediary airport and using separate carriers.
- The strategies of air carriers particularly relied on transmodalism with the setting of major hubs that maximize the number of city-pairs serviced. For freight transportation, transmodalism is more challenging since it was conventionally complex to switch load units within the same mode because of the large amount of handling required.
- Paradoxically, it is the development of intermodalism that has favoured the setting of transmodalism since it incited the development of long distance transportation services and an increase of container volumes to be handled across the same mode.

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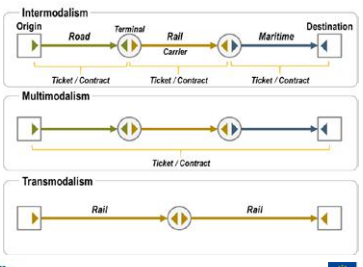


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## Driving forces of Intermodalism

| Factor | Cause | Consequence |
|---|---|---|
| Technology | Containerization & IT | Modal and intermodal innovations; Tracking shipments and managing assets |
| Capital investments | Returns on investments | Highs costs and long amortization; Improve utilization to lessen capital costs |
| Supply chains | Globalization | Coordination of transportation and production (integrated demand) |
| Networks | Consolidation and interconnection | Multiplying effect |

Improvements in the capacity, efficiency and reliability of freight transportation have allowed integrated transport systems to emerge

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## Moving cargos

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## Types of cargo

- **Break bulk cargo/ General Cargo** (countable) Goods that must be loaded individually, and not in standard ways (e.g. intermodal containers nor in bulk as with oil or grain). Break bulk cargo is transported in bags, boxes, crates, drums, or barrels.
- **Bulk cargo /Bulk dry cargo (weightable)** Cargo transported unpackaged in large quantities. Bulk cargo is classified as liquid or dry.
- Bulk liquid cargo (weightable): liquids or gases, e.g. oil, gad, chemicals, winde, fresh water, molasses
- **Roll-on/roll-off Cargo (countable):** wheeled cargo, such as cars, trucks, semi-trailer trucks, trailers, and railroad cars, that are driven on and off the ship on their own wheels or using a platform vehicle, such as a self-propelled modular transporter.

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## Some way to handle cargos

Terracotta wine amphora, ca. 100 B.C. from shipwrecked cargo vessel (MET Collection, NYC)

A crate (left) and a barr (right)
credits www.homedepot.com

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## Main steps in intermodal integration

- 1930s
  - Pallets
  - Fork lifts
- 1952
  - Trailer on flat car services
- 1956
  - Container

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## How can we carry goods?

Drum

Bag

Forklift and pallet

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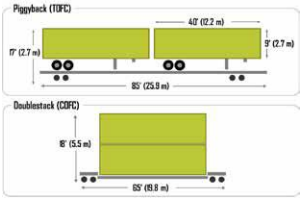
## TOFC & COFC

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## Intermodal Transport Unit (ITU)

- Container, swap body or semi-trailer/goods road motor vehicle suitable for intermodal transport
- Intermodal transportation concerns the movements of passengers or freight from an origin to a destination relying on several modes of transportation. The container has become the dominant intermodal transport unit.

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## Swap Body

- Other names: swop body, exchangeable container or interchangeable unit
- One of the types of standard freight containers for road and rail transport.


Credits: (left) https://www.sicom-containers.com/en/container/715-745-782-steel-van-curtain-side-swap-body/ (right) https://en.wikipedia.org/wiki/Swap_body



## Containerisation

- **The container** permits easy handling between modal systems.
- Intermodalism could take place without the container but it would be very inefficient and costly
- ITU Intermodal Transport Unit

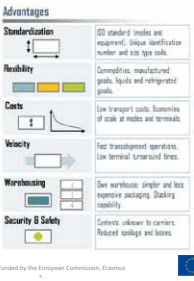


## Container

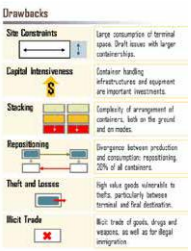
- A **large standard size metal box** into which cargo is packed for shipment aboard specially configured transport modes.
- It is designed to be moved with common handling equipment **enabling high-speed intermodal transfers in economically large unit**s between ships, railcars, truck chassis, and barges using a minimum of labor.
- The container, therefore, serves as the load unit rather than the cargo contained therein.
- The reference size is the 20 foot box of 20 feet long, 8'6" feet high and 8 feet wide, or 1 **Twenty-foot Equivalent Unit (TEU)**.



## Advantages of containerization



## Drawbacks of containerization

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## Main types of containers (1)

**Dry storage containers**
The most commonly used shipping containers; they come in various dimensions standardized by ISO. They are used for shipping of dry materials and come in size of 20ft, 40 ft and 10ft.

**Flat rack containers**
With collapsible sides, these are like simple storage shipping containers where the sides can be folded so as to make a flat rack for shipping of wide variety of goods.

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## Main types of containers (2)

**Open top container**
With a convertible top that can be completely removed to make an open top so that materials of any height can be shipped easily.

**Tunnel container**
Container storage units provided with doors on both ends of the container, they are extremely helpful in quick loading and unloading of materials.

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## Main types of containers (3)

**Open side storage container**
These storage units are provided with doors that can change into completely open sides providing a much wider room for loading of materials.

**Double doors container**
They are kind of storage units that are provided with double doors, making a wider room for loading and unloading of materials. Construction materials include steel, iron etc in standardized sizes of 20ft and 40ft.

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## Main types of containers (4)

**Refrigerated ISO containers**
These are temperature regulated shipping containers that always have a carefully controlled low temperature. They are exclusively used for shipment of perishable substances like fruits and vegetables over long distances.

**Insulated or thermal containers**
These are the shipping storage containers that come with a regulated temperature control allowing them to maintain a higher temperature.
The choice of material is so done to allow them long life without being damaged by constant exposure to high temperature. They are most suitable for long distance transportation of products.

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## Main types of containers (5)

**Tanks**
Container storage units used mostly for transportation of liquid materials, they are used by a huge proportion of entire shipping industry. They are mostly made of strong steel or other anti corrosive materials providing them with long life and protection to the materials.

**Cargo storage roll container**
A foldable container, this is one of the specialized container units made for purpose of transporting sets or stacks of materials. They are made of thick and strong wire mesh along with rollers that allows their easy movement. Availability in a range of colored wire meshes make these shipping container units a little more cheerful.

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## Main types of containers (6)

**Half height containers**
Another kind of shipping containers includes half height containers. Made mostly of steel, these containers are half the height of full sized containers. Used especially for good like coal, stones etc which need easy loading and unloading.

**Car carriers**
Car carriers are container storage units made especially for shipment of cars over long distances. They come with collapsible sides that help a car fit snugly inside the containers without the risk of being damaged or moving from the spot.

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## Main types of containers (7)

**Intermediate bulk shift containers**
These are specialized storage shipping containers made solely for the purpose of intermediate shipping of goods. They are designed to handle large amounts of materials and made for the purpose of shipping materials to a destination where they can be further packed and sent off to final spot.

**Drums**
As the name suggests, circular shipping containers, made from a choice of materials like steel, light weight metals, fiber, hard plastic etc. they are most suitable for bulk transport of liquid materials. They are smaller in size but due to their shape, may need extra space

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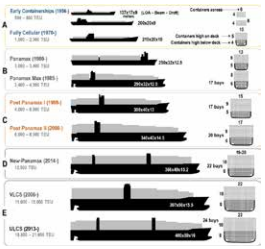

## Containerships

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## Transport Terminals

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## Terminal (1)

- Passengers and freight travel **in batches**
- Freight has to be consolidated at a port or a rail yard before onward shipment.
- ***Terminal.*** *Any location where freight and passengers either originates, terminates, or is handled in the transportation process. Terminals are central and intermediate locations in the movements of passengers and freight. They often require specific facilities and equipment to accommodate the traffic they handle.*

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## Terminals (2)

- Terminals may be points of interchange within the same modal system and which insure a continuity of the flows.
- Terminals are also very important points of transfer between modes.
- One of the main attributes of transport terminals, international and regional alike, is their convergence function.
- Obligatory points of passage having invested on their geographical **location** (generally intermediate to commercial flows).
- Transport terminals are either created by the centrality or the intermediacy of their respective locations.

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## The size of transport terminals

- The importance of a transport terminal depends on its **size**.
- Large transport terminals, particularly ports and airports, confer the status of gateway or hub to their location since they become obligatory points of transit between different segments of the global transport system.
- Containerization has favored the emergence of a **hierarchy of terminals** fulfilling different function and level of added value.

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## Freight terminals

- Freight handling requires specific loading and unloading equipment
- Freight terminals are **differentiated functionally** both by the mode involved and the commodities transferred

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## Characteristics of Freight Transport Terminals

| | | |
|---|---|---|
| **Core (Operations)** | Infrastructure | Modal access (dock, siding, road), unloading areas |
| | Equipment | Intermodal lifting equipment, storing equipment |
| | Storage | Yard for empty and loaded containers |
| | Management | Administration, maintenance, access (gates), information systems |
| **Ancillary (Added value)** | Trade facilitation | Free trade zone, logistical services |
| | Distribution centers | Transloading, cross-docking, warehousing, temperature controlled (cold chain) |
| | Storage depot | Container depot, bulk storage |
| | Container services | Washing, preparation, repair |

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## Cargo types

- **Terminals can be differenciated based on the commodities they transfer**
- **Bulk** refers to goods that are handled in large quantities that are unpackaged and are available in uniform dimensions.
  - Liquid bulk goods include crude oil and refined products that can be handled using pumps to move the product along hoses and pipes. → significant storage facilities may be required.
  - Dry bulk (ores, coal and cereals) → More equipment for dry bulk handling is required, because the material may have to utilize specialized grabs and cranes and conveyor-belt systems.
- **General cargo**
  - Goods that are of many shapes, dimensions and weights such as machinery, processed materials and parts.
  - Goods are so uneven and irregular → handling is difficult to mechanize.
  - General cargo handling usually requires a lot of labor.
- **Containers**
  - Minimal labor requirements
  - Significant storace space and intermodal equirpment

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## Terminal – Storage area

- Need for storage space
- Assembling the individual bundles of goods may be time-consuming
- specialized infrastructures (grain silos, storage tanks, and refrigerated warehouses) or simply space to stockpile
- Containerization, because of its large volumes, has forced a significant modal and temporal separation at terminals and thus the need of a buffer in the form of storage areas.

Container yard, Port le Havre

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## Terminal costs

- Terminal costs represent an important component of total transport costs.
- Fixed costs (regardless of the length of the eventual trip)
- Vary significantly between modes.
- They can be considered as:
  - **Infrastructure costs**. (construction and maintenance costs of structures such as piers, runways, cranes and facilities).
  - **Transshipment costs**. The costs of loading and unloading passengers or freight.
  - **Administration costs.** Many terminals are managed by institutions such as port or airport authorities or by private companies (e.g. terminal operators).

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## Conventional Intermodal Terminal Equipment


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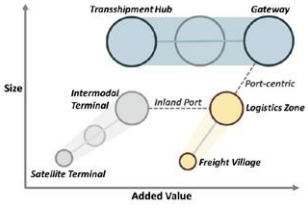
## Freight terminal hierarchy and added value

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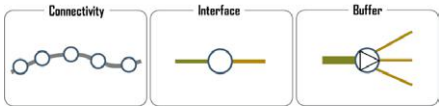
## Function of a Transport Terminal

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## Performance of Transport Terminals

- **Location**
  - serve a large concentration of industrial activities, representing a terminal's market area.
  - Specific terminals have specific locational constraints, such as port and airport sites.
  - New transport terminals tend to be located outside central areas to avoid high land costs and congestion.
- **Accessibility**
  - Accessibility to other terminals (at the local, regional and global scale) as well as how well
  - Links to the regional transport system
- **Infrastructure.**
  - Amount of land they occupy and their level of technological, labor and managerial intensity.
  - Infrastructure considerations → must accommodate current traffic and anticipate future trends along with technological and logistical changes.
  - Modern terminal infrastructures consequently require massive investments
  - A utilization rate of 75 to 80% of design capacity is considered to be the optimal since above this level, congestion starts to arise, undermining the reliability of the terminal facility.

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## Major Commercial Actors

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## Major Commercial Actors in Freight Distribution (1)

| Transport Sector | Function |
|---|---|
| Maritime shipping companies | Control long distance segments of the global freight distribution linking major markets. Highly capital intensive industry. Decide of their network configuration (ports of call and routing). |
| Global port terminal operators | Control important intermodal infrastructures (terminals) within the world's largest container ports. Have strong linkages with maritime shipping companies. |
| Port authorities | Manage and plan port infrastructures. Tend to lease terminal operations. Important intermediaries for regional distribution (hinterland). |
| Trucking industry | Control vast and diverse assets that include critical segments of freight distribution in all economic sectors. Short and medium haul transport. |

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## Major Commercial Actors in Freight Distribution (2)

| Transport Sector | Function |
|---|---|
| Maritime lock and canal operators | Operate strategic passages in global and national distribution (e.g. the Panama Canal, the Suez Canal or the St. Lawrence Seaway). |
| Real estate promoters | Develop logistics zones (build to lease, build to suit), often in coordination with terminal operators (rail and port) or port authorities. Manage a real estate portfolio of distribution centers (leases). |
| Rail and rail terminal operators | Strategic inland freight carriers transporting a wide array of raw materials and commodities. Responsible for many of the transhipments between rail and road, particularly for containerized freight. |



## Major Commercial Actors in Freight Distribution (3)

| Transport Sector | Function |
|---|---|
| Third party logistics providers | Important managerial and organizational skills within supply chains. Often act as brokers between transport customers and service providers. Some own and operate transport assets. |
| Air freight transport companies and air freight terminals | Important assets for the rapid distribution of high value added freight. Decide of their network configuration (airports serviced). |
| Freight forwarders | Perform tasks such as packaging, labeling and the consolidation of shipments on behalf of their customers. Operate distribution centers. Define how markets are serviced. Can subcontract to third party providers. |



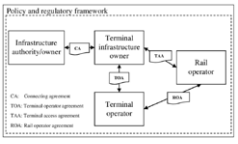
## Key functions and actors in intermodal operations

| Function | Govt dept/ authority | Infrastructure regulator | Infrastructure (network) owner | Infrastructure (terminal) owner | Terminal operator | Rail operator |
|---|---|---|---|---|---|---|
| Licensing/safety | | X | | | | |
| Emergency services | | | X | | X | |
| Protection of public interest | X | X | If public | If public | | |
| Setting policy goals | X | | | | | |
| Maintenance | | | X | X | X | |
| Marketing and service development | | | X | X | X | X |
| Land acquisition and disposal | | | X | X | | |
| Infrastructure investment | | | X | X | X | |
| Equipment investment | | | | X | X | |
| Security | | | | | X | |
| Cargo handling | | | | | X | |
| Transport services (mainline) | | | | | | X |
| Transport services (shunting within the terminal) | | | | | X | |

Bergqvist, Rickard & Monios, Jason. (2014)



## Intermodal terminal structure & governance




Conceptual framework of intermodal terminal governance and contracts Bergqvist, Rickard & Monios, Jason. (2014)

# Incoterms

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## IncoTerms (1)

- International Commerce TERMS rules are a total of 11 terms
- Published by the International Chamber of Commerce, which defined the conditions of supply of goods in international sales transactions
- Facilitation of international trade→ need for common set of rules and guidelines
- First published in 1936, revision every 10 years
- Incoterms are private law rules and are not supported by the laws of any country ot a supranational organisation
- Incoterms do not have the force of law → there is no obligation to use them international trade operations
- They are used only if the seller and buyer agree to use them in the sale contract
- They are widely known and used

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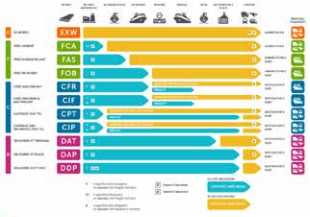
## Incoterms (2)

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Notes:

# TM4: Transport organisation

**Date:** 10 – 11 September, 2019

**Units & lecturers:**

| Unit title | Trainer | Classroom |
|---|---|---|
| **Unit 1**: Calculating the costs of a transport mission | Sarah Koneke<br>Patricija Bajec | 203/R1<br>203 |
| **Unit 2**: Preparing a transport mission | | |
| **Unit 3**: Assessing the feasibility of a transport mission | | |
| **Unit 4**: Monitoring a transport mission | | |
| **Unit 5**: Assessing the KPIs of a transport mission | | |

**Observers:** Bojan Beškovnik & Žiga Vuk

**TM4**
TRANSPORT ORGANISATION

Unit 1: Basics of treating a transport demand
Unit 2: Use case study

Tuesday, 10th of September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

## Introduction to TM4 Transport Organisation

**The Transport Organisation Training Module is structured into 3 sub-units with different aims:**

- Unit 1: Basics of treating a transport demand
- Unit 2: Use case study
- Unit 3: Simulator

## What are YOUR expectations of TM4 Transport Organisation?

Go to www.slido.com

Type access code: #8337

Tell us what your expectations are! (key words)

## Introduction

**There are 3 decisive factors for the selection of a transport mode:**

## Introduction

It is fundamental to properly analyse the customer's request...

But which questions to ask yourself ?

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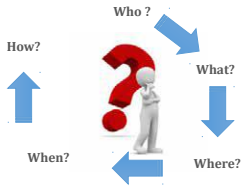
## Analysis of the customer's demand

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## Work in small groups


Which elements do you need to consider to answer these questions?

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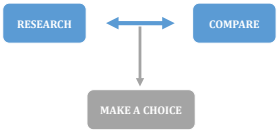
## Feasibility study

**To study the feasibility of a transport mission means:**

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## Work in small groups

20 min

1. Which elements need to be chosen/decided?
2. What influences this choice?

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## Work in small groups

10 min

What are the main criteria for your choice?

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**TM4**
TRANSPORT ORGANIZATION

Unit 3: Simulators' use to deepen knowledge and skills of unit 1 and 2

September 2019, Portoroz, Slovenia

Project is funded by the European Commission, Erasmus +.

## SIMULTRA Simulator for Transport operators

- Pedagogical game developed in the framework of the **SIMULTRA** project
- **Context**: Simulate the daily activities of a transport operator working in a road freight transport company
  - Transport of a container by road from Antwerp (Belgium) to Parma (Italy)
- The transport operator is a key player within a transport company
  - He/she processes orders, organises and plans the route of the truck drivers, monitors and controls the realisation of the transport service
  - He/she operates taking into account cost-effectiveness, safety and security, corporate social responsibility and the various regulations related to transport
  - He/she is in contact with customers, drivers and other departments from the company
- **Aim**: Understand the main activities of the transport operator's profession through a simulation of various professional situations

Project is funded by the European Commission, Erasmus +.

## Pre-test of the SIMULTRA Simulator for Transport operators

- Online questionnaire to test your knowledge about the transport operator's profession before using the SIMULTRA Simulator for Transport Clerks:

**5 min**

https://ec.europa.eu/eusurvey/runner/Simultra_Traffic_Officer_201904

Project is funded by the European Commission, Erasmus +.

## Open the game:

- On the desktop of the computer, you have a folder called **"Transport operator"**
  - Open the folder
  - **Select autotrasporti.exe**, make a right click and choose: open (or double click on it)
  - The game will open directly.

## Recommendations:

- For a good visualisation of the data (e.g. drop-down menu) during the game we advise you to use a mouse
- A calculator may also be useful for some steps of the game

Project is funded by the European Commission, Erasmus +.

## How to start the game?

- To start the game choose the English language and click on "Play":


Project is funded by the European Commission, Erasmus +.

## Navigation

- Control keys:
  - **Mouse** : movement, selection
  - **Keyboard** : completion
- Navigation bar and buttons:
  - According to the stages of the game you will meet different elements to progress in the game: Buttons with "Go", "Continue", "Update" or "Validate" enable you to check if you gave the correct answer
  - A navigation bar at th s through the game at certain stage:


Click on "Next" to move forward and "Exit" to leave the game.

!! Please note that when you leave the game, all progress and points are lost. It is not possible to restart from the stage where you stopped the game.

- Replies to a question:
  - either put the relevant data expected into the **empty boxes** and click on "Update".
  - or **select the right answers** and press "Validate"

Project is funded by the European Commission, Erasmus +.

## Guidelines for calculation exercises:

- To answer the exercises requesting calculations, complete the fields **only** with numbers.
  - For example, if the result is 23 hours, you must enter only 23 into the empty field
- The result for the global driving time must be rounded to the nearest whole number
- Fields requiring a date as answer have to be completed as follows: DD/MM
  - For example: 10th of March → 10/03
- There will be one exercise where you will have to calculate the price of the service:
  - You will have to complete each field with numbers that require decimals
  - Please use (.), e.g.: 12.34

Project is funded by the European Commission, Erasmus +.

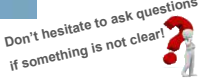
## Guidelines for reading the feedbacks:

- For every exercise, the learners will have **2 attempts**
- After having answered twice, he/she will receive feedbacks explaining the correct answers
  - In some cases, to read the feedbacks, you need to hover with the mouse over the different fields of answers
  - In other stages, the feedbacks will appear automatically

Project is funded by the European Commission, Erasmus +.

## Now you are ready to play the Transport operator simulator. Have fun!


30 min




Project is funded by the European Commission, Erasmus +.

## Post-test of the SIMULTRA Simulator for Transport operators

- Online questionnaire to test your knowledge about the transport operator's profession before using the SIMULTRA Simulator for Transport Clerks:

https://ec.europa.eu/eusurvey/runner/Simultra_Traffic_Officer_201904

5 min

Project is funded by the European Commission, Erasmus +.

## SIMULTRA Simulator for Customs practices

- Pedagogical game developed in the framework of the **SIMULTRA** project
- **Context**: Simulate the daily customs activities **for an international transport**
  - A European company has requested and already accepted a quote from a **freight forwarder** for the goods import service
  - The estimate specifies that the Container will leave by ship from the port of Shanghai and will arrive in Antwerp; it is then transported by road carrier to the client company in Parma
  - For transport from the port of Antwerp to the company, the shipper entrusted with an **MTO - multimodal transport operator** where the customs officer works, who uses the support of a **customs agent**.
- **Aim**: Understand the main procedures of the customs activities through a simulation of various professional situations

Project is funded by the European Commission, Erasmus +.

## Open the game:

- On the desktop of the computer, you have a folder called "**Customs practices**"
  - Open the folder
  - **Select pratiche_doganali**, make a right click and choose open (or double click on it)
  - The game will open directly

## How to start the game?

- To start the game choose the English language and click on "Play":


Project is funded by the European Commission, Erasmus +.

## Select a level:

- The simulator has 4 different levels that correspond to the 4 roles involved in the customs procedure:
  - MTO customs employee (Multitrans / Lucas Rossi)
  - Freight Forwarder (Weship / Jim Clarke)
  - Customer (Amazul)
  - Customs agent (CustomPass / MirKo Bianchi)
- In the beginning, the player can only select the first level (*MTO customs employee*), the following ones will only be unlocked when the previous levels were completed successfully


Project is funded by the European Commission, Erasmus +.

## Navigation

- Control keys:
  - **Mouse**: movement
  - **Left mouse key**: selection
  - **Keyboard**: completion
- The role in which the player is operating is indicated by the word Player next to the character

Project is funded by the European Commission, Erasmus +.

## How to play?

- The game proposes multiple choice and completion questions that you will have to answer:
  - To do so, you will be provided with documents or textual information to complete the tasks assigned
  - !! Always remember to view the documents provided by the game before proceeding with the completion of the data
- NOTICE: all the documents inside the simulator are in English, therefore the completion answers must be given in English as shown in the form in which they are reported respecting uppercase, lowercase, spaces and dashes!

Project is funded by the European Commission, Erasmus +.

## Now you are ready to play the Customs Practice simulator. Have fun!


**50 min**

Don't hesitate to ask questions if something is not clear!

Project is funded by the European Commission, Erasmus +.

## Thank you for your attention!

**Contact information:**
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**Sarah KONEKE**
**Project manager**
**sarah.koneke@aft-dev.com**
**+33 (0)6 84 50 28 37**

Project is funded by the European Commission, Erasmus +.

Notes:

# TM2: Supply chain management of cold chain products

**Date:** 12 September, 2019

**Units & lecturers:**

| Unit title | Trainer | Classroom |
|---|---|---|
| **Unit 1**: Understanding the basics of supply chains | Patricija Bajec | 202 |
| **Unit 2**: Organising a supply chain of cold products | Andrea Bardi | |
| **Unit 3**: Cold chain warehousing | | |
| **Unit 4**: Understanding the main aspects of transporting cold products | | |

**Observers:** Karlo Šoštarič & Eleonora Tu

**TM2**
SUPPLY CHAIN MANAGEMENT FOR COLD PRODUCTS

Unit 1: Understanding basics of supply chain

September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

## Content

- Introduction (me & topics)
- What do you know about supply chain?
- **What** is supply chain?
- **Which** are supply chain partners?
- **Which** are supply chain aims?

Project is funded by the European Commission, Erasmus +.

- **What** is the diference between supply and logistics chain?
- Supply chain risks and their management

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## WHAT is supply chain?


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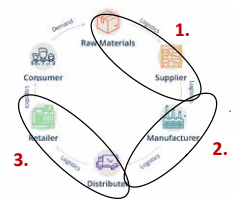
## WHAT is supply chain?




Project is funded by the European Commission, Erasmus +.

## Real examples:

Each supply chain is unique.

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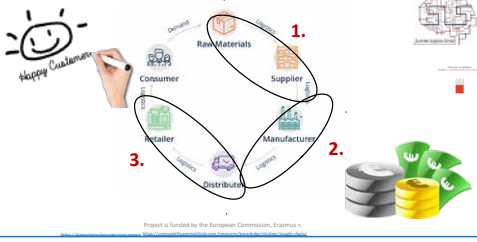
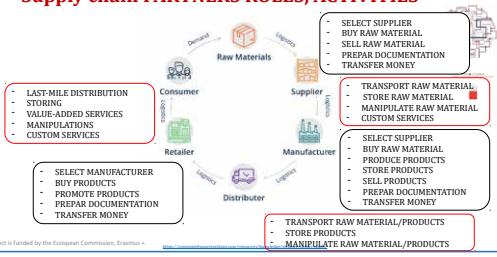
## WHICH are supply chain AIMS?




Project is funded by the European Commission, Erasmus +.

## Supply chain PARTNERS ROLES, ACTIVITIES

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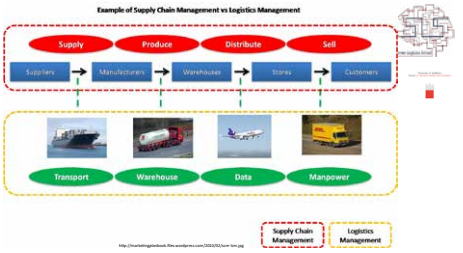
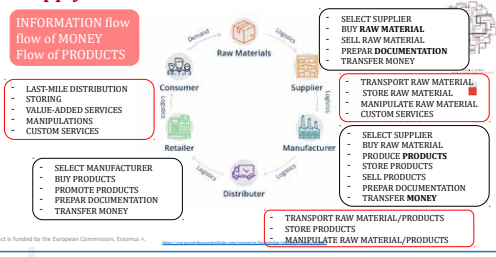
Supply chain = Logistics chain

Logistics chain is very important for the supply chain.




## Supply chain FLOWS

INFORMATION flow
flow of MONEY
Flow of PRODUCTS




- LAST-MILE DISTRIBUTION
- STORING
- VALUE-ADDED SERVICES
- MANIPULATIONS
- CUSTOM SERVICES

- SELECT SUPPLIER
- BUY **RAW MATERIAL**
- SELL RAW MATERIAL
- PREPAR **DOCUMENTATION**
- TRANSFER MONEY

- TRANSPORT RAW MATERIAL
- STORE RAW MATERIAL
- MANIPULATE RAW MATERIAL
- CUSTOM SERVICES

- SELECT MANUFACTURER
- BUY PRODUCTS
- PROMOTE PRODUCTS
- PREPAR DOCUMENTATION
- TRANSFER MONEY

- SELECT SUPPLIER
- BUY RAW MATERIAL
- PRODUCE **PRODUCTS**
- STORE PRODUCTS
- SELL PRODUCTS
- PREPAR DOCUMENTATION
- TRANSFER **MONEY**

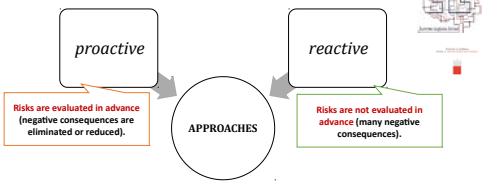
- TRANSPORT RAW MATERIAL/PRODUCTS
- STORE PRODUCTS
- MANIPULATE RAW MATERIAL/PRODUCTS

## Case study:

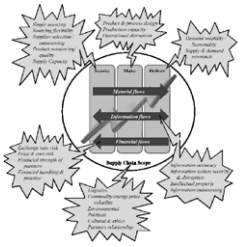
## Supply chain risks

Risk is the **likelihood** that a **negative consequences** will occur due to an (**unusual) event**.

## Risk management APPROACHES




## Risks DRIVERS




Vir: Musa, S.N., Supply Chain Risk Management, 2012

## Case study:

Project is funded by the European Commission, Erasmus +.

## Learning outcomes

- Each supply chain is unique.
- Supply chain ≠ Logistics chain
- Logistics chain is very important for the supply chain.
- INFORMATION flow
  flow of MONEY
  flow of PRODUCTS
- BE PROACTIVE

Project is funded by the European Commission, Erasmus +.


Erasmus+
Thanks for the attention. Any question?
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Notes:

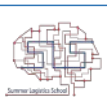
# TM3: Warehouse analysis

**Date:** 12 September, 2019

**Units & lecturers:**

| Unit title | Trainer | Classroom |
|---|---|---|
| **Unit 1:** Calculating and assessing the KPIs of a logistics warehouse | Kristijan Rogić | 203 |
| **Unit 2:** Proper use of a Warehouse Management System | | |
| **Unit 3:** Preparing an order | Ivona Bajor | |
| **Unit 4:** Using methods/techniques for the optimisation of warehouse operations | | |

**Observers:** Ksenija Rožanski Fidler & Andrej Androjna



Erasmus+

**TM3**

**WAREHOUSE ANALYSIS**

Unit 1: Calculating and Assessing KPIs of a Logistics Warehouse

September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

## Calculating and Assessing KPIs of a Logistics Warehouse

Erasmus+

- Warehouse performance analysis
- Basic KPI's in warehouse and their meaning according to the value
- Calculation method of different KPI's in warehouse

Project is funded by the European Commission, Erasmus +.

## Calculating and Assessing KPIs of a Logistics Warehouse

Erasmus+

- A KPI measures activities that have a significant effect on warehouse performance.
- The dimensions of time, space, and costs are three cornerstones by which efficient and effective warehouse is measured
- The result of performance analysis is a key indicator of efficiency or inefficiency and it points to where cost reducing improvements can be made.
- Continuous measurement of warehouse systems key performance indicators is essential to track the progress of the process.
- Key performance indicators for warehouse systems allow to measure the success of warehouse processes and thus enable their optimization.

Project is funded by the European Commission, Erasmus +.

## Calculating and Assessing KPIs of a Logistics Warehouse

Erasmus+

- KPI in the warehouse system include:
  - Service level:
    - Percentage of orders sent on time,
    - Delivery time,
    - Products returns due to customer dissatisfaction,
    - Availability of optimal inventory levels in warehouses.
  - Operational efficiency:
    - Number of picks products per hour person,
    - Number of picks orders per hour person,
    - Availability of warehouse equipment (eg number of hours for which a forklift is available, without charging the battery).
  - Cost efficiency:
    - Cost per product (cost that includes all activities from entry to exit of warehouse),
    - Cost per storage pallet,
    - Costs: staff, space, equipment maintenance, packaging.

Project is funded by the European Commission, Erasmus +.

## Calculating and Assessing KPIs of a Logistics Warehouse

- Resource utilization:
  - Utilizing the space capacity occupied by the pallet,
  - The hours number worked in the day when the storage equipment used,
  - The number of hours worked in a day .
- Inventory accuracy:
  - Percentage of locations with the exact stock level (inventory level in inventory control system and actual inventory level),
  - Keeping stocks in the warehouse.
- Cycle time:
  - The average time required to receive goods at the warehouse until the goods are stored,
  - The average time from receiving customer orders to delivery of goods.

Project is funded by the European Commission, Erasmus +.

## Calculating and Assessing KPIs of a Logistics Warehouse

- Safety:
  - The number of days without a crash,
  - The number of days that workers spend in training for safety,
  - Dedication to increase security and prevent accidents.
- Environment:
  - Consumption energy, water
  - Waste water recycling,
  - Recycling percentage of return packaging items.

Project is funded by the European Commission, Erasmus +.

## Calculating and Assessing KPIs of a Logistics Warehouse

- It is necessary to determine the performance to monitor the warehouse role as well as the selection of process that are to be optimized.
- Operating parameters include:
  - Permeability,
  - Number of storage units,
  - Characteristics of storage goods,
  - Order Number by Product,
  - Requirements for Value Added Orders.

Project is funded by the European Commission, Erasmus +.

## Calculating and Assessing KPIs of a Logistics Warehouse

- Reasons for measuring storage system performance:
  - To ensure customer satisfaction,
  - Ensure continuous improvement and improvement in warehouse operations,
  - Identify potential problems, correct them before they become a problem,
  - Ensure the attendance of staff.
- It is necessary to measure four main performance indicators in the warehouse:
  - Reliability,
  - Flexibility,
  - Cost,
  - Use of warehouse.

Project is funded by the European Commission, Erasmus +.

## Calculating and Assessing KPIs of a Logistics Warehouse

- Reliability includes timely delivery, accuracy, storage space utilization.
- The order-to-delivery cycle best reflects the service flexibility, as it covers all processes from ordering, order picking, packaging to delivery.
- Cost represents a percentage of sales and productivity versus working ho
- The utilization of the storage area includes the efficient utilization of the storage area, warehouse equipment and personnel.

Project is funded by the European Commission, Erasmus +.

## Calculating and Assessing KPIs of a Logistics Warehouse

- The performance is measured according to the process, it is necessary to note the beginning and end of process, volume of goods covered (pallets or boxes).
- Measure:
  - Preparation time (collection, equipment, pallet, paperwork),
  - Human factor (motivation, skill)
  - Mechanical factors (battery charging, time of picking a pallet),
  - Operating factors.
- KPI for process receiving:
  - Cost - Cost of receiving goods per vehicle,
  - Productivity - volume of goods accepted per hour of a worker,
  - Recovery - percentage of utilization of the receiving zone,
  - Quality - the quality of acceptance,
  - Cycle time - time needed for one receive.

Project is funded by the European Commission, Erasmus +.

## Calculating and Assessing KPIs of a Logistics Warehouse

- KPI for process storage:
  - Cost - one pack storage cost (packet, tube, pallet),
  - Productivity - the amount of stored goods per square meter,
  - Usability - percentage usability of storage space in cubic meters,
  - Quality- percentage position without mismatch,
  - Cycle time - cycle time during inventory retention.
- KPI for process order picking:
  - Cost - picking cost per order,
  - Productivity - picking orders number per hour,
  - Usability - percentage usability of storage equipment and surfaces for order picking process,
  - Quality - percentage of order picking process without error,
  - Cycle time - cycle time required for one order picking.

Project is funded by the European Commission, Erasmus +.

## Calculating and Assessing KPIs of a Logistics Warehouse

- Time indicators:
  - Vremenski pokazatelji performansi skladišnih sustava prikazuju vrijeme koje je potrebno za izvršenje skladišnih operacija.
  - Vremenske pokazatelje performansi skladišnih sustava moguće je optimizirati promjenom dizajna skladišta.

$Rec_t$=(hour/pallet)

$Rep_t$=(hour/pallet)

$Pu_t$=(hour/pallet)

$Pick_t$=(hour/orderline)

$DS_t$=(hour/pallet)

Table 1. Time indicators

| Symbol | Indicator | Definition |
|---|---|---|
| $Rec_t$ | Receiving time | Unloading time |
| $Pu_t$ | Putaway time | Lead time since products has been unloaded to when it is stored in its designed place |
| $DS_t$ | Dock to stock time | Lead time from supply arrival until product is available for order picking |
| $Rep_t$ | Replanishment time | Lead time to transfer products from reserve storage area to forward pick area |
| $Pick_t$ | Order picking time | Lead time to pick an order line |

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## Calculating and Assessing KPIs of a Logistics Warehouse

- Productivity indicators
  - Productivity indicators can be defined as the level of asset utilization, or how well resources are combined and used to accomplish specific, desirable results.

$Lab_p$=(items/LaborHour)

$Pick_p$=(orderline/LaborHour)

$Le_p$=(%)

$InvUt_p$=(%)

$Rec_p$=(pallets/LaborHour)

$TO_p$=(time/month)

$Sto_p$=(pallets/LaborHour)

$EqD_p$=

$Rep_p$=(pallets/LaborHour)

$TO_p$=(time/month)

Project is funded by the European Commission, Erasmus +.

## Title of Calculating and Assessing KPIs of a Logistics Warehouse

Table 2. Productivity indicators

| Symbol | Indicator | Definition |
|---|---|---|
| $Lab_p$ | Labor productivity | Ratio of the total number of items manager to the amount of item handling working hours |
| $Pick_p$ | Picking productivity | Total number of products picked per labor hours in picking activity |
| $Le_p$ | Labor efficiency | Standard time defined by engineering divided by actual time |
| $InvUt_p$ | Inventory utilization | Rate of space occupied by storage |
| $Rec_p$ | Recieving productivity | Number of vehicles unloaded per labor hour |
| $TO_p$ | Turnover | Ratio between the costs of goods sold and the average inventory |
| $Sto_p$ | Storage productivity | Total number of products stored per labor hour in storage activity |
| $EqD_p$ | Equipment downtime | Percentage of hours that the equipment is not utilized |
| $Rep_p$ | Replenishme nt productivity | Total number of pallets moved per labor hour in replenishment activity |
| $TO_p$ | Turnover | Ratio between the cost of goods sold and the average inventory |

Project is funded by the European Commission, Erasmus +.

## Title of Calculating and Assessing KPIs of a Logistics Warehouse

- Cost indicators
  - The number of cost indicators used for warehouse management is not as abundant in the literature as the quality or the productivity indicators. That fact stating that despite the strategic importance in the supply chain, warehouses have most of their activities in the operational level, which is normally based on non financial indicators. Also, some warehouse objectives are difficult to be measured monetarily. For this reasons, cost indicators will be shown in next table.

$Inv_c$=Inventory Cost + Penalty when product is not delivered($)

$OrdProc_c$=($/order)

$Maint_c$=BuildC+ EqMaintC+ Others ($/month)

Project is funded by the European Commission, Erasmus +.

## Title of Calculating and Assessing KPIs of a Logistics Warehouse

Table 3: Cost indicators

| Symbol | Indicator | Definition |
|---|---|---|
| $Inv_c$ | Inventory costs | Holding cost and the stock out penalty |
| $OrdProc_c$ | Order processing costs | Total processing cost of all orders per number of orders |
| $Maint_c$ | Maintenance cost | Costs of building maintenance and equipment maintenance |

Project is funded by the European Commission, Erasmus +.

## Title of Calculating and Assessing KPIs of a Logistics Warehouse

- Quality indicators
  - The quality indicators can be divided in two groups: some metrics are related to internal quality operations, while others focus on customer service level.

$Rec_n$=(%)

$Pick_n$=(%)

$Sto_n$=(%)

$OTDel_n$=(%)

$Rep_n$=(%)

$Inv_n$=(%)

Table 4.:Quality indicators

| Symbol | Indicator | Definition |
|---|---|---|
| $Rec_n$ | Recieving accuracy | Pallets unloaded without incidents |
| $Pick_n$ | Picking accuracy | Number of orders picked correctly per orders picked |
| $Sto_n$ | Storage accuracy | Storing products in proper locations |
| $OTDel_n$ | On time delivery | Number of orders received on or before committed date |
| $Rep_n$ | Replenishment accuracy | Correct movement of products from storage area to forward pick area |
| $Inv_n$ | Physical inventory accuracy | The physical counts of inventory agree with the inventory status reported in the database |

Project is funded by the European Commission, Erasmus +.

## Title of Calculating and Assessing KPIs of a Logistics Warehouse

- Some of the analyzed KPIs were presented in the following equations

Pallets In=$\frac{PI_n}{PI_{n-1}} \cdot 100$

Pallets Out=$\frac{PO_n}{PO_{n-1}} \cdot 100$

Pallets Stocks=$\frac{PS_n}{PS_{n-1}} \cdot 100$

Table 5.: KPI goals

| KPI | Limit | Real Situation |
|---|---|---|
| Pallets In | 145% | 185% |
| Pallets Stock | 130% | <130% |
| Pallets Out | 154% | 172% |
| Pallets CrossDocking | 140% | 160% |

Pallets CrussDocking=$\frac{PCD_n}{PCD_{n-1}} \cdot 100$

- PIn, PSn, POn, PCDn represents the month under consideration reflected in the number of pallets in the current year n;
- PIn-1, PSn-1 POn-1 PCDn-1 represents the month under consideration reflected in the number of pallets in the previous year. The most satisfactory situation for the company would be to achieve 20% more than expected, goals for each indicator have been defined in table 5.

Project is funded by the European Commission, Erasmus +.

TM3

WAREHOUSE ANALYSIS

Unit 2: Use of Warehouse Management System

September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

## Proper use of Warehouse Management System

- Understand basic warehouse processes
- Basic arhitecture of WMS
- Connection between the WMS features with the warehouse processes activities
- WMS features in warehouse process
- WMS data input

Project is funded by the European Commission, Erasmus +.

## Proper use of Warehouse Management System

- Warehouse processes are important feature of warehousing systems on which depends functioning of the whole system.
- Basic operations occurring within the warehouse are the following: receiving, put-away, order picking and shipping.
- Receiving:
  - The goods arrive at the warehouse by a certain means of transport (e.g. a truck) or by an internal transport vehicle (if it is a production warehouse).
  - During this process, the goods will be inspected and any exceptions noted
  - receiving accounts for only 10% of operating costs in a typical warehouse, but it is supposed to be reduced by use of RFID

Project is funded by the European Commission, Erasmus +.

## Proper use of Warehouse Management System

- Storage:
  - Before product can be storaged, an appropriate storage location must determined.
  - Products locations in the warehouse are predefined or random. Utilizing predefined locations (fixed locations) implicates designating a specific location for a particular SKU. The random location is as it states, where the products are placed in the most efficient slot available.
  - Storage accounts for about 15 % of warehouse operating expenses.

Project is funded by the European Commission, Erasmus +.

## Proper use of Warehouse Management System

- Order picking:
  - After receipt of a customer order the warehouse worker must perform checks such as verifying that inventory is available to ship.
  - Then the warehouse worker must produce pick lists to guide the order picking. Fina must produce any necessary shipping documentation and schedule the order pickin, and shipping. These activities are typically accomplished by a warehouse management system (WMS), a large software system that coordinates the activities of the warehouse.
  - Order picking itself may be further broken in 6 activities (traveling, searching, extracting, paperwork and other activities).
  - Differentiate order picking methods, such as: single-order picking, batching with sort-while-pick, batching with sort-afterpick, sequential zone picking with single order, sequential zone picking with batching, concurrent zone picking without batching in the zones, and concurrent zone picking with batching in the zones.
  - Order picking process accounts for about 55 % of warehouse operating costs.

Project is funded by the European Commission, Erasmus +.

## Proper use of Warehouse Management System

- Shipping:
  - Last process amongst warehouse processes.
  - A worker positions goods into the transportation vehicles and they are transported.
  - Shipping generally handles larger units than picking, because packing has consolidates the items into fewer containers (cases, pallets).
  - Shipping accounts for about 20 % of warehouse operating expenses.

Project is funded by the European Commission, Erasmus +.

## Proper use of Warehouse Management System

- Most popular programs for warehouse management are ERP (Enterprise resource planning) and WMS (Warehouse management system).
- ERP is business process management software that allows an organization to use system of integrated applications to manage the business and automate many back-office functions related to technology, services and human resources.


Project is funded by the European Commission, Erasmus +.

## Proper use of Warehouse Management System

- WMS (Warehouse management systems) is usually connected with ERP and it brings new value to data and connects ERP with warehouse.
- WMS is software and processes that allow organizations to control and administer warehouse operations from the time goods or materials enter a warehouse until they move out.
- Operations in a warehouse include inventory management, picking processes and auditing.


Project is funded by the European Commission, Erasmus +.

## Proper use of Warehouse Management System

- WMS include:
  - Main PC,
  - WMS server,
  - PC and other warehouse equipment.

Project is funded by the European Commission, Erasmus +.

## Proper use of Warehouse Management System

- The WMS system is based on a structured data on a particular item, most commonly defined as master data.
- Benefits of Integrated Master Data Management:
  - increased operational efficiency,
  - an improved decision-making process,
  - increased customer confidence,
  - reducing out-of-stock cases,
  - facilitated traceability
  - improved storage space utilization.

Project is funded by the European Commission, Erasmus +.

## Proper use of Warehouse Management System

- Reasons for introducing WMS to warehouse operations:
  - labor costs reduction,
  - accelerating warehouse processes,
  - more efficient utilization of warehouse space,
  - increasing the accuracy of goods delivery,
  - inventory records increase the accuracy,
  - total inventory level reduction.

Project is funded by the European Commission, Erasmus +.

## Proper use of Warehouse Management System

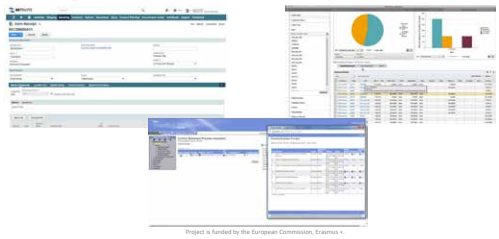

Project is funded by the European Commission, Erasmus +.

## Proper use of Warehouse Management System

- The most famous WMS systems in the world:
  - NetSuite Warehouse and Order Fulfillment
  - Oracle WMC
  - IBM Sterling WMS

Project is funded by the European Commission, Erasmus +.

## Proper use of Warehouse Management System



Project is funded by the European Commission, Erasmus +.

Thank you for your attention

September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

**TM3**
WAREHOUSE ANALYSIS

Unit 3: Preparing an order

September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

## Preparing an order

- Understanding warehouse documentation
- Procedures for completing the documentation
- Use of warehouse documentation
- Warehouse procedures
- Procedures for completing the documentation

Project is funded by the European Commission, Erasmus +.

## Preparing an order

- Documentation in warehouse:
  - User order – order form
  - Pick list
  - Report for update pick locations
  - Bill of lading
- User sends the order to the purchasing department
- The purchasing departmant check inventory and approve the order
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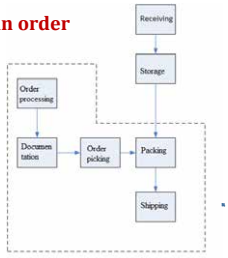
Project is funded by the European Commission, Erasmus +.

## Preparing an order




Project is funded by the European Commission, Erasmus +.

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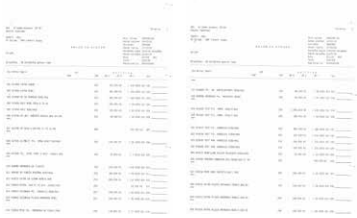

Project is funded by the European Commission, Erasmus +.

## Preparing an order

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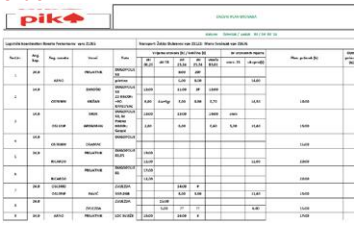
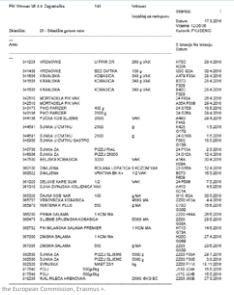



Project is funded by the European Commission, Erasmus +.

## Preparing an order

Report for update pick locations



Project is funded by the European Commission, Erasmus +.

## Preparing an order

Pallet label


Project is funded by the European Commission, Erasmus +.

## Preparing an order

The document for the receiving of goods in the warehouse from manufactory

Project is funded by the European Commission, Erasmus +.

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Repatriate

Project is funded by the European Commission, Erasmus +.

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Receiving between warehouse

Project is funded by the European Commission, Erasmus +.

## Preparing an order

Shipping from warehouse
to another warehouse

Project is funded by the European Commission, Erasmus +.

## Preparing an order

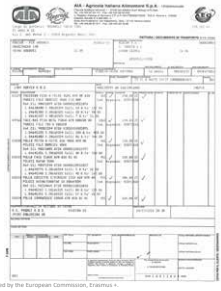
Order picking list


NALOG ZA KOMISIONIRANJE

Project is funded by the European Commission, Erasmus +.

## Preparing an order

Bill of lading



Project is funded by the European Commission, Erasmus +.

## Preparing an order

Bill of lading

Project is funded by the European Commission, Erasmus +.

**TM3**
WAREHOUSE ANALYSIS

Unit 2: Using methods/techniques for the optimization of the warehouse operations

September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

## Using methods/techniques for the optimization of the warehouse operations

- Effective layout for a certain type of warehouse
- Efficient warehouse systems for a certain kind of goods
- Available storage space within warehouse

Project is funded by the European Commission, Erasmus +.

## Using methods/techniques for the optimization of the warehouse operations

- There is a certain number of warehouse categorization, for example categorization depending on type of stored goods and offered services.
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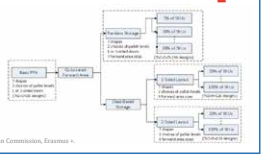

Project is funded by the European Commission, Erasmus +.

## Using methods/techniques for the optimization of the warehouse operations

- Decision of picking space is crucial. Picking locations are located on a lower level of central row storage rack.
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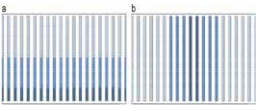
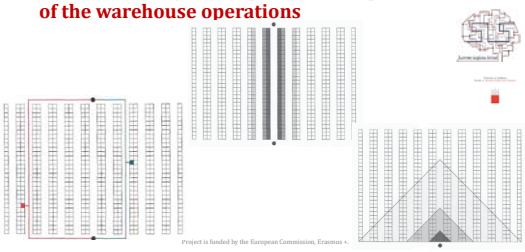


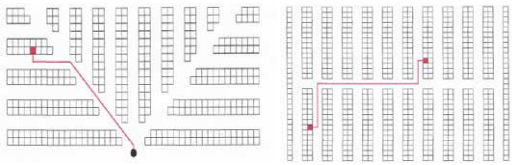

Project is funded by the European Commission, Erasmus +.

## Using methods/techniques for the optimization of the warehouse operations



Project is funded by the European Commission, Erasmus +.

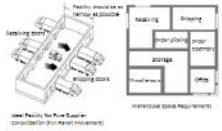
## Using methods/techniques for the optimization of the warehouse operations



Project is funded by the European Commission, Erasmus +.

## Using methods/techniques for the optimization of the warehouse operations

- Warehouses may differ in several criteria, and one of the most important is storage of goods. The entire warehouse space is not used for storage, there are passages, space for labelling, etc. It is divided 70/30, that is 70% of warehouse space is intended for storage and 30% for all other activities.

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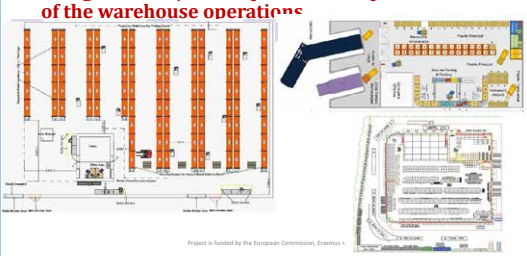
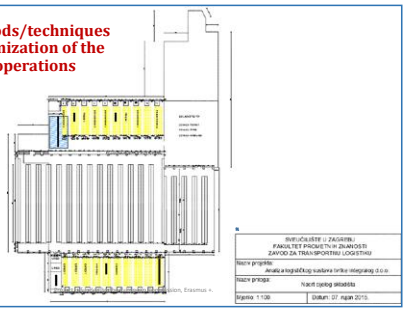


Project is funded by the European Commission, Erasmus +.

**Using methods/techniques for the optimization of the warehouse operations**



**Using methods/techniques for the optimization of the warehouse operations**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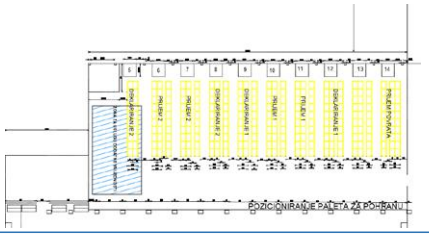


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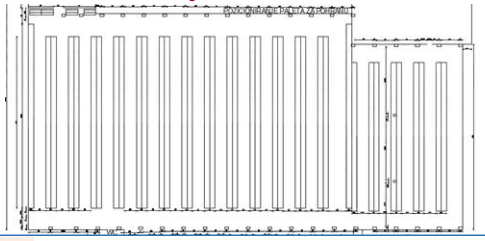

## Using methods/techniques for the optimization of the warehouse operations


Project is funded by the European Commission, Erasmus +.

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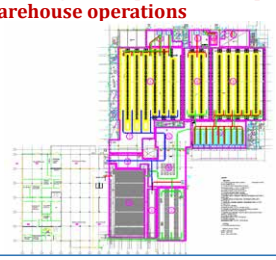

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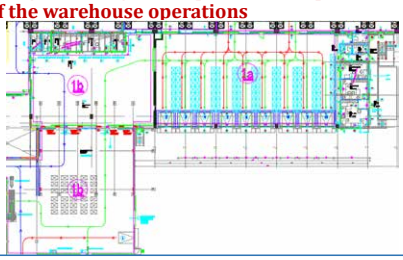


Thank you for your attention

September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

**TM3**
WAREHOUSE ANALYSIS

Unit 3: Preparing an order

September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

## Preparing an order

- Understanding warehouse documentation
- Procedures for completing the documentation
- Use of warehouse documentation
- Warehouse procedures
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## Preparing an order

- Documentation in warehouse:
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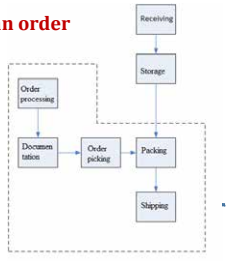


Project is funded by the European Commission, Erasmus +.

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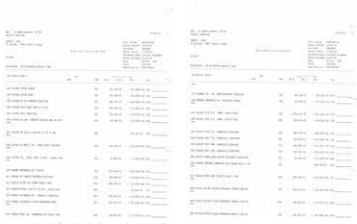

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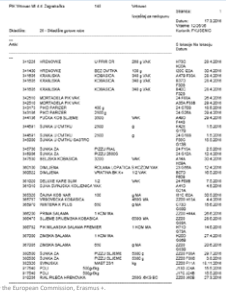
## Preparing an order

Report for update pick locations



Project is funded by the European Commission, Erasmus +.

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Pallet label


Project is funded by the European Commission, Erasmus +.

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The document for the receiving of goods in the warehouse from manufactory

Project is funded by the European Commission, Erasmus +.

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Project is funded by the European Commission, Erasmus +.

## Preparing an order

Shipping from warehouse
to another warehouse

Project is funded by the European Commission, Erasmus +.

## Preparing an order

Order picking list


NALOG ZA KOMISIONIRANJE

Project is funded by the European Commission, Erasmus +.

## Preparing an order

Bill of lading

Project is funded by the European Commission, Erasmus +.

## Preparing an order

Bill of lading

Project is funded by the European Commission, Erasmus +.

**TM3**
WAREHOUSE ANALYSIS

Unit 4: Using methods/techniques for the optimization of the warehouse operations

September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

## Using methods/techniques for the optimization of the warehouse operations

- Effective layout for a certain type of warehouse
- Efficient warehouse systems for a certain kind of goods
- Available storage space within warehouse

Project is funded by the European Commission, Erasmus +.

## Using methods/techniques for the optimization of the warehouse operations

- There is a certain number of warehouse categorization, for example categorization depending on type of stored goods and offered services.
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- After studying warehouse design methodology, most follow next steps:
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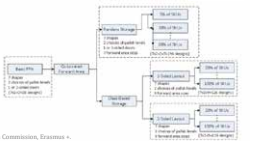

Project is funded by the European Commission, Erasmus +.

## Using methods/techniques for the optimization of the warehouse operations

- Decision of picking space is crucial. Picking locations are located on a lower level of central row storage rack.
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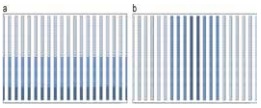
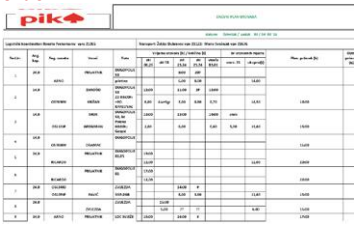



Project is funded by the European Commission, Erasmus +.

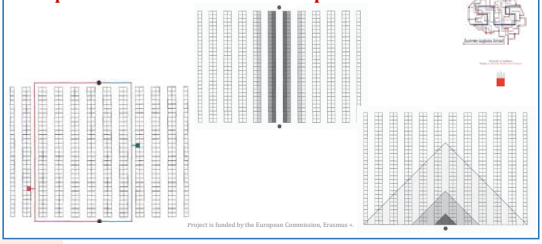
## Preparing an order

Loading schedule



Project is funded by the European Commission, Erasmus +.

## Using methods/techniques for the optimization of the warehouse operations



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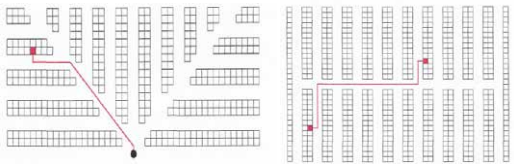
## Using methods/techniques for the optimization of the warehouse operations



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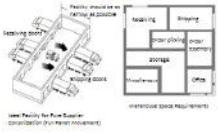


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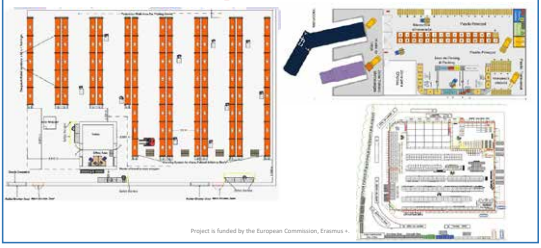

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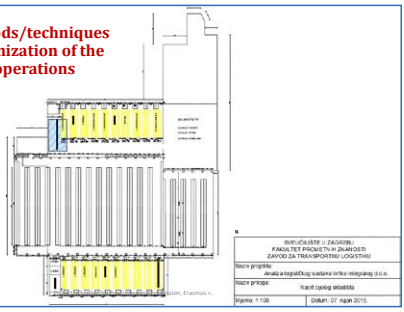

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**Using methods/techniques for the optimization of the warehouse operations**


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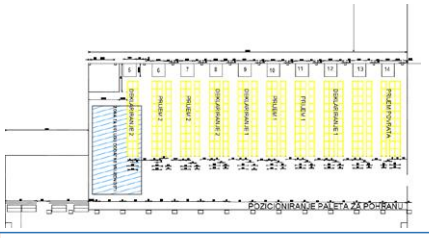


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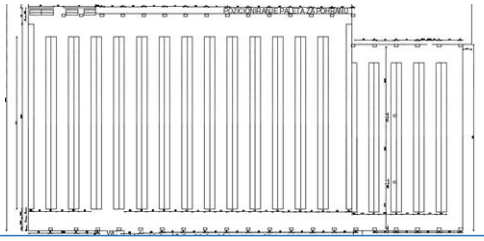


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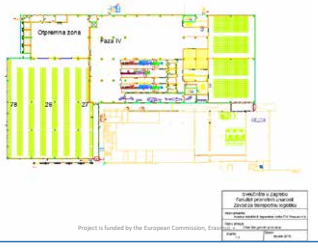

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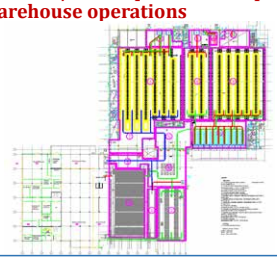

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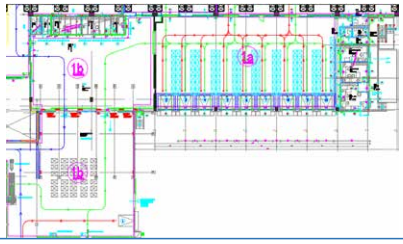



Thank you for your attention

September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

Notes:

# TM5: Key soft skills

**Date:** 12 September, 2019

**Units & lecturers:**

| Unit title | Trainers | Classroom |
|---|---|---|
| **Unit 1:** Managing stress | Mojca Poredoš | 206 |
| **Unit 2:** Time management and prioritising | | |
| **Unit 3:** Managing changes | | |

**Observers:** Sarah Koneke & Bojan Beškovnik

Erasmus+

September 2019, Portorož, Slovenia

**TM5**
KEY SKILLS

Unit 1: Managing stress

Project is funded by the European Commission, Erasmus +.

## What you will learn today?

Erasmus+

- **What is stress?**
- **Causes of stress→What is a stressor?**
- **Consequences of stress → What happens when we are stressed?**
- **Coping with stress → What can we do to reduce stress?**

Project is funded by the European Commission, Erasmus +.

## First, let's play a game…

**Form pairs. Count to three by each individual saying one number. Count <u>as fast as possible!</u>**

**a) Change number 1 for a clap.**

**b) Change number 3 for a snap with fingers.**

**c) Change number 2 for a kick against the flor.**

→How did it go?

→How did you feel while playing this game?

→Can you describe any special sensation in your body?

→What did you think about?

→How did you start to behave?

Project is funded by the European Commission, Erasmus +.

## What is stress?

Erasmus+

- **= emotional, behavioral, psychological or physical reaction to any change that requires an adjustment or response**
- **Positive → also eustress**
  - Normal part of life
  - Desired, beneficial
  - Keeping us alert, motivated, and ready to avoid danger→slightly pushed (challenged), but not overwhelmed
- **Negative→ also distress**
  - A feeling of strain and pressure
  - Unable to adapt to stressor or use maladaptive behaviors
  - Can increase the risk of strokes, heart attacks, ulcers, mental illnesses (e.g., anxiety, depression, panic attacks) and inappropriate social interaction (e.g., aggression, passivity, or withdrawal)

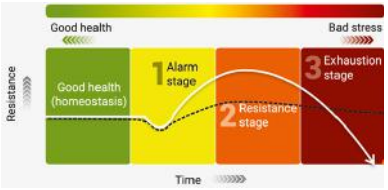
Project is funded by the European Commission, Erasmus +.

## General adaptive syndrome

- **The alarm stage**
  - "fight or flight response„ →increase energy levels, increase muscle tension, reduce sensitivity to pain, slow down the digestive system, and cause a rise in blood pressure
  - the hypothalamic-pituitary-adrenal axis and sympathetic nervous system are activated→cortisol, adrenaline (epinephrine), and norepinephrine are released
- **The stage of resistance**
  - building up resistance, until the problem is solved or the body's resources are depleted→psychosomatic disorders first begin to appear
- **The stage of exhaustion**
  - The body is drained→anxiety, irritability, withdrawal, self-destructive behavior, poor judgment, poor memory, health problems

Project is funded by the European Commission, Erasmus +.

## General adaptive syndrome




Project is funded by the European Commission, Erasmus +.

## Causes of stress

- **Stressor=any event, experience, or environmental stimulus that causes stress in an individual (context, perceiving situation!)**
- **Physical/task stressors** (noise, heat, workload, number of working hours etc.)
- **Psychological stressors** (lack of control, predictability, interpersonal conflict, role stressors, work-family conflict etc.)

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## Causes of stress

- **Crises/catastrophes** →unforeseen, unpredictable, out individual's control (e.g., natural disasters, illness, accidents)
- **Major life events** →positive or negative, a sense of uncertainty and fear (e.g., retirement, moving home, pregnancy, becoming a parent, marriage, divorce, uncertainty or waiting for an important outcome)
- **Microstressors**→daily annoyances and minor hassles (e.g., making decisions, meeting deadlines, traffic jams, job issues, lack of time or money)
- **Ambient stressors**→global low-grade stressors that are a part of the background environment (e.g., excessive noise, overcrowding, pollution)

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## Consequences of stress

- **Behavioral consequences** (intimation processing, poor decision making, job performance, absence, lateness, accidents, compulsive use of substances or behaviors trying to relieve stress, grinding teeth, food cravings and eating too much or too little)
- **Psychological consequences** (anger, concentration issues, fatigue, a feeling of insecurity, forgetfulness, irritability, restlessness, sadness, dissatisfaction, burnout, depression, anxiety, sleep problems, panic attacks, suicide)
- **Physiological consequences** (cardiovascular disease, gastrointestinal outcomes, back pain, muscle tension in neck, face or shoulders, headaches, sexual dysfunction, biochemical outcomes, racing heart, cold and sweaty palms, sweating, trembling/shaking, weight gain or loss)

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## What can we do to reduce stress?

- **Stress management:**
  - **Problem-focused coping (defining the problem, generating different solutions)**
    - Time management
    - Planning and decision making (prioritizing, make time for hobbies and interests)
    - Being assertive (setting appropriate limits, saying *No*)*
    - Seeking different solution to the problem*
    - Healthy living (regular exercise, healthy, well-balanced meals, enough rest and sleep)
  - **Emotion-focused coping**
    - progressive muscle relaxation*,
    - mindfulness*,
    - deep breathing, visualization, relaxation techniques*,
    - writting your worries,
    - humor,
    - keeping a positive attitude and accepting events that one cannot control,
    - social support, spending time with family and/or friends, talking about problems
- **Find your own de-stressor!**

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## References


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- Cameron, E., & Green, M. (2015). Making sense of change management: A complete guide to the models, tools and techniques of organizational change. Kogan Page Publishers.
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**TM5**
KEY SKILLS

Unit 2: Time management and prioritizing
September 2019, Portorož, Slovenia

Project is funded by the European Commission, Erasmus +.

## What you will learn today?

- What is time management?
- Prioritizing
- Techniques of prioritizing
- Identifying distractors and "little tricks" of time management

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## Let's first watch something...

- https://www.youtube.com/watch?v=arj7oStGLkU

- What is the video about?
- How would you describe procrastination?
- Do you also procrastinate? What behaviors do you use?
- Why is procrastination problematic?
- What is the consequence of procrastination?

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## What is time management?

- = developing plan of action for a job with many demands.
- = the process of planning and exercising conscious control of time spent on specific activities, especially to increase effectiveness, efficiency, and productivity (and reduce stress).

- Useful in private life and in work life.

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## Prioritizing and goal setting

- Prioritizing = arranging activities in order of importance relative to each other.
- Aids in the rationale and justification for the use of limited resources (←TIME).

- Goal = something you want to achieve.
  - Long-term (vision) vs. Short-term (motivation)
  - Achieving goals raises self-confidence → you recognize your own ability and competence in achieving the goals that you've set

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## Wheel technique

- **identification of important life fields, definition of current state and desired state**

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## SMART goals

- **How are you going to reach your „desired state"? →SMART goals**

- **S – specific:** only one desired outcome
- **M – measurable:** indicator of success (date, percent)
- **A – attainable:** is it possible to achieve the goal in available time, space and recourses
- **R – relevant:** *Do I really want to achieve it?*
- **T – time based:** *When will I achieve it?*

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## The Eisenhower method: Urgency – importance matrix

- **We sort each activity on two dimensions:**
  - **Urgency → urgent vs. Not urgent**
  - **Importance → important vs. unimportant**

- **4 possible combinations:**
  - **Urgent and important→** should be done immediately and personally
  - **Urgent but unimportant →** should be done immediately, but can be delegated (spend as little time as possible for it)
  - **Not urgent but important →** set a date and do it personally (80% of our time)
  - **Not urgent and unimportant→** can be dropped

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## The Eisenhower method: Urgency – importance matrix

| | Urgent | Not urgent |
|---|---|---|
| **Important** | | |
| **Unimportant** | | |

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## Time management

- **Identify distractors→** excessive socializing, excessive use of social media?
- **Plan: daily, weekly,** (monthly, yearly)
  - To-do = task list → an inventory tool; serves as an alternative or supplement to memory
  - + combining to-do's with Eisenhower Method
- **"Little tricks" of time management**
  - Most important tasks in the morning
  - Reserve time for important tasks (e.g., Monday, from 9h – 11h)
  - Set time limits and plan rest (e.g., POMODORO: 25 min work + 5 min rest)
  - Habits (e.g., each evening at 19:00)
  - Following your own progress
  - Organize your environment!

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## References


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**TM5**
KEY SKILLS

Unit 3: Managing changes

September 2019, Portorož, Slovenia

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## What you will learn today?

- **What is organizational change?**
- **Barriers to change**
- **Change management**
- **Developing collaboration skills**
- **Personal development and continuous training (I DO ARRT principle)**
- **Final goal: business agility and flexibility**

Project is funded by the European Commission, Erasmus +.

## What is organizational change?

"The only thing that is constant is change." Heraclitus

- **Types of change** ←Understanding the nature of the change you wish to effect and the context in which you are working are important in determining an appropriate strategy.
  - **Planned** (= deliberate, a product of conscious reasoning and actions) **or emergent** (=spontaneous, unplanned; as a consequence of other decisions)
  - **Developmental** (= enhances or corrects existing aspects of an organization; improves a skill or process), **transitional** (=wants to achieve a known desired state that is different from the existing one; episodic, planned and second order, or radical) **or transformational** (= it's radical; requires a shift in assumptions made by the organization and its members; results in an organization that differs significantly in terms of structure, processes, culture and strategy) **(Ackerman, 1997)**
  - **Episodic** (=infrequent, discontinuous, intentional; radical; replacement of one strategy or program with another) **or continuous** (= ongoing, evolving, cumulative; incremental; people constantly adapting and editing ideas they acquire from different sources) **(Weick & Quinn, 1999)**

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## Barriers to change

- **Structural inertia**→ The tendency of a mature organization to continue on its current trajectory.
  - **Resource rigidity** (= unwillingness to invest; no motivation to change) + **Routine rigidity** (= an inability to change the patterns and logic that underlie those investments)
- **Work group inertia**→ The individuals resist change because the work group to which they belong resists it. The degree and force of resistance will depend upon how loyal one is to the group and how effectively group resists the change.
- **Threats to power** → Most changes have the capacity to disrupt the organization's power structure.
- **Prior unsuccessful change efforts**

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## Change management

- **= a collective term for all approaches to prepare, support, and help individuals, teams, and organizations in making organizational change.**
- **= the discipline that guides how we prepare, equip and support individuals to successfully adopt change in order to drive organizational success and outcomes.**
- **= the set of steps followed by a team member on a particular project or initiative**
  - Preparing for change (readiness assessments and formulation of a strategy)
  - Managing change (integrating the project plan)
  - Reinforcing change

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## Change management

- **Individual change management:**
  - Understanding how people experience change and what they need to change successfully.
  - Understanding people's reaction to change→ resistance to change because of economic fear, fear of the unknown, fear of altered social relationships.
  - How to overcome resistance? Build awareness, desire, knowledge and ability for change, and reinforce the change.
- **Organizational change management**
  - Identifying the need for change.
  - Preparing a plan→ in what ways people/process will need to change.
  - Creating a customized plan for ensuring impacted employees receive the awareness, leadership, coaching, and training they need in order to change successfully.

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## Planning a change: SWOT technique

- **SWOT technique will help you prepare a plan by focusing on important internal and external factors, which can help or harm your plan**

- **S – strengths** } **internal factors**
- **W – weaknesses** }
- **O – opportunities** } **external factors**
- **T – threats** }

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## SWOT technique

| | Helpful factors | Harmful factors |
|---|---|---|
| Internal factors | **Strengths** → Which of my traits may help me reach this change? | **Weaknesses** → Which of my traits could be problematic? |
| External factors | **Opportunities** → What can I use to reach this change? What/who can help me? | **Threats** → What can present as a problem? |

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## Collaboration skills: Active listening

- Better communication skills will **improve collaboration and team work**
- **Active listening** → key part of effective communication; it enables better understanding of the other person
- **Exercises for active listening:**
  - **being present in the moment and focused on the other person:**
    - What should you do vs. what you shouldn't do during a conversation?
    - For 3 minutes focuse only on your thoughts, feelings and body.
  - **summarizing:**
    - In one sentence summarize what your partner told you. Use a question instead of a affirmation. It may help, if you start with: *If I understood you correctly, ... or Do you want to say, ...*
  - **paraphrasing:**
    - Repeat what your partner told you using different words, try using a metaphor and synonym.
  - **asking questions;**
    - Form open ended questions using word like *Who, What, How, When, Where, What was it like?*

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## Collaboration skills: Giving feedback

- **Choosing the right time:**
  - Is the person ready to receive your feedback? Is one of you in a hurry? Is one of you facing strong emotions? Do you have enough energy for this conversation?
- **Choosing the right space:**
  - Are you alone? Never give feedback in public or in front of friends or family members.
  - Does he/she feel save in the space you have chosen?
- **What is your intention? What do you want to achieve?**
  - Keep in mind you are not necessary right and you don't know what is best for this person.
  - Feedback should not be a way to show your power.
- **Focus on behavior (not on personality).**
- **Tell how you felt during/because of his/her actions** (*I was hurt by your words.* Or *I had to stay longer, which made me angry.*)
- **Give example of desired behavior.**
- **Invite him/her to explain his/hers behavior or/and give comment on your feedback.**

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## Personal development

- Based on personal results we will prepare a personal development plan: **principle I DO ARRT**
- **I – intention** (Why?): what you want to achieve, where you want to go, what do you want to focus on, a general vision
- **DO – desired outcomes** (What?): what specifically you want to achieve, what are your goals, what do you want to know/have/feel
- **A – agenda:** how you will reach your goals, what has to happen, which activities should take place
- **R – rules:** what rules you will have to take into account
- **R – roles** (Who?): What will be the role of different people? What will be your role in the process?
- **T – time:** Time frame

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## Final goal: Business agility and flexibility

- **Business agility =** ability of a business system to rapidly respond to change and adapt to market and environmental changes in productive and cost-effective ways.
  - Strives to make change a routine part of organizational life.
- **Flexibility =** an ability to quickly adapt to change; accepts change as an inevitable part of the business environment

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