Intelligent Transport System for Innovative Intermodal Freight Transport

Deliverable No. D1.2

Report on lead-user requirements

Work package no.: 1
Work package name: Analysis phase
Lead participant: DAF
Nature of Deliverable: R
Dissemination level: PU
Due del. date from Annex I: 4
Actual delivery date: 6th December 2013
Version: 2.1
Status: Final

\(^1\text{R} = \text{Report}; \text{P} = \text{Prototype}; \text{O} = \text{Other}\)

\(^2\text{PU} = \text{Public}; \text{RE} = \text{Restricted to a group specified by the consortium}; \text{CO} = \text{Confidential, only for members of the consortium (including the Commission Services)}\)
## Overview

<table>
<thead>
<tr>
<th><strong>Author(s):</strong></th>
<th>Jeroen van den Oetelaar (DAF), Peter Kramer (DAF), Alexia Fenollar Solvay (RWTH)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contact Person(s):</strong></td>
<td>Jeroen van den Oetelaar / Peter Kramer</td>
</tr>
<tr>
<td></td>
<td>Organization: DAF Trucks N.V.</td>
</tr>
<tr>
<td></td>
<td>Address: Hugo van der Goeslaan 1, 5600 PT Eindhoven, The Netherlands</td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:a-jeroen.van.den.Oetelaar@daftrucks.com">a-jeroen.van.den.Oetelaar@daftrucks.com</a>, <a href="mailto:Peter.kramer@daftrucks.com">Peter.kramer@daftrucks.com</a></td>
</tr>
<tr>
<td></td>
<td>Tel: +31 40 214 2673 / +31 40 214 2765</td>
</tr>
</tbody>
</table>

## Review:

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Reviewed by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.10.2013</td>
<td>V0.5</td>
<td>Monica García and Eric Muller (Goodyear)</td>
</tr>
<tr>
<td>31.10.2013</td>
<td>V1.0</td>
<td>Andrea Grisilla (EIA)</td>
</tr>
<tr>
<td>05.12.2013</td>
<td>V2.0</td>
<td>All TelliSys consortium partners</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Person</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>0.1</td>
<td>19.07.2013</td>
<td>A. Fenollar Solvay</td>
</tr>
<tr>
<td>0.2</td>
<td>23.07.2013</td>
<td>J. v.d. Oetelaar</td>
</tr>
<tr>
<td>0.3</td>
<td>07.08.2013</td>
<td>P. Kramer</td>
</tr>
<tr>
<td>0.4</td>
<td>30.08.2013</td>
<td>A. Fenollar Solvay</td>
</tr>
<tr>
<td>0.5</td>
<td>04.10.2013</td>
<td>A. Fenollar Solvay</td>
</tr>
<tr>
<td>1.0</td>
<td>26.10.2013</td>
<td>A. Fenollar Solvay</td>
</tr>
<tr>
<td>2.0</td>
<td>19.11.2013</td>
<td>A. Fenollar Solvay</td>
</tr>
<tr>
<td>2.1</td>
<td>06.12.13</td>
<td>A. Fenollar Solvay</td>
</tr>
</tbody>
</table>
Table of Contents

1. Executive summary ................................................................................................................. 1

2. Lead-user interviews .............................................................................................................. 2
   2.1 Methodology ......................................................................................................................... 2
   2.2 Results ................................................................................................................................. 3
       2.2.1 Manufacturers ................................................................................................................. 3
       2.2.2 Transport operators and logistic companies ................................................................. 4
       2.2.3 Combined terminals ....................................................................................................... 6

3. Transport logistic trade fare .................................................................................................. 7
   3.1 Results ................................................................................................................................. 7
   3.2 New concepts developed in intermodal transport field ..................................................... 8

4. TelliSys requirements ............................................................................................................ 10

5. Conclusions .......................................................................................................................... 11

References ................................................................................................................................ 13

Annexes ..................................................................................................................................... 14

Annex 1: Presentation lead user interview ................................................................................. 14
Annex 2: Interview Guideline .................................................................21

Annex 3: TRIMODER concept developed ..................................................25
List of Figures

Figure 3.1: Transport unit and low deck tractor developed by MAN/DB Schenker ..........9
List of Tables

Table 2.1: MSB requirements for manufacturers .................................................................4

Table 2.2: MSB requirements for transport operators ..........................................................5

Table 2.3: MSB requirements for combined terminals..........................................................7
1. Executive summary

The report on lead user requirements presents the results and conclusions of the project task 1.2 “Identification of lead user requirements” and describes the methodology used to achieve them.

The correct identification of lead user requirements is an important task since these results will be considered for the final design of the TelliSys components. Therefore this task has taken more than five months in which the Consortium has carried out a total of 21 interviews with the aim to present and discuss the project and to acquire direct information from the final customers of TelliSys components. Among these lead users are big manufacturing companies, logistic companies, transport operators, port authorities and tri-modal terminals.

The data collected during the interviews, the minutes of different workshops and meetings, where the TelliBox and TelliSys projects have been discussed, are summarized in this document.

The document is divided in two main chapters:

- **Lead user interviews**: twelve interviews carried out by the consortium during 5 months to discuss the project with expert workers from lead user companies.

- **Transport logistic trade fair**: nine interviews carried out during the trade fair of Munich.
2. Lead-user interviews

In this chapter the methodology pursued and the results obtained by the lead user interviews are presented. The TelliSys project starts with the analysis of the market and the identification of lead-user requirements. Both tasks are related and divided in a way that the Market analysis focuses on the current state of the market (legislation, policy and statistics) and this document focuses on the analysis of lead user results and the definition of the TelliSys components specifications.

2.1 Methodology

The objective is to collect all needed requirements for an optimised modular MegaSwapBox (MSB), the trailer and the low deck tractor considering operational, technical and economic aspects. Therefore, twelve interviews were carried out by the Consortium to get direct information of the lead user requirements.

At least two TelliSys partners attended the meeting with experts from companies that represent a target group. During the meetings, the project was first presented (c.f. Annex 1) and then the TelliBox and TelliSys projects were discussed along an interview guideline in order to ensure that all necessary information was collected (c.f. Annex 2).

Companies that took part in the interviews are arranged into three different sectors:

- Manufacturers: Companies producing different products (e.g. furniture, automobile, white goods) will use the MSB to transport their products, if the MSB gives them an advantage in comparison with existing transport units: e.g. in terms of profitability (better alignment production, logistics processes), safety (reduction incidents, safeguarding brand/image), speed (overall supply chain speed) or energy (lower energy expenses).

- Transport operators and logistics companies: expeditors responsible for the logistics and delivery of different products will use the whole transport system (MSB, low deck tractor and chassis). The MSB should give them an advantage in comparison
with existing transport units e.g. in terms of flexibility (using MSB for various sorts of customers) or in terms of maintenance (cost savings on asset maintenance).

- Intermodal terminals: Tri-modal, combined terminals and ports are a fundamental part of intermodal transport since there the loading unit will be handled and placed to change between the different transport modes. The MSB should give them an advantage in comparison with existing transport units e.g. in terms of throughput (increase through automation or identification), investments (reduction of needed handling investments) or train management and dispatching (marshalling yards).

2.2 Results

During the interviews the questionnaire was filled out and in this section the results are summarized and grouped regarding the type of company.

2.2.1 Manufacturers

Six big companies producing different products have been interviewed. The different manufactures answered questions about their target state and the ideal requirements of a transport unit.

All the manufacturers interviewed pointed out the interest to have a transport unit with 3 m height. The automobile industry has special interest due to the use of automotive loading units with 1 m high. That means that the loading unit needs a minimum inside height of 2.97 m, since a minimum of 1.5 cm is saved when the loading units are stacked. Regarding the possibility of openable long sides of the transport unit, most of them found this option as interesting but in some cases are automated to load from the back.

Table 2.1 summarizes the MSB requirements regarding dimensions and construction. Besides, the following IT requirements for an intermodal loading unit and other requirements were mentioned:

- Daily status
- Basic information (database or data coming from the terminal)
- Tracking/tracing for supply-to-order

Other requirements:

- Cargo securing
- Box adaptable to other wagons
- Cross border handling requirements (e.g. transport to Spain)
- Adaptable boxes to place pallets

Table 2.1: MSB requirements for manufacturers

<table>
<thead>
<tr>
<th>Companies/Requirements</th>
<th>Inside Height</th>
<th>Sides</th>
<th>Top</th>
<th>Inside width</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviewee 1</td>
<td>3m will be an advantage out of Europe</td>
<td>Stable sides, back loading capacity is more important</td>
<td>Hinged roof is not necessary</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Interviewee 2</td>
<td>3m</td>
<td>Minimum loading capacity from one side (1)</td>
<td>Hinged roof</td>
<td>2.5m</td>
<td>-</td>
</tr>
<tr>
<td>Interviewee 3</td>
<td>2.7m but 3m would be interesting for long lanes</td>
<td>Loading from the back (2)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Interviewee 4</td>
<td>-</td>
<td>No openable (solid walls)</td>
<td>Roof to compress (hydraulic)</td>
<td>2.48m at the backdoor</td>
<td>Small size in order to increase shipping frequency</td>
</tr>
<tr>
<td>Interviewee 5</td>
<td>3m is interesting but 2.97 will be enough (3)</td>
<td>Both side open</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Interviewee 6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Wide</td>
<td>4.5 feet (40 feet in deep sea and R2D)</td>
</tr>
</tbody>
</table>

Remarks: (1) Both sides closed if the width is 2.5m
(2) Loading from the side might be interesting in combination with automatic loading
(3) However it is plan to need 3m for special logistics applications

2.2.2 Transport operators and logistic companies

Four logistic companies and one transport operators were interviewed. According to their requirements, there is no optimal box height; it ranges between 2.95m and 2.98m. However, the transport operator remarks that this change in height could induce problems in warehouses or in the automatic production. It was confirmed the necessity or/and
profitability of logistic companies to have the possibility to load and unload a loading unit from both sides.

The possibility to have a loading unit that can be stacked and with openable long sides might be interesting for most of the transport operators if it brings an improvement on the efficiency of the loading process, although currently most of them are automatized to load and unload from the back. Nevertheless, the possibility of openable long sides in combination with automatic technology can lead to a faster loading process and can open new market places where loading from the back is not possible.

The desired requirements for transport operators and logistic companies regarding dimensions and construction of a new loading unit are summarized in Table 2.2.

Table 2.2: MSB requirements for transport operators

<table>
<thead>
<tr>
<th>Companies/Requirements</th>
<th>Inside high</th>
<th>Sides</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviewee 7</td>
<td>2.97m</td>
<td>Loading and unloading from sides (both sides is a bonus)</td>
<td>40 or 45 feet</td>
</tr>
<tr>
<td>Interviewee 8</td>
<td>3m currently not possible (1)</td>
<td>-</td>
<td>Standard dimensions</td>
</tr>
<tr>
<td>Interviewee 9</td>
<td>2.98m will be enough</td>
<td>Loading and unloading from both sides</td>
<td>-</td>
</tr>
<tr>
<td>Interviewee 10</td>
<td>3m would be no problem to handle (2)</td>
<td>Openable sides could be an advantage but would not have a major impact</td>
<td>20, 40 and 45 feet (3)</td>
</tr>
<tr>
<td>Interviewee 11</td>
<td>2.05m will be enough</td>
<td>Loading and unloading from both sides</td>
<td>-</td>
</tr>
</tbody>
</table>

Remarks: (1) Racks are standardized (2.97m)
(2) A change in the pallets height means also a change of the automatic production and changes in the store of the warehouses (3) 45 feet or higher would be no problem in deep sea terminal but more than 45 feet is problematic for inland terminals

The importance of a minimum payload of 24 t was pointed out by all interviewees. Requirements like weight, stackability, a competitive market price and openable sides are interconnected. A new box, with openable sides and with the possibility of stacking, needs special constructive reinforcement that makes the loading unit heavy and expensive due to the use of different material and/or more material. This was also an important lesson learned thanks to the previous project Tellibox.
Following IT requirements for an intermodal loading unit for transport operators and logistics companies were also mentioned:

- Need standard dimensions
- Flow data monitoring
- Temperature
- Monitoring the train
- More automated/integrated registration, e.g. Track & Trace information

Other requirements:

- TIR (Convention on “Transports Internationaux Routiers” or "International Road Transports")
- Stackability
- Standard cargo securing
- Hinged roof

2.2.3 Combined terminals

Tri-modal or combined terminals are an important and fundamental part of intermodal transport, since it is the place where the transport unit has to be handled and placed to switch between different transport modes.

Table 2.3 present the IT, dimensions and construction requirements for a new loading unit for intermodal terminals.
Table 2.3: MSB requirements for combined terminals

<table>
<thead>
<tr>
<th>Companies/Requirements</th>
<th>Inside high</th>
<th>Sides</th>
<th>Size</th>
<th>IT</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviewee 12</td>
<td>-</td>
<td>Loading and unloading from the sides</td>
<td>40 and 45 feet (45 feet problematic for top craning)</td>
<td>GPS-EPV System to reach stacker, automatic handling</td>
<td>44t weight</td>
</tr>
<tr>
<td>Interviewee 10</td>
<td>3m would be no problem to handle</td>
<td>Openable sides could be an advantage but would not have a major impact</td>
<td>20, 40 and 45 feet</td>
<td>More automated/integrated registration, e.g. Track &amp; Trace information</td>
<td>-</td>
</tr>
</tbody>
</table>

For intermodal terminals would not present a problem to handle a new loading unit as long as it has the standard handling devices, like corner castings or grapple pockets.

One goal of transport terminals is to automate the process of container handling as much as possible. Therefore it will be of great advantage if the transport unit integrates IT requirements like Track and Trace or automatic handling of the box.

3. Transport logistic trade fare

To complete the identification of lead user requirements the Consortium decided to participate in the Transport Logistic Trade Fair (4–7th June 2013) in Munich. Nine interviews were done at place and direct contact was established with six other companies to arrange future meetings if necessary.

3.1 Results

Interview highlights:

- Most interviewed partners expressed their positive opinion about the idea and the aim of the project. Several companies were interested to keep informed about the project.

- Other companies are also working on new intermodal concepts (e.g. Trimoder, DB Schenker/Transfesa or SBB Cargo), that should be kept in mind for the further development of TelliSys.
• There is some uncertainty regarding where the development of loading units is heading. What seems to be clear is, that: top craneable semi-trailers gain more relevance as an alternative to swap bodies, whereas there is still no alternative to standard containers for oversea shipping.

• The carrying wagon for rail transport should be considered when developing an intermodal loading unit.

• Several dialogue partners remark the need to have payload as much as possible.

• Electronic goods are not transported on the trans-Siberian railway route when the temperature is below -27°C (usually between November and February).

• Short sea transport: HC containers are stacked up to 6 times in waterway transport. However the stacking capability depends on water drought (level) and infrastructure limitations (bridges etc.).

3.2 New concepts developed in intermodal transport field

The trade fair was also a good opportunity to see what other companies in intermodal or combined transport are developing.

DB Schenker, Transfesa and MAN have developed a Swap Body 2.98 meter height able to be transported with a low deck tractor and special wagons (Figure 3.1).
The transport unit developed has following characteristics:

- Complies with the German Road Traffic Licensing Regulations (StVZO), a special permit is not required.
- Designed for use with tractors with a 830 mm coupling height
- 100 m³ loading volume with a 2.98 m effective loading height
- Swap body designed for standard railway cars and special intermodal flatbedcars in combined traffic (road/rail)
- Maximum payload: 24.5 tonnes

**TRIMODER – CES Containerhandling** have developed a 45’Trimoder Short Sea Container and a Superlight-Chassis using a modular concept, so that they have three types of trading units, Dry (container), cool (reefer) and curtain (Swap Body). Further technical specifications can be found in Annex 3.
4. **TelliSys requirements**

Following requirements have to been considered regarding the decision of final requirements for the new trading unit:

- **Size**: the 45 ft loading units are interesting for road transport and the European market while the 40 ft loading units have big advantages regarding the standardization of vessels and wagons and are the standard equipment in the eastern market. The new legislation in Europe on masses and dimensions gives 45 ft container more possibilities on road transport.

- **Height**: the optimal box height ranges between 2.95 m and 2.98 m. A total 4.00 m vehicle height must be respected for road use. On the other hand, the box height must be limited to 3.20 m for railway application.

- **Handling**: the new loading unit needs standard handling devices (at least corner castings and grappler pockets).

- **Weight**: importance of a minimum payload of 24 t.

- **Stackability**: minimum stackability of 3 (2+1) loaded units for trimodal transport. This feature has big impact on the construction and weight of the box.

- **Loading**: openable long sides can improve the efficiency of loading processes and may open new markets. The new loading unit should ideally have the possibility to be loaded from the back and at least from one side. It must be possible to load from one side over the full width of the container.

- **Main interesting IT requirements**: tracking and tracing, security and temperature control.
5. Conclusions

The biggest market interest is in a 45 ft MSB with the highest possible (at least 2.97 m) inside height and total vehicle height limited to 4.00 m. A 45 ft box maximizes the volume and the adaption of the latest 96/53/EC directive makes transporting a 45 ft container by road easily possible. The 45 ft box will give the best performance in terms of CO₂ burden per m³ payload.

A 45 ft MSB for road transport is well accepted. Regarding overseas transport it remains an abnormality. On container ships the 45 ft container has to be placed on special places on the upper deck. Regarding rail intercontinental transportation the use of 45 ft containers has to be differentiate between West Europe and the Eastern area (starting with Belarus, Ukraine, Russia etc.). In West Europe there are a substantial number of wagons able to carry two 45 ft container up to a C45/C75 codification. In the Eastern area the most railway wagons are not suitable for 45 ft containers since the majority of the wagons are 80 ft, i.e. they are able to carry two 40 ft container or only one 45 ft container so that too much air is transported, meaning too much idle space. Furthermore, the number of 45 ft containers that are used for shipping and rail transport has decreased (Hamburg port) during the last years.

The requirements for tractor and chassis design are directly connect to the definition of the new MSB. After the analysis of the market and taking into account the current trend and demands, the chassis has to be as light and as low as possible to allow higher and heavier MSB. Likewise, the tractor must meet the specifications of the MSB, e.g. coupling height, weight, intermodal transport requirements taking into account a competitive purchase price.

Regarding the tractor, a three axle motor vehicle is required by current 96/53/EC directive for intermodal transport and 44ton GVW (Gross Vehicle Weight). Considering this, a 6x2 truck configuration (which is preferred to a 6x4 configuration due to fuel efficiency) gives the highest flexibility for intermodal transport in Europe.
The success of the whole system solution will depend on the optimization between possible payload (low vehicle weight), price and feasible features such as openable sides, stacking and container handling. At least 24 ton payload is requested in order to present an appealing business model. Beside of this, the handling processes (loading and unloading) and the maneuverability of the new loading unit should be easy, otherwise transport companies will fall back on other solutions that already exists or which are in development (Trimoder for instance).

All this ideal or optimal requirements for the new MSB, low deck tractor and chassis have always to comply with the current legislations for intermodal transport in the EU (The European Parliament and the Council, 2013). Thus, it is a challenge to achieve all these requirements in terms of construction, normative and economic efficiency. Therefore, a compromise between the ideal requirements must be performed.
References

[1] The European Commission, Rheinisch Westfälische Technische Hochschule Aachen: *Grant Agreement No. 314310. 2012*


Annex 1: Presentation lead user interview

TelliSys -
Intelligent Transport System for Innovative Intermodal Freight Transport

Lead User Interviews

Heiko Sennewald
Intermodal Consultant

Dr.-Ing. Max Klingender
IMA/ZLW & IfU der RWTH Aachen

www.ima-zlw-ifu.rwth-aachen.de
Table of Contents

I. Project TelliBox
   - project aim
   - results
II. Introduction of TelliSys
   - innovation highlights
   - project structure

Project Aim

Advantages of existing loading units integrated in one MegaSwapBox!

- Container
  - Standard handling processes
  - Stackability
  - Applicable on road, rail, waterborne
  - Security of cargo

- Swap-Body
  - Flexible handling process
  - Applicable on road and rail
  - Optimised cargo volume

- Mega-Trailer
  - Easy handling process
  - Optimised cargo volume

© TelliSys consortium
TelliSys is funded within the Seventh Framework Programme (FP7) of the European Commission
Unique Selling Propositions TelliBox

- Long side(s) are openable
- 3 meters loading height (or at least higher internal height)
- Trimodality
- Pallet wide
- Optimized volume
- Cargo security (theft and pilfer proof)

Impressions
I. Project TelliBox
   - project aim
   - results

II. Introduction of TelliSys
   - innovation highlights
   - project structure

Innovation Highlights of TelliSys

- “Family” of MegaSwapBoxes for different use cases
  - Overseas
  - Reefer

- Next level “low deck” tractor unit with less than 950 mm fifth wheel height (ambitious aim 820 mm) and single drive axle

- Special tyres to enable “low deck” tractor units in general with the same diameter like the chassis for efficient retreading

- Smart tracking of MegaSwapBoxes and their cargo

- Flexible container chassis
Project Approach

- Brainstorming for a vast variety of ideas
- Clear description of the project vision to achieve
- Engineering the ideas
- Building the prototypes
- Extensive testing on intermodal corridors

Project Phases I

Analysis Phase
- As-Is (Market) Analysis
- Identification of Lead-User Requirements
- Identification of Evaluation Criteria
- Programme Vision

Concept Phase
- Conceptual Design of ICT technologies
- Conceptual Design of modular MSB
- Conceptual Design of Trailer
- Conceptual Design of Low Deck Tractor
- Solution Space

Evaluation & Decision Phase
- Evaluation of Profitability
- Evaluation of Usability
- Technical Feasibility Studies
- Programme Description Book
Project Phases II

- Design Phase
  - Engineering Design and Optimisation of modular M&B
  - Engineering Design and Optimisation of Trailer-Chassis
  - Engineering Design and Optimisation of Low Deck Tractor
  - Approval for Production
- Construction Phase
  - Prototyping of modular M&B
  - Prototyping of Trailer-Chassis
  - Prototyping of Low Deck Tractor
- Demonstration Phase
  - Test Runs I (road, rail, short-sea/land shipping)
  - Test Runs II (terminal handling, loading/unloading)
  - Evaluation of Test Run and Recommendations
  - Proof of Concept

TelliSys Consortium

Freight Forwarder
- GEFCO

Research Facility
- RWTH Aachen University, IMA/LLW & IU

Manufacturer
- WECON GmbH
- Wesob Sp. z o.o.
- DAF Trucks N.V.
- Goodyear

Consultant
- Hoko Semenow, Intermodal Consultant

Association
- European Intermodal Association

© TelliSys consortium
TelliSys is funded within the Seventh Framework Programme (FP7) of the European Commission
External Factors influencing the impact

- Continually increasing energy-costs
- EU policy, e.g. concerning environmental issues
- Limitations of present infrastructure
- Integration of all interested groups

this requires Lead User interviews

Thank you very much for your attention
- We would greatly appreciate your input!

Heiko Sennewald
Intermodal Consultant
mobile: +49 171 9747098
heiko.sennewald@t-online.de

Dr.-Ing. Max Klingender
Research Group Leader Traffic and Mobility
phone: +49 241 80 911-49
mobile: +49 175 432 6012
max.klingender@ima.rwth-aachen.de
# TelliSys market analysis: Interview Guideline

<table>
<thead>
<tr>
<th>Frage</th>
<th>Antwort</th>
<th>Kommentare</th>
</tr>
</thead>
<tbody>
<tr>
<td>To which sector does the company belong?</td>
<td>□ Transport operators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Manufacturing industries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Forwarders</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Logistics companies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Equipment suppliers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Other:</td>
<td></td>
</tr>
<tr>
<td>What is your approx. annual freight transport in tons?</td>
<td>□ up to 10 000 t</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ 10 000 t – 100 000 t</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ 100 000 t – 500 000 t</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Over 500 000 t</td>
<td></td>
</tr>
<tr>
<td>What types of goods do you transport mainly?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## 2. Current state

<table>
<thead>
<tr>
<th>What is your prior concern choosing any kind of transport solution?</th>
<th>□ Volume</th>
<th>□ Weight</th>
<th>□ Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>What transport modes does your company use?</td>
<td>□ Railway transport</td>
<td>□ Road transport</td>
<td>□ Water transport</td>
</tr>
<tr>
<td>Question</td>
<td>Options</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What types of loading units does your company use?</td>
<td>☐ Containers – which types?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>☐ Swap bodies – which types?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>☐ Trailers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>☐ Megatrailers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>☐ Jumbo road trains</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>☐ Other, please specify:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What trading units do you primarily use (e.g. euro-pallets)??</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is your company satisfied with the existing intermodal loading units available on the market? Please specify.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How is your cargo usually handled?</td>
<td>☐ Reach stacker</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>☐ Forklift truck</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>☐ Crane</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>☐ Other:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If you handle cargo, between what means of transport do you handle it?</td>
<td>☐ Road - Rail</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>☐ Road - Ship</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>☐ Rail – Ship</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3. Target state

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do you intermediately store the cargo?</td>
<td></td>
</tr>
<tr>
<td>What information about the cargo do you process?</td>
<td></td>
</tr>
</tbody>
</table>

### Target state

- What requirements do you have regarding the dimensions of an intermodal loading unit? (e.g. internal height,)
- What constructive requirements do you have for an intermodal loading unit? (e.g. openable sides, stackability etc.)
- What IT requirements do you have for an intermodal loading unit? (e.g. tracking/tracing,
<table>
<thead>
<tr>
<th>intelligent temperature regulation etc.)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>What other requirements do you have for an intermodal loading unit?</td>
<td></td>
</tr>
</tbody>
</table>
Annex 3: TRIMODER concept developed
Trimoder System: Public Information from “transport logistic 2013” 4th-7th June in Munich
www.trimoder.eu