

Port and logistics simulator concept

Steyr, 30 July 2014

WP 4: Danube school ship and simulator strategy

Act. 4.4: Simulator training for reach stackers and cranes

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Alexandra Haller	19.05.2014	0.2 draft
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1. Introduction and Methodology

1.1 Introduction

The demand for better preparation of port workers for manoeuvring transshipment vehicles and the demand for fundamental understanding of the overall logistics/transshipment processes can also be coped with the application of simulation tools that offer “simulated” practical experience in training and education activities. Simulation tools for training can be an appropriate education method when it is too expensive or risky to allow employees to learn in the practical environment. Thus, employees can experiment, make mistakes and learn in a virtual and save environment without fearing to cause expenses through possible mistakes.

In order to identify the requirements for a port and logistics simulator for reach stackers and cranes in the Danube Region to simulate transshipment processes a survey was conducted. As cranes and reach stackers are only in use at container terminals, mainly container terminals were questioned. The survey is part of the project HINT and aims to identify the demand for port vehicle simulators within the eight participating Danube countries.

To reach this aim it was necessary to:

- Identify the demand for port vehicle simulator training
- Identify how training for operating port vehicles is currently performed
- Identify the interest of involved partners in buying and operating a port vehicle simulator

Based on the evaluated demand within the survey a technical concept and business study for the simulation of transshipment vehicles will be developed, covering national and transnational demands. Once technical and training aspects are clearly defined, the concept will thereby focus on estimated costs for the implementation of such simulators.

1.2 Methodology

To reach the just presented objectives a questionnaire was conducted and sent to our project partners with the request to interview different terminals and companies within their countries. Since transshipment vehicles such as reach stackers and portal cranes are only in use at container terminals, particularly container terminals with access to waterways are relevant. Based on a research on Danube Blue pages, container terminals were selected and proposed to all involved partners.

As you can see within Annex I the questionnaire was structured into two main parts:

- **Current situation at the port**
- **Demand for simulator training**

1.1.1 Current situation at the port

The first part was about the current situation at the port. Within this first part the goal was to find out:

- How many cranes and reach stackers are in use;
- How many people work with them;
- How these employees currently were trained to use these transshipment vehicles;
- By whom they were trained and
- If simulators were used for training.

1.1.2 Demand for simulator training

The aim of part two was to evaluate if there is a demand for simulator training.

Within this part it was asked:

- If the port operators would send their employees to simulator training;
- How long the accepted travelling would be;
- How much they would pay for such training;
- Which competences should be trained and
- If they could imagine buying and operating a simulator themselves.

1.1.3 Questionnaire evaluation

Within the questionnaire some questions had to be filled out others had specified options to answer. It was possible to choose more than one answer. As some questions were not answered the total sum was not always 23.

When a volume range was filled in within the questionnaire the average value was taken. Thus, the overall results represent average values. Within the most questionnaires the training duration was filled out in hours, only a few have chosen days as time unit. To make a standardized interpretation possible an average value of 8 hours a day was taken.

2. Status quo

2.1 Overview of all countries

2.1.1 Project partners responsible for interviews and interview partners

Project Partner	Responsible Person	Interview Partner
BME (Hungary)	Csaba Hargitai	Port of Budapest, Hungarian Federation of Danube Ports
FPZ (Croatia)	Katarina Mostarac	Port Osijek, Port Vukovar
KVD (Slovakia)	Andrej Dávid	Port of Bratislava, Port of Komarno
SBBH (Serbia)	Tanja Djokic	Port Feranex, Port Pancevo, Port Novi Sad, Port Tomitrade
CER (Romania)	Ghiuler Manole	Port Bazinul/UPIR, A.A.O.P.F. Romania, SC Romanel, Galati Harbour/Damen Shipyard, Hercules SA
RUSE (Bulgaria)	Asen Tsvetanov Asenov	Port Belene, Port Somovit, Port Ruse, Port Svishtov, Port Silistra
EH (Austria)	Karin Kainzinger	Ennschafen, Port of Vienna, Port of Linz
ONMA (Ukraine)	Igor Gladkykh	no responses

Figure 1: Project and interview partners

In total 23 questionnaires from seven different countries were evaluated.

2.1.2 Current situation at the port

Reach Stackers

- In total 203 reach stackers are used by the interviewed terminals
- In total 327 people work on reach stackers at the interviewed terminals
- 8 terminals stated that employees are trained at the company's reach stackers through colleagues
- 8 terminals stated that employees are trained by specialized training companies
- Only 3 answered to hire only people with previous knowledge
- NO reach stacker simulators are used for training

Cranes

- In total 259 cranes are used by the interviewed terminals
- In total 342 people work on cranes at the interviewed terminals
- 7 terminals stated that employees are trained at the company's reach stackers through colleagues
- 13 terminals stated that employees are trained by specialized training companies
- 8 answered to hire only people with previous knowledge
- NO reach stacker simulators are used for training

2.1.3 Demand for simulator training

- 13 of 21 ports stated in its questionnaire that they would send its employees to simulator training for reach stackers, 2 ports are not interested and 6 ports do not work with reach stackers.
- 15 of 21 ports stated in its questionnaire that they would send its employees to simulator training for cranes.

- Around 1/3 each would accept a journey of
 - maximal 1 hour (7 ports),
 - a journey between 1 and 3 hours (6 ports)
 - and more than 3 hours (4 ports)for their employees to reach the simulator training
- 14 ports would pay up to 500 Euros for simulator training; no port is willing to pay more.
- The ports consider an average training duration of 11 hours as reasonable, whereby a wide range between 4 and 20 hours within the countries was noted.
- 2 ports each could imagine to buy and operate a simulator:
 - to train their own employees (Port Novi Sad, Port Vienna)
 - to train their own employees and external people for money (Port Complex Ruse and Port Pancevo)
- 17 ports cannot imagine to buy and operate a simulator for training.

2.1.4 Requested competences

The requested competences were quite balanced, 18 ports would be interested in simulator training on the operation of vehicles, 15 ports request that safety issues should be taught, 14 ports are interested in the technical background of vehicles and only eight ports in environmental issues such as fuel savings, tyre preserving or driving manners.

2.2 Hungary

Partner responsible for interviews:	Csaba Hargitai, BME
Interview partners:	<ol style="list-style-type: none"> 1. Port of Budapest 2. Hungarian Federation of Danube Ports

Figure 2: Hungarian project and interview partners

In total about 96 reach stackers are used in Hungary. These reach stackers are operated by 189 people.

In contrast only about 34 cranes are used by the interview partners, operated by 69 people.

The training for reach stackers as well as for cranes in Hungary is divided in two parts: The employees get their theoretical knowledge by specialized training companies. The practical training took place at the company's reach stacker under control of their colleagues.

Crane and reach stacker simulators are not in use for training.

Depending on the price and other circumstances the interviewed partners could imagine sending their employees to specific crane and reach stacker trainings on simulators.

They would accept a journey of maximum one hour (Port of Budapest) or rather between one and three hours (Hungarian Federation of Danube Ports).

In the corresponding opinion of both interview partners a training duration of one day would be reasonable. They would therefore be willing to pay up to 500 Euros per person for the whole day fee.

With regard to contents the Hungarian interview partners would be interested in all suggested areas: in the operation of vehicles, the technical background of vehicles, environmental issues such as fuel savings or tyre preserving driving manners and in safety issues. One interview partner (Port of Budapest) noted that the different trainings of competences should not be organized in one training event.

Both interviewed partners could not imagine buying and operating a simulator for training themselves.

2.3 Croatia

Partner responsible for interviews:	Katarina Mostarac, FPZ
Interview partners:	3. Port Osijek 4. Port Vukovar

Figure 3: Croatian project and interview partners

As no reach stackers are in use at the interviewed Croatian ports all results refer to cranes. In total ten cranes are in use at the Croatian ports. 19 people are working on these cranes, in total. To be able to operate the cranes the employees are trained by specialized training companies. No crane simulators are thereby in use.

The port of Osijek has no interest in sending its employees to specific training for cranes on simulators. Thus, the following results only refer to the port of Vukovar who would be basically interested in sending its employees to specific training for cranes on simulators.

Thus, there is only a potential demand for simulator training of persons (currently 12) working at the four cranes at the port of Vukovar.

The port of Vukovar would even be prepared to accept a journey of more than three hours and considers a training duration of at least four hours as reasonable. The interview partner would be willing to pay up to 500 Euros per day for it.

The ports prior interest for its employees is to raise knowledge on the topics of operating the cranes and in safety issues.

However, the Port of Vukovar is not able or/and willing to buy and operate a simulator for training.

2.4 Slovakia

Partner responsible for interviews:	Andrej Dávid, KVD
Interview partners:	5. Port of Bratislava 6. Port of Komarno

Figure 4: Slovakian project and interview partners

The results of the two interviewed ports in Slovakia differ a lot so a separation was appropriate.

Port of Komarno:

At the port of Komarno no reach stackers are in use. However six persons are operating the seven cranes at the port.

Either persons with previous knowledge are employed or people are trained at the company's cranes through colleagues. Once a year the employees have to participate at a regular training at the company "Metrans" (global logistics service provider for container transports).

The port is not interested in sending its employees to specific trainings for cranes on simulators.

Port of Bratislava:

At the port of Bratislava six people are operating three reach stackers.

To be able to operate the reach stackers employees are either trained at the company's reach stackers through colleagues or by reach stacker manufacturers.

Additionally the port of Bratislava has 24 cranes operated by 16 employees. The people are trained through colleagues at the company's cranes.

Neither for reach stackers nor for cranes simulators are in use for training.

The port of Bratislava would basically be interested in sending its employees to specific trainings for reach stackers as well as for cranes on simulators.

Therefore, they would accept a journey of more than three hours and training costs of up to 500 Euros per day.

The port considers a duration of eight hours reasonable for the training.

There is a training demand on the operation of vehicles and on its technical background.

2.5 Serbia

Partner responsible for interviews:	Tanja Djokic, SBBH
Interview partners:	<ul style="list-style-type: none"> 7. Port Feranex 8. Port Pancevo 9. Port Novi Sad 10. Port Tomitrade

Figure 5: Serbian project and interview partners

In total 39 reach stackers are operated by around 36 employees at the Serbian ports.

The way they are trained differs within the ports but none of them is using simulators for training. At three ports the employees are trained at the company's reach stackers through colleagues. At one port the employees are additionally trained by the reach stacker manufacturer. At the fourth port employees are solely trained by specialized companies.

Currently 25 cranes are in use at the Serbian ports operated by 28 people.

The training for crane operation differs from how they are trained to operate reach stackers.

Two ports only hire people knowing how to operate cranes. Continuing training is held by specialized training companies. One port trains its employees through specialized companies and at one port employees are trained by specialized companies as well as at the company's cranes through colleagues.

The feedback from the four interviewed Serbian ports was quite positive. All of them are basically interested in specific simulator trainings for reach stackers and for cranes. Two ports each would accept a journey of maximum one hour or a journey between one and three hours. All of them would pay up to 500 Euros per day. Three ports don't know what the reasonable duration of such trainings would be. One port considers ten hours in total (split over five days, two hours each) reasonable.

Two of the interviewed ports could even imagine buying and operating a simulator for training:

Port Pancevo could imagine buying and operating one for its own employees. Port Feranex could imagine buying and operating a simulator for its own employees as well as to offer trainings to external people for money.

The required competences to be trained vary between the ports. While all ports are interested in safety issues two ports are interested in training on the operation of the vehicles, its technical background and in environmental issues such as fuel savings or the tyre preserving driving manners.

2.6 Romania

Partner responsible for interviews:	Ghiuler Manole, CER
Interview partners:*	<ul style="list-style-type: none"> 11. Port Bazinul/UPIR 12. A.A.O.P.F. Romania 13. SC Romanel 14. Galati Harbour/Damen Shipyard 15. Hercules SA

Figure 6: Romanian project and interview partners

*At four Romanian ports the questionnaires were filled out twice. These questionnaires were included into the evaluation only once. There were also no time unit at some Romanian questionnaires as one port specially marked one week as time unit, the values without special mark were evaluated as days.

In total ten reach stackers are in use, most of them (seven) at SC Romanel. No reach stackers are in use at Galati Harbour/Damen Shipyard.

In total 16 persons operate these reach stackers.

At two ports only people with previous knowledge are employed to operate reach stackers whereas at one port each, people are trained at the company's reach stackers through colleagues and by specialized training companies.

The number of cranes used at the Romanian ports is much higher compared to the reach stackers in use. In total 107 cranes are operated by 116 people.

The kind how people are trained to operate cranes is quite balanced. At two ports only persons with previous knowledge are employed and people are trained by specialized training companies. At one port they are trained at the company's cranes through colleagues.

Neither reach stacker nor crane simulators are in use for training.

Four ports are basically interested in sending its employees to specific simulator trainings for reach stackers but the port operating the most reach stackers (SC Romanel) answered this question with no.

In contrast all ports would be basically interested in sending its employees to specific trainings for cranes on simulators.

Two ports would accept a journey of more than three hours, one port would travel between one and three hours and two ports would accept a journey of maximum one hour for its employees to participate at such trainings.

The time the interviewed partners would consider reasonable for such trainings varies widely. Two ports consider a duration between four and five hours reasonable, whereas one port would consider three days and one port five days reasonable for such trainings.

No port would pay more than 500 Euros per day.

Regarding to the content the interviewed partners would be interested in the operation of vehicles, the technical background of vehicles as well as safety issues. Only one port showed its interest on environmental issues.

No Romanian interview partner could imagine buying and operating a simulator for training.

2.7 Bulgaria

Partner responsible for interviews:	Asen Tsvetanov Asenov, RUSE
Interview partners:	16. Port Belene 17. Port Somovit 18. Port Ruse 19. Port Svishtov 20. Port Silistra

Figure 7: Bulgarian project and interview partners

In total 26 people are operating 34 reach stackers at the questioned Bulgarian ports. At two ports no reach stackers are in use.

At all ports using reach stackers people are trained at the company's reach stackers through colleagues or by specialized training companies.

All ports are using cranes. In total 47 cranes are operated by 52 employees. The training situation is identical with the reach stacker training: people are trained at the company's cranes through colleagues or specialized training companies.

Neither for reach stackers nor for cranes training simulators are in use.

In contrast to most interviewed partners within the other countries only one port (Port Ruse) would send its employees to specific trainings for cranes and reach stackers on simulators. The four other interviewed partners could also not imagine buying and operating a simulator for training.

The port would accept a journey of maximally one hour, would pay up to 500 Euros per day for training and considers a duration of 20 hours reasonable.

The port would only be interested in simulator training on the operation of vehicles.

Therefore Port Ruse could imagine buying and operating a simulator to train as well their own employees as external people for money.

Yet the other ports would not send its employees to simulator training for reach stackers and cranes two of them would consider 20 hours for such trainings reasonable. In the opinion of three ports the operation of vehicles should be trained as well as safety issues (two ports) and the technical background of the vehicles (one port).

2.8 Austria

Partner responsible for interviews:	Karin Kainzinger, EH
Interview partners:	21. Ennshafen 22. Port Vienna 23. Port Linz

Figure 8: Austrian project and interview partners

In Austria in total 21 reach stackers are operated by 54 employees at the interviewed ports. At two ports people are trained at the company's reach stackers through colleagues. At the port of Vienna only people with previous knowledge are employed, additionally they are taught through colleagues at the company's reach stackers as well as by reach stacker manufacturer. Summarized six cranes are operated by 36 persons.

All Austrian ports only hire people with previous knowledge. Additional knowledge do they learn at the company's cranes through colleagues as well as partially from manufacturer of cranes. Neither for reach stackers nor for cranes simulators are used for training.

All Austrian ports asked would basically be interested in sending their employees to specific trainings for reach stackers as well as for cranes on simulators. 2 ports would accept a journey between one and three hours, one port would maximally drive one hour to get to the training.

They would consider between one and two days as reasonable training duration. No port asked would pay more than 500 Euros per day for the training.

The most important skills trained for the Austrian ports is the operation on vehicles and in contrast to the overall trend environmental issues. Two ports each would also be interested in the technical background of vehicles and safety issues.

The port of Vienna could even imagine buying and operating a simulator for its own employees.

2.9 Ukraine

Partner responsible for interviews:	Igor Gladkykh, ONMS
Interview partners:	no responses

Figure 9: Ukrainian project and interview partners

There was no response or feedback from the Ukraine so no data could be evaluated.

2.10 Summary

	Hungary	Croatia	Slovakia	Serbia	Romania	Bulgaria	Austria
reach stackers	96	-	3	39	10	34	21
employees reach stackers	189	-	6	35,5	16	26	54
cranes	32,5	10	31	22	107	47	6
employees cranes	69	19	22	28	116	52	36
training demand reach stackers	2/2*	-	1/1*	4/4	4/5*	1/3*	3/3
training demand cranes	2/2	1/2	1/2	4/4	5/5	1/4	3/3
duration Ø hours	8	4	8	10	18,25	20	12

Figure 10: Overview survey results

*interviewed partners using reach stacker

3. Concept

3.1 Demand analysis

To get an idea of the potential demand of specialized simulator trainings for reach stackers and cranes we reduced the total number of people operating reach stackers (in total **327**) and cranes (in total **342**) in the first step by the number of people working at ports or companies with no interest in sending its employees to such trainings:

Companies with no interest in simulator training	Nr. of people operating reach stackers	Nr. of people operating cranes
Port Somovit	4	7
Port Svishtov	5	14
SC Romanel	12	*
Port Osijek	-	6
Port of Komarno	-	6
Port Belene	-	1
Port Silistra	-	5
Total	21	39

Figure 11: Overview survey results – container terminals with no interest on simulator training

*SC Romanel has no interest in specific simulator training for reach stackers but a basic interest on simulator training for cranes.

Total number of people operating reach stackers at the interviewed ports 327

People working on reach stackers at companies with no interest in

sending its employees to specific simulator training for reach stackers - 21

Potential target group for reach stacker simulator training

306 employees

Total number of people operating cranes at the interviewed ports	342
People working on cranes at companies with no interest in sending its employees to specific simulator training for cranes	- 39
Potential target group for crane simulator training	303 employees

3.2 Acquisition, location and accessibility

3.2.1 Potential provider/operator of simulator training

As there are currently no specific alternatives in potential simulator operators we concentrated on the ports that could basically imagine buying and operating a simulator for training. So the second step was to get an overview of these ports:

Four of the 21 questioned **interview partners** could basically imagine buying and operating a simulator for training.

However, Port Novi Sad (Serbia) and Port Vienna (Austria) could **only** imagine buying and operating a simulator for training for its **own employees**.

Port Complex Ruse (Bulgaria) and Port Pancevo (Serbia) could imagine buying and operating a **simulator** for training for its own employees and **external people for money**.

As the goal within the concept is a framework for the use of simulator training thus **Port Ruse** and **Port Pancevo** are the two **potential operators** for simulator training. **BUT** as **no reach stackers** are in use at **Port Pancevo** they would probably not offer reach stacker simulator training (details see 3.3)

3.2.2 Accessibility

As 2/3 of the interview partners with a basic interest in sending its employees to specific simulator training would only accept a journey of maximum one hour or between one and three hours it was of high importance to analyse the distance and travel time between the potential operating ports to the interviewed partners with a basic interest in sending its employees to simulator trainings.

The indicated travel times within the following points are approximate values calculated via Google Maps.

As transshipment simulators are very complex and of big size, transporting them within the different ports would be very cost intense and not profitable. This alternative was therefore not further analysed.

Hungary

The port of Budapest would accept a journey of maximum one hour for their employees to reach the training. **No interview partner would travel more than three hours.**

The estimated travelling time from the Hungarian ports to Port Pancevo is between 3,5 and 5,5 hours, depending on the exact location of the ports.

The estimated travel time to Port Ruse is at least 10 hours.

Thus, reaching both potential locations would cause a **journey of more than three hours.**

Croatia

The **port of Vukovar** would accept a journey of more than three hours for its employees to travel to the simulator training.

Approximate travel time Vukovar – Ruse: about 10 hours

Approximate travel time Vukovar – Pancevo: about 2 hours.

Potential **demand for crane simulator training: 12 employees**

Better located: **Port Pancevo**

Slovakia

The **port of Bratislava** would accept a journey of more than three hours to send its employees to specific simulator training.

Approximate travel time Bratislava – Ruse: about 10 hours

Approximate travel time Bratislava – Pancevo: about 6 hours

Potential **demand for crane simulator training: 16 employees**

Potential **demand for reach stacker simulator training: 6 employees**

Better located: **Port Pancevo**

Serbia

Port Pancevo has a potential demand for **crane** simulator training **itself** for **10 employees**.

Port Novi Sad and Port Pancevo would both accept a journey of maximum one hour to send its employees to specific simulator training.

Approximate travel time Pancevo – Ruse: about 8,5 hours

Approximate travel time Novi Sad – Ruse: about 9 hours

Approximate travel time Novi Sad – Pancevo: about 1,5 hours

As all calculated travel routes have a travel time of more than one hour there is **no further potential demand** (except of the 10 employees at the Port Pancevo itself.)

Romania

Port Bazinul and SC Romanel would accept a journey of more than 3 hours to send its employees to specific simulator training.

Approximate travel time Bazinul – Ruse: about 4 hours

Approximate travel time Bazinul – Pancevo about 11 hours

Approximate travel time SC Romanel – Ruse: about 1,5 hours

Approximate travel time SC Romanel – Pancevo: about 11 hours

Potential **demand for crane simulator training: 26 employees**

Potential **demand for reach stacker simulator training: 14 employees**

Better located: **Port Ruse**

Galati Harbour would accept a journey between one and three hours to send its employees to specific simulator training. The other two interview partner a journey of maximum 1 hour.

No interview partner would travel more than three hours.

The approximate travel time is between **3,5** and **4** hours to the **Port of Ruse** depending on the location of the interview partner and about **11 hours** to **Port Pancevo**.

Thus, reaching both potential locations would cause a **journey of more than three hours**.

Bulgaria

Port Ruse has a potential demand for simulator training **itself** for **17 employees** working on **reach stackers** and **25 employees** working on **cranes**.

Port Ruse would accept a journey of maximum 1 hour to send its employees to specific simulator training.

Approximate travel time Ruse – Pancevo: about 8 hours

As the calculated travel route has a travel time of more than one hour there is **no potential demand** for Port Pancevo.

Austria

Port Vienna would accept a travel time of maximum one hour to send its employees to specific simulator training. The two other Austrian ports questioned (Ennschafen, Port Linz) between one and three hours. **No interview partner would travel more than three hours.**

The approximate travel time from the Austrian ports to **Port Ruse** is between **13 and 14 hours**. The approximate travel time to **Port Pancevo** is between **6 and 8 hours**.

Thus, reaching both potential locations would cause a **journey of more than three hours**.

3.2.3 Summary

In consideration of the maximum travel time the interviewed partner would accept for their employees to reach the simulator training, the potential demand for simulator training changed as followed:

	demand reach stackers	demand cranes	better located port
Hungary	-	-	-
Croatia	-	12 employees	Port Pancevo
Slovakia	6 employees	16 employees	Port Pancevo
Serbia		10 employees*	only Port Pancevo
Romania	14 employees	26 employees	Port Ruse
Bulgaria	17 employees ⁺	25 employees ⁺	only Port Ruse
Austria	-	-	-
Ukraine	-	-	-
In total	37 employees	89 employees	

Figure 12: Travel time related potential demand

*Port Pancevo itself, no potential demand for Port Ruse

⁺Port Ruse itself, no potential demand for Port Pancevo

In total	Port Pancevo	Port Ruse
Potential demand crane simulator training	63 employees	79 employees
Potential demand reach stacker simulator training	-	37 employees

Figure 13: Summary – travel time related potential demand

3.3 Simulator types – status quo

3.3.1 Introduction

As there is an extreme variety of different models and installations of transshipment simulators the first important step within this phase was to get an overview of the different possibilities and the technical equipment of the different simulator types.

Therefore, we searched for transshipment service providers and contacted them via email and/or by telephone:

Simulator Provider	Location	Response
e-Tech simulation	West Palm Beach, Florida, USA	email
Kongsberg Maritime	Local sales points in Norway and USA	no response
Liebherr "LiSIM"	Nenzing, Vorarlberg, Austria	email exchange and telephone call

Figure 14: Contacted simulator providers

Both responsible persons from the two companies we received an answer from, were highly interested in our concept and were very ambitious to help us. But the general tenor from both was that giving us a standardized answer to our question(s) is not possible because of the extreme wide range of possibilities and external factors.

To find out what kind of transshipment training offer is feasible and if its implementation would even be profitable the first important step was to get an overview of the approximate price range of transshipment simulators offered by the different providers.

The outcomes were showed within the next two points.

3.3.2 Simulators – e-Tech simulation

The most important outcome of our email correspondence was that all simulators offered by e-Tech simulation are individually customized to meet the client's needs. Therefore, a wide range of possibilities is needed. Differences within the types and brands of equipment simulated, motion platforms, hardware customization to meet specific brand requirements, software customization to meet specific demands and other factors cause a wide price range within the different products offered.

E-Tech simulators estimate the following acquisition costs:

40,000 US Dollar (for base models) up to

240,000 US Dollar (depending on how much customization is required)

As customization is very individual and since we had no specific request on a model we neither got feedback on the equipment and training possibilities of base models, nor on the wide range of different customization possibilities.

As e-Tech simulation is located in Florida, USA delivery conditions and possible additional costs had to be taken into account as well. Again, as we had no specific request on a model we got no information and price on that.

3.3.3 Simulators – Liebherr “LiSIM“

Within our research on simulator providers we took special note on the company Liebherr and its production site in Nenzing, Vorarlberg in Austria which is specialised on the production of different transshipment simulators.

As the information on the different simulators within the homepage of the company was quite informative we were able to ask more detailed questions we were interested in within our email.

To be able to answer our questions more detailed we were contacted via phone by a responsible person from the production site in Nenzing.

Again, like the feedback from e-Tech simulation, we got the confirmation, that the price range is extremely wide, depending on the different types and overall the specific customer demands. So the acquisition costs for a simplified basic model start at about 10,000 to 12,000 Euros up to more million Euros for the most expensive simulators.

Apart from the price information we got a lot of important input from this talk and the information available on the homepage:

LiSIM crane simulators are running on an advanced computer system. This crane control system precisely calculates all crane movements in 3D and real time. To create a realistic training environment where employees can be trained appropriate it is important to operate in a cockpit where the real hardware utilised at the ports is used. The associated motion platform simulates

the response and feel of the crane-mounted operator's seat. Flat screens and surround sound speakers reproduce views and sound of the typical port environment.

Taking this information into account and according to the statement of Liebherr it has to be differentiated between:

- Simulator training for new employees with no experience in operating a crane or reach stacker, and
- Advanced simulator training for existing employees to optimize their skills.

Simulator training for new employees

For an initial training for people without experience in operating cranes or reach stackers it would be possible to use a basic transshipment simulator model to get familiar with the basic functions of cranes and reach stackers.

To offer an appropriate basic training at least two different simulators – one crane simulator and one reach stacker simulator – would be necessary to get a first practical knowledge on how to generally operate cranes or reach stackers.

As the operation of cranes and reach stackers varies between the different types of cranes and reach stackers and as the employees have to get familiar with the port area building on the basic simulator training, additional training would be necessary.

Advanced simulator training

To get additional knowledge on how to operate cranes or reach stackers, so that transshipment processes can be optimized and thus, transshipment volumes can be increased much more complex and individually customized transshipment simulators would be required.

To achieve this goal the transshipment simulator has to be equipped with the actual hardware in conformity with the type and brand of cranes or reach stackers used at the different ports. Additionally, the exact port environment has to be simulated and the training has to be adapted to the exact transshipment processes.

As all these adaptations are needed to offer advanced simulator training it is according to the statement of Liebherr not practical to use such a simulator at different ports.

The costs of acquisition for such advanced and customized simulators are in the five-digit range.

3.3.4 Conclusion

- Offering port transcending advanced simulator training operated by container terminals is caused by the different types of cranes and reach stackers used within the ports as well as the different port environment technically not feasible yet.
- Only basic simulator training could be offered port transcending.

3.4 Profitability analysis – basic simulator training

To see if offering basic simulator training would be profitable the first step was to find out about the potential target group of basic simulator training. Therefore we took the valued potential demand (see 3.2.3) and calculated a new potential demand assuming to an EU-wide fluctuation rate of about 18 % (source: HayGroup, http://atrium.haygroup.com/downloads/marketingps/de/Sind%20Ihre%20Talente%20bereit%20zum%20Abflug_executive_summary.pdf)

Taking this numbers into account the maximum potential target group is as follows:

In total	Port Pancevo	Port Ruse
Potential demand basic crane simulator training	11 – 12 employees / year	14 – 15 employees /year
Potential demand basic reach stacker simulator training	-	6 – 7 employees

Figure 15: Potential demand – basic simulator training

As no port would pay more than 500 Euros per day and an average training duration of one day was evaluated the calculation would be as followed:

	Port Pancevo	Port Ruse
Maximum earnings basic crane simulator training	5,500 – 6,000 € / year	7,000 – 7,500 € / year
Maximum earnings basic reach stacker simulator training	-	3,000 – 3,500 € / year

Figure 16: Maximum potential earnings – basic simulator training

As extra training would nonetheless be necessary the demand will probably decrease additionally.

Comparing the maximum earnings above with the acquisition costs of about 12,000 Euros for a basic transshipment simulator and taking additional trainer and maintenance costs into account offering basic simulator training would not be profitable or rather even cost covering.

4. Validation – ports and logistics simulator concept

4.1 Introduction

To receive feedback on the port and logistics simulator concept and to find out if the findings made correspond with the opinion of the different stakeholders, following efforts were made:

External stakeholders (i.e. simulator manufacturers) were contacted and **questioned** via email and phone during the development of the concept. We interviewed the simulator manufacturers concerning:

- different simulator types;
- approximate acquisition costs;
- technical feasibility (of container terminals as potential operators of port-transcending crane and reach stacker simulator trainings)

Findings can be found within **3.3** and **3.4** of the ports and logistics simulator concept.

After the draft version of the port and logistics simulator concept was completed it was together with a feedback form (see 5.2 Annex 2) sent to the **project partners** to collect feedback from the interview partner. It was the project partners' responsibility to and at their discretion how to do the concept evaluation.

Within the **feedback form** the following **questions** were asked:

1. *Does our survey evaluation correspond with your point of view?*
2. *Are there any aspects you do not agree with?*
3. *Do you have any supplements or change proposals*
 - *on the whole concept*
 - *on the evaluation of the questionnaires from your country?*
4. *Other comments*

As some interview partner insisted on an anonymous data evaluation, the following validation was mainly anonymised and divided by country. However, within the validation the exact wording of the received feedback was used.

After each received feedback, which needs to be clarified, a chapter "comments on the feedback received" can be found. Within this chapter a statement to the feedback, based on the experience gained during this study, and an explanation how we proceeded with it was given.

4.2 Hungary

Partner responsible for interviews:	Csaba Hargitai, BME
Interview partners:	<ol style="list-style-type: none"> 1. Port of Budapest 2. Hungarian Federation of Danube Ports

Figure 17: Hungarian project and interview partners

4.2.1 Received feedback

1. Does our survey evaluation correspond with your point of view?

In one hand yes: The study shows that the interest for logistics simulators are low in Danube region.

But in other hand the study does not mention that the survey concentrated only on the container handling

2. Are there any aspects you do not agree with?

There are nothing in the written text what we do not agree.

3. Do you have any supplements or change proposals

- on the whole concept
- on the evaluation of the questionnaires from you country?

on the whole concept:

- We think it should be pointed out that reach stacker and crane simulators means simulators of container handling simulators.

- It should be mentioned that for crane and reach stacker operators/drivers have strict and specific education. It would be good if the study shows what parts of the mandatory education would be able to help by the simulators, and what kind of extra trainings are available using simulators.

- What is the conclusion? Is it a good idea to force the education by simulators in this jobs?

on evaluation of Hungarian questionnaires:

- Only the estimation of Hungarian Federation of Danube Ports and Port of Budapest were evaluated. This is good if the study is about simulators of container handling equipments.

- In case the study is about the cargo handling facilities in ports (in general), the estimation of other interviewed Hungarian ports should be taken into account.

4. Other comments

no other comments were made

4.2.2 Comments on the feedback received

Feedback:

- We think it should be pointed out that reach stacker and crane simulators means simulators of container handling simulators.
- Only the estimation of Hungarian Federation of Danube Ports and Port of Budapest were evaluated. This is good if the study is about simulators of container handling equipments.
- In case the study is about the cargo handling facilities in ports (in general), the estimation of other interviewed Hungarian ports should be taken into account.

Comment: These aspects were discussed with the Hungarian project partner. The project partner rejected his feedback as it was pointed out, that the concept concentrates on container terminals and container handling simulators. Nevertheless, in the final version this aspect was more frequently mentioned.

Feedback:

- It should be mentioned that for crane and reach stacker operators/drivers have strict and specific education. It would be good if the study shows what parts of the mandatory education would be able to help by the simulators, and what kind of extra trainings are available using simulators.

Comment: As regulations on education concerning crane and reach stacker operation widely vary within the different countries, it was not possible to specify mandatory education needed. Thus, education was divided into basic and advanced crane and reach stacker simulator training.

Feedback:

- What is the conclusion? Is it a good idea to force the education by simulators in this jobs?

Comment: Using simulation tools in training and education to gain practical experience in manoeuvring transshipment vehicles is one option to train ports' personnel. Simulator training allows to make mistakes and to learn in a virtual and safe environment without fearing to cause expenses through possible mistakes. Currently simulators were mainly operated by crane and reach stacker (simulator) operators. Due to the high technical and organizational expenses as well as the quite small potential target group it is technically not feasible or at least not profitable for container terminals to offer port-transcending transshipment simulator training yet.

4.3 Croatia

Partner responsible for interviews:	Katarina Mostarac, FPZ
Interview partners:	3. Port Osijek 4. Port Vukovar

Figure 18: Croatian project and interview partners

4.3.1 Received feedback

Following the interviews, document *Port and logistics simulator concept* was sent for validation to the interviewed stakeholders. Feedback for the concept was obtained from both institutions. Since there are no reach stackers operating in any of the mentioned ports, interviews were focused on cranes.

Feedback from both interviewed partners was positive. Both stakeholders consider that survey evaluations well as the concept is given correctly, with all relevant and essential information.

Stakeholders listed above agree with all aspects of the concept. They do not have any supplements or change proposal on the concept or on the evaluation of the questionnaire.

Stakeholders are willing to support projects that are working on improvement of quality in ports.

4.4 Slovakia

Partner responsible for interviews:	Andrej Dávid, KVD
Interview partners:	5. Port of Bratislava 6. Port of Komarno

Figure 19: Slovakian project and interview partners

4.4.1 Received feedback

1. Does our survey evaluation correspond with your point of view?

Yes, it does.

The survey was aimed at the concept of port and logistics simulator. It consists of the analysis of present situation in the Danube ports including the suggestion related to the concept of this simulator / these simulators (the location of simulator(s), function of simulator(s), and the costs for its / their acquisition ...).

2. Are there any aspects you do not agree with?

No, they are not.

The basic problem of the concept is that the target group is very low due to low interest. Another problem is the journey to the ports which should have these simulators (the port of Pancevo and the port of Ruse) and other Danube ports is very long (over 3 hours), see more Other comments.

3. Do you have any supplements or change proposals

- on the whole concept
- on the evaluation of the questionnaires from you country?

We suggest filling the chapter about financing of this simulator / these simulators. We could not find it in the concept.

4. Other comments

The idea of this simulator is very good but there are some aspects that influence on its development negatively. The first thing is that there is very low target group of trainees for reach stacker or crane simulators. Other problems are:

- each port uses different handling equipment for transshipment of containers including bulk and general cargo, so it is not possible to create unified model of this simulator / these simulators for whole Danube,
- travel time is very long between the ports which should have these simulators (port of Pancevo and port of Ruse) and other Danube ports. It is over 3 hours to get there. About 2/3 ports would accept the journey for their employees that would take less than 3 hours.
- acquisition / operation cost of these simulators. High quality simulators are very expensive. Who will pay the costs related to its / their operation? Most ports would like to pay maximum 500 EUR per trainee for the course so the ports will have to find another way how to finance its / their operation.

4.4.2 Comments on the feedback received

Feedback:

- We suggest filling the chapter about financing of this simulator / these simulators. We could not find it in the concept.

Comment:

Offering advanced port-transcending simulator training, operated by container terminals itself, is technically and economically not feasible yet. In contrast, offering basic port-transcending simulator training is possible in principle. However, in comparison to the maximum earnings with the acquisition costs of at least 12,000 Euros for a basic transshipment simulator and taking additional trainer and maintenance costs into account, it is currently not profitable or rather even cost covering for the potential operating container terminals. Another aspect was that we had no clearly defined simulator type one of the two potential port operators was interested in. Due to those facts we do not consider it practicable at the current stage to do a chapter on financing of simulators.

4.5 Serbia

Partner responsible for interviews:	Tanja Djokic, SBBH
Interview partners:	<ul style="list-style-type: none"> 7. Port Feranex 8. Port Pancevo 9. Port Novi Sad 10. Port Tomitrade

Figure 20: Serbian project and interview partners

4.5.1 Received feedback

1. Does our survey evaluation correspond with your point of view?

The questionnaire has fully covered all the relevant points in this area. It is detailed and complete.

All the stakeholders have analyzed the costs of training and the cost of the simulator in order to gain knowledge on how this would pay off.

2. Are there any aspects you do not agree with?

The only thing that could be a problem in Serbia is certainly a financial aspect, since the price you have put as a minimum (500 euros) is too high, it is rather a maximum that workers would pay. A more acceptable amount would be 300 euros, and of course this would shorten the duration (for example, less days and more hours per day)

3. Do you have any supplements or change proposals

- on the whole concept
- on the evaluation of the questionnaires from you country?

We have none.

4. Other comments

The stakeholders got the questionnaire form on time, however none of them sent their opinion. These answers were obtained through telephone conversations as we didn't get any of the stakeholders' answers in writing. This is the reason we are late with our feedback.

Port Pancevo is still interested in obtaining the simulator and doing the training.

4.5.2 Comments on the feedback received

Feedback:

- The only thing that could be a problem in Serbia is certainly a financial aspect, since the price you have put as a minimum (500 euros) is too high, it is rather a maximum that workers would pay. A more acceptable amount would be 300 euros, and of course this would shorten the duration (for example, less days and more hours per day)

Comment: Within the port and logistics simulator concept the price of 500 Euros, ports would pay for simulator training, as a result of the questionnaires, was a maximum price. It was taken into the profitability analysis as a maximum value. It was clearly pointed out that ports would only pay up to 500 Euros for simulator training and that no port would pay more than 500 Euros.

4.6 Romania

Partner responsible for interviews:	Ghiuler Manole, CER
Interview partners:*	11. Port Bazinul/UPIR 12. A.A.O.P.F. Romania 13. SC Romanel 14. Galati Harbour/Damen Shipyard 15. Hercules SA

Figure 21: Romanian project and interview partners

4.6.1 Received feedback – SC Romanel International Group

1. Does our survey evaluation correspond with your point of view?

Yes, feedback of our organisation was correctly integrated.

2. Are there any aspects you do not agree with?

No.

3. Do you have any supplements or change proposals

- on the whole concept
- on the evaluation of the questionnaires from you country?

No.

4. Other comments

No further comments, congratulations for a comprehensive and elaborate document.

4.6.2 Received feedback – A.A.O.P.F. Romania, Galati Harbour

1. Does our survey evaluation correspond with your point of view?

Yes! The evaluation is correct.

2. Are there any aspects you do not agree with?

Travelling time from Romanel Braila to Ruse is more than 4 hours, if it matters anymore.

3. Do you have any supplements or change proposals

- on the whole concept
- on the evaluation of the questionnaires from you country?

It has been discussed about the (500 euro) price per day but not for lump sum for the entire costs (transport, hotel and food) and if it will be only one day of training (for the theory and practice) of course that will be impossible to make profit in the first year. The question should be how much would pay the owner as a total cost for one crane operator training (of three days training + transport + hotel + food).

4. Other comments

Best regards.

4.6.3 Comments on the feedback received – A.A.O.P.F. Romania, Galati Harbour

Feedback:

- It has been discussed about the (500 euro) price per day but not for lump sum for the entire costs (transport, hotel and food) and if it will be only one day of training (for the theory and practice) of course that will be impossible to make profit in the first year. The question should be how much would pay the owner as a total cost for one crane operator training (of three days training + transport + hotel + food).

Comment: Even when taking a maximum price of 500 Euros only for the simulator training as value for the profitability calculation, offering port-transcending basic simulator training, operated by container terminals is yet not profitable or even cost covering. Thus, at the current stage we did not consider it practicable to further precise cost and financial aspects.

4.6.4 Received feedback – UPIR

1. Does our survey evaluation correspond with your point of view?

As I understood only a basic simulator can meet partially the clients demands but will not cover all requirements due to a broad diversity of machine types and port environment. But a complex simulator option (that can do less if it is required) need a deeper analysis. The conclusion that such simulator is not feasible was not analyzed quite

Also, the accessibility seems to be a problem. If the simulator cannot be used by distance it will not be feasible. Is it technically possible? Not clear from the document

Our expectations refers to a complex simulator accessible from distance

We expected that this study , beside the necessity and opportunity analysis, will define at least the terms of reference of the simulator and the feasibility study

2. Are there any aspects you do not agree with?

Are the max amount of 500 EUR including the travelling costs? If not, there is no response if the clients afford these extra costs. The profitability analysis includes only incomes but no operational costs to find out if there will be no loses.

Why the demand analysis took into consideration only the port employees? The survey took into consideration the existing situation but not the previsions in relation with future intermodal terminals development and people which want to attend such a job.

3. Do you have any supplements or change proposals

- on the whole concept
- on the evaluation of the questionnaires from you country?

The output need to ensure the sustainability of the project. How is it ensured ? The concept is not clear

4. Other comments

There is no logistic component

4.6.5 Comments on the feedback received - UPIR

Feedback:

- As I understood only a basic simulator can meet partially the clients demands but will not cover all requirements due to a broad diversity of machine types and port environment. But a complex simulator option (that can do less if it is required) need a deeper analysis. The conclusion that such simulator is not feasible was not analyzed quite
- Also, the accessibility seems to be a problem. If the simulator cannot be used by distance it will not be feasible. Is it technically possible? Not clear from the document
- Our expectations refers to a complex simulator accessible from distance

Comment:

To raise additional knowledge on how to operate cranes or reach stackers, so that transshipment processes can be optimized, complex and individually customized transshipment simulators would be required. To achieve this goal, the transshipment simulators have to be equipped with the actual hardware in conformity with the type and brand of cranes or reach stackers used at the different ports. Additionally, the exact port environment has to be simulated and the training has to be adapted to the exact transshipment processes. As all these adaptations are needed to offer advanced simulator training, research suggests that it is not practical to use such advanced transshipment simulators at different ports. The costs of acquisition for such advanced and customized simulators are in the five-digit range. For that reason offering port-transcending advanced simulator training, operated by container terminals, is technically not possible yet caused by the different types of cranes and reach stackers used within the container terminals as well as the different port environment.

As transshipment simulators are very complex and of big size, transporting them within the different ports would be very cost intense and not profitable. Therefore, this alternative was not further analysed within this study. Our research made within the concept development suggests that using transshipment simulators by distance is technically not possible yet.

Feedback:

- Are the max amount of 500 EUR including the travelling costs? If not, there is no response if the clients afford these extra costs. The profitability analysis includes only incomes but no operational costs to find out if there will be no losses.

Comment:

Even when taking a maximum price of 500 Euros only for the simulator training as value for the profitability calculation, offering port-transcending basic simulator training, operated by container terminals is yet not profitable or even cost covering. Thus, at the current stage we did not consider it practicable to further precise cost and financial aspects.

Feedback:

- Why the demand analysis took into consideration only the port employees? The survey took into consideration the existing situation but not the previsions in relation with future intermodal terminals development and people which want to attend such a job.

Comment:

Scope of the concept was to evaluate the current potential demand on port-transcending simulator training offered by container terminals itself. For that reason future intermodal terminal development and future development in general was not taken into account.

Feedback:

- We expected that this study , beside the necessity and appportunity analysis, will define at least the terms of reference of the simulator and the feasibility study

Comment:

Research suggests that all high-quality simulators offered are individually customized to meet the clients' needs. There is a wide variety of types and brands of equipment simulated as well as of different motion platforms. In fact, hardware customizations, to meet specific brand requirements, software customizations, to meet specific demands, as well as a lot of different functions are required. Due to that as well as caused by the lack of clearly defined demand on a specific simulator type, defining the terms of reference as well as a more detailed feasibility study on the simulator was not possible.

Feedback:

The output need to ensure the sustainability of the project. How is it ensured ? The concept is not clear

Comment:

Within the previous comments all feedback from UPIR was answered or commented. The overall statement, that the concept is not clear in their opinion is acknowledged. As the last question is not clearly defined the last question cannot further be discussed.

4.7 Bulgaria

Partner responsible for interviews:	Asen Tsvetanov Asenov, RUSE
Interview partners:	16. Port Belene 17. Port Somovit 18. Port Ruse 19. Port Svishtov 20. Port Silistra

Figure 22: Bulgarian project and interview partner

4.7.1 Received feedback – anonymous collection of all ports

1. Does our survey evaluation correspond with your point of view?

Yes, as a whole.

2. Are there any aspects you do not agree with?

No, (I agree).

3. Do you have any supplements or change proposals

- on the whole concept
- on the evaluation of the questionnaires from you country?

The range of issues covered important aspects for the port.

4. Other comments

4.8 Austria

Partner responsible for interviews:	Karin Kainzinger, EH
Interview partners:	21. Ennshafen 22. Port Vienna 23. Port Linz

Figure 23: Austrian project and interview partners

4.8.1 Received feedback

1. Does our survey evaluation correspond with your point of view?

Yes the survey was well done. From my point of view for the time being the costs are too high according to the profit we would have. When the capacities/frequencies will further increase, maybe more personal would be needed and one could think about a possible additional training (via simulator).

2. Are there any aspects you do not agree with?

n.a.

3. Do you have any supplements or change proposals

- on the whole concept
- on the evaluation of the questionnaires from you country?

n.a.

4. Other comments

n.a.

4.9 Ukraine

5. Partner responsible for interviews:	Igor Gladkykh, ONMS
Interview partners:	no responses

Figure 24: Ukrainian project and interview partners

There was no response or feedback from the Ukraine so no data could be evaluated.

4.10 Summary and conclusion

In Summary the received feedback mainly corresponds with the outcome of the concept. Questionnaire evaluation and research suggests that there is basic interest on simulator training for cranes and reach stackers within ports. However, the interview partners made strong limitations concerning price and accessibility of port-transcending simulator training. A reason for that is that training requirements are also sufficiently covered by colleagues and training companies such as crane and reach stacker (simulator) manufacturers.

Regarding technical and economic feasibility, offering advanced port-transcending simulator training, operated by container terminals itself, is not feasible yet. Offering basic port-transcending simulator training, in contrast, is possible. However, in comparison to the maximum earnings with the acquisition costs of at least 12,000 Euros for a basic transshipment simulator and taking additional trainer and maintenance costs into account, it is currently not profitable or rather even cost covering for the potential operating container terminals. Nevertheless each container terminal will have to decide itself, if operating a training simulator makes sense for them or not.

This specific result is in line with the overall conclusion that using simulators for training is largely recognized and accepted within the educational sector but caused by high technical and economic efforts often not feasible or at least not profitable yet.

Due to that outcome we did not consider it practicable or even possible at the current stage to do more detailed analysis on specific simulator types as well as on financial and funding aspects of offering port-transcending crane and reach stacker simulator training. For a next step a concrete simulator type as well as the expected requirements and functions the potential operating port is interested in will be needed.

5. Annexes

5.1 Annex 1 - questionnaire

Simulator Training for Reach Stackers & Cranes



Current situation at the port

Reach Stackers

1. How many reach stackers are used at your port? _____
2. How many persons work with reach stackers? _____
3. How are persons trained to operate a reach stacker?
 - Only persons with previous knowledge are employed
 - People are trained at the company's reach stackers through colleagues
 - People are trained by specialized training companies
(if this option is valid, please go on with 3.1)
 - Others: _____
- 3.1 Which companies train the people?
 - Manufacturer of reach stacker
 - Specialized training companies
 - Others: _____
4. Are reach stacker simulators used for training?
 - Yes No

Cranes

5. Which and how many **cranes** are used at your port?

6. How many persons work with these crane(s)? _____
7. How are persons trained to operate a crane?
 - Only persons with previous knowledge are employed
 - People are trained at the company's cranes through colleagues
 - People are trained by specialized training companies
(if this option is valid, please go on with 7.1)
 - Others: _____
- 7.1 Which companies train the people?
 - Manufacturer of cranes
 - Specialized training companies
 - Others: _____
8. Are crane simulators used for training?
 - Yes No

Demand for simulator training

1. Would you send your employees to specific trainings for reach stackers on simulators?
 Yes No

2. Would you send your employees to specific trainings for cranes on simulators?
 Yes No

3. Would you accept a long journey to reach the location of the simulator training for your employees?
 maximum 1 hour between 1 and 3 hours more than 3 hours

4. How many hours or days would you consider reasonable for these trainings?

5. How much would you be willing to pay for these trainings per day?
 up to € 500 between € 500 and € 1.000 more than € 1.000

6. Which competences should be trained on simulator training for reach stackers and cranes?
 Operation of vehicles
 Technical background of vehicles
 Environmental issues (fuel savings, tyre preserving driving manners, ..)
 Safety issues
 Others: _____

7. Can you imagine buying and operating a simulator for training?
 Yes, for own employees
 Yes, for employees and external people for money
 No

Comments**Thank you!**

Name:

Organisation:

May your name be mentioned? Yes NoAre you interested in further information? Yes No

e-Mail:

5.2 Annex 2 – feedback form

Feedback Form Port and logistics simulator concept

1. Does our survey evaluation correspond with your point of view?

2. Are there any aspects you do not agree with?

3. Do you have any supplements or change proposals

- on the whole concept
- on the evaluation of the questionnaires from your country?

4. Other Comments

Thank you!

Name:

Organisation:

May your name be mentioned? Yes No

e-Mail: