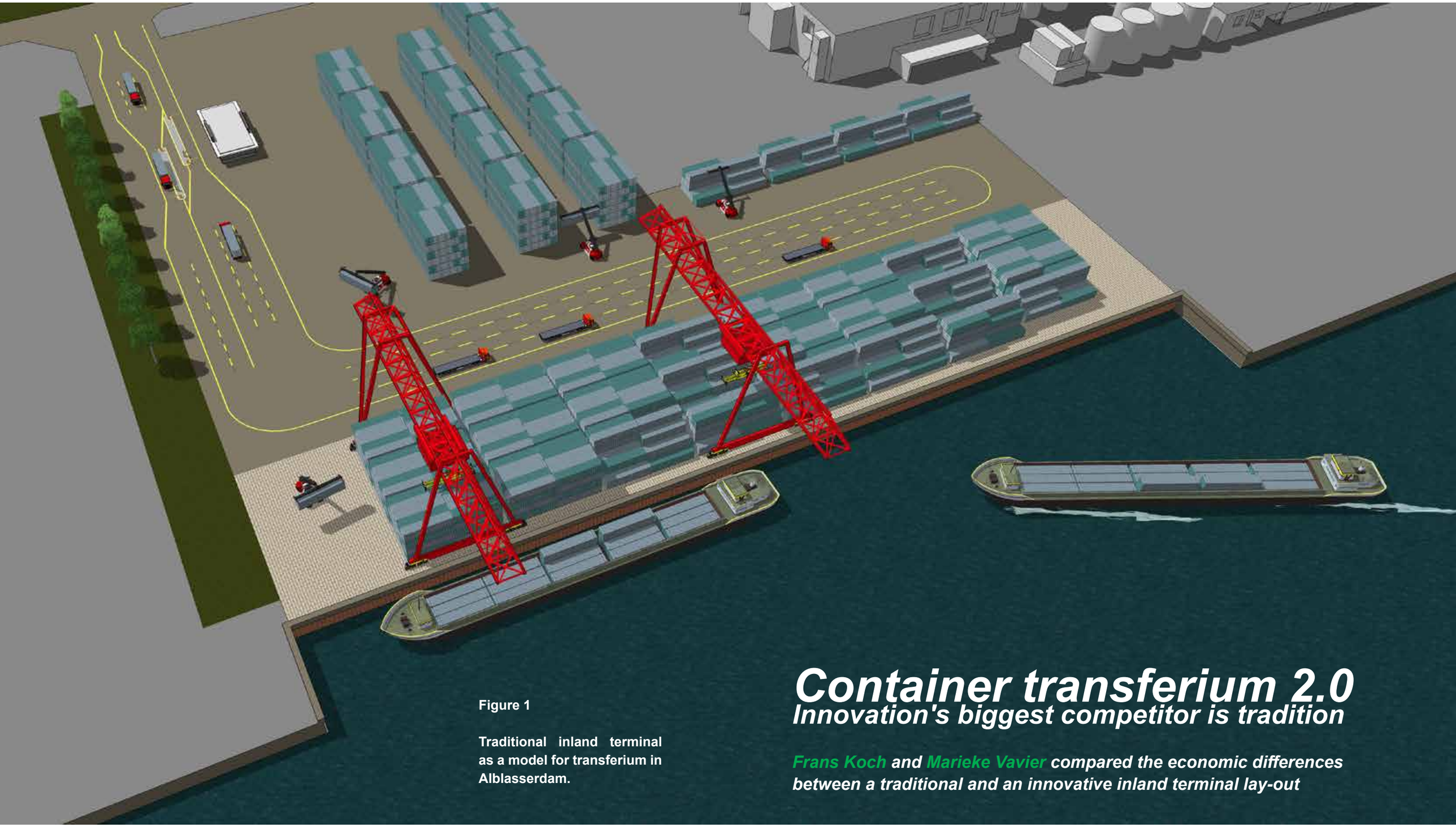


Figure 1

Traditional inland terminal as a model for transferium in Alblasserdam.

Container transferium 2.0

Innovation's biggest competitor is tradition

***Frans Koch** and **Marieke Vavier** compared the economic differences between a traditional and an innovative inland terminal lay-out*

NEW STYLE INLAND CONTAINER TRANSFERIUM

SUPER FAST CONTAINER TRANSFERIUM - PROFITABLE FOR ALL PARTNERS IN THE CHAIN

INTRODUCTION

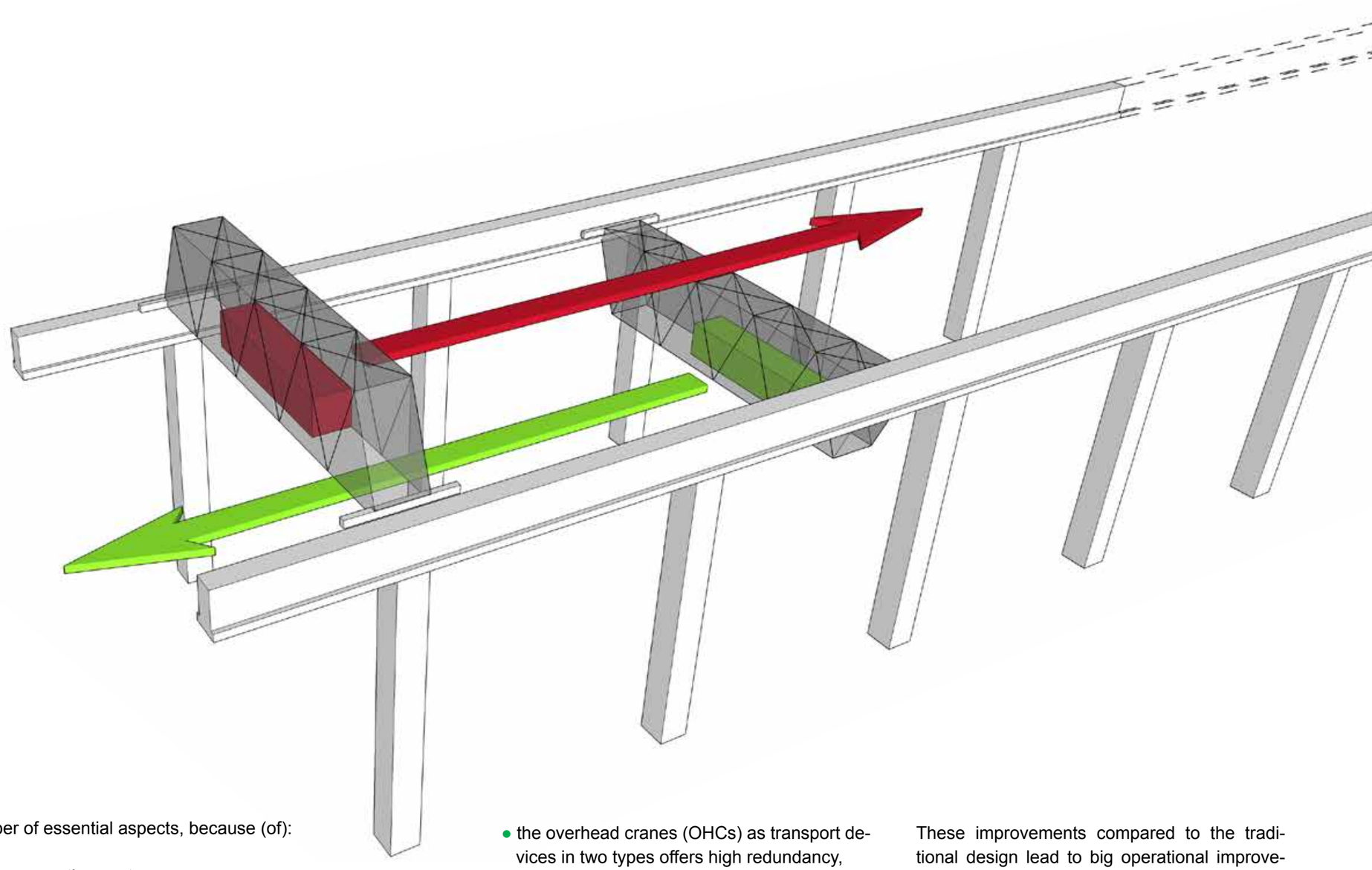
The deep sea container terminals of Antwerp and Rotterdam have set themselves a target to achieve a modal split of 20% rail transport, 40% road transport and 40% inland shipping. This poses quite a challenge and all parties involved in container logistics agree that – in order to reach this target – building container transferia is not a luxury but a necessity, to be able to even get close to reaching the target.

A container transferium is situated at a short distance from a deep sea terminal and bundles the container flows that – when the transferium wasn't there yet – went to the hinterland by road, and transfers this load onto inland shipping (and vice versa).
Every deep sea terminal or cluster of such terminals near high concentrations of population will need several transferia in order to reach the required modal split target.

Hereafter, a 'new style container transferium' is described, set-up according to the NGICT-system 1 of Raadgevend Ingenieursburo F. Koch B.V. from Goes in Zeeland, The Netherlands.

Advantages

This 'new style container transferium' distinguishes itself from the traditional design 2 in a large number of essential aspects, because (of):



- lower operating costs,
- the modular set-up: investments are in step with volume growth,
- a minimal ecological foot print,
- the reduction of the space occupation,
- 50% reduction of the quay length,
- the overhead cranes (OHCs) as transport devices in two types offers high redundancy,
- remotely controllable OHCs is proven technology in warehouses,
- a 100% automation option (only linear movements),
- the very high ship handling on the quay (100 to 160 moves per hour).

These improvements compared to the traditional design lead to big operational improvements: very short mooring times and subsequently a very efficient, maybe even the most efficient, shuttle service possible between the deep sea terminal and the container transferium.

The fact that application of the NGICT-system is also much more appealing than a traditionally set-up transferium from an economic point of view, requires further explanation.

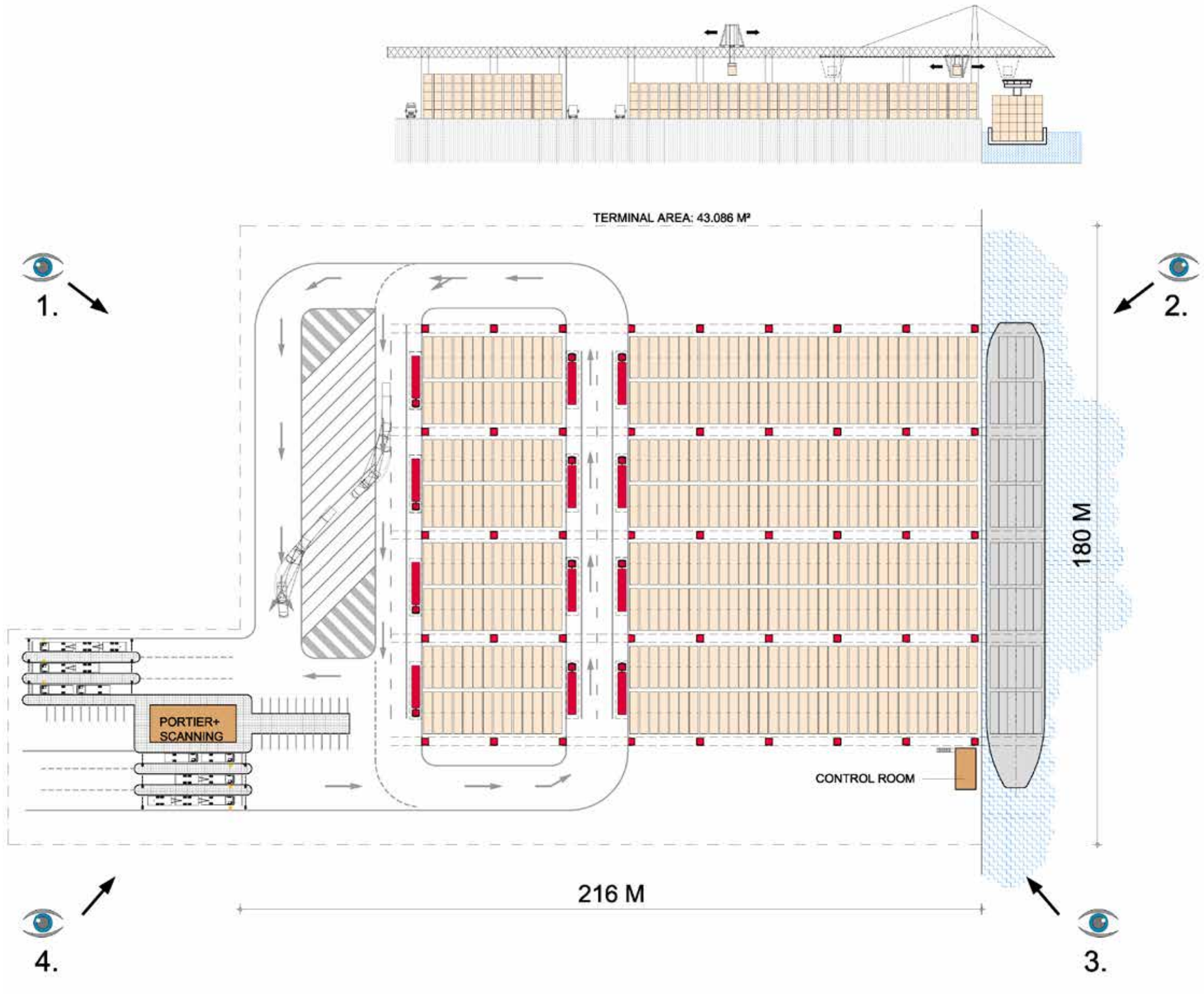
That's why Marieke Vavier, owner of Port Solutions Rotterdam, independent economic consultants in the field of port and area development in the maritime and logistic sector, has further investigated this aspect and added her conclusions to this article.

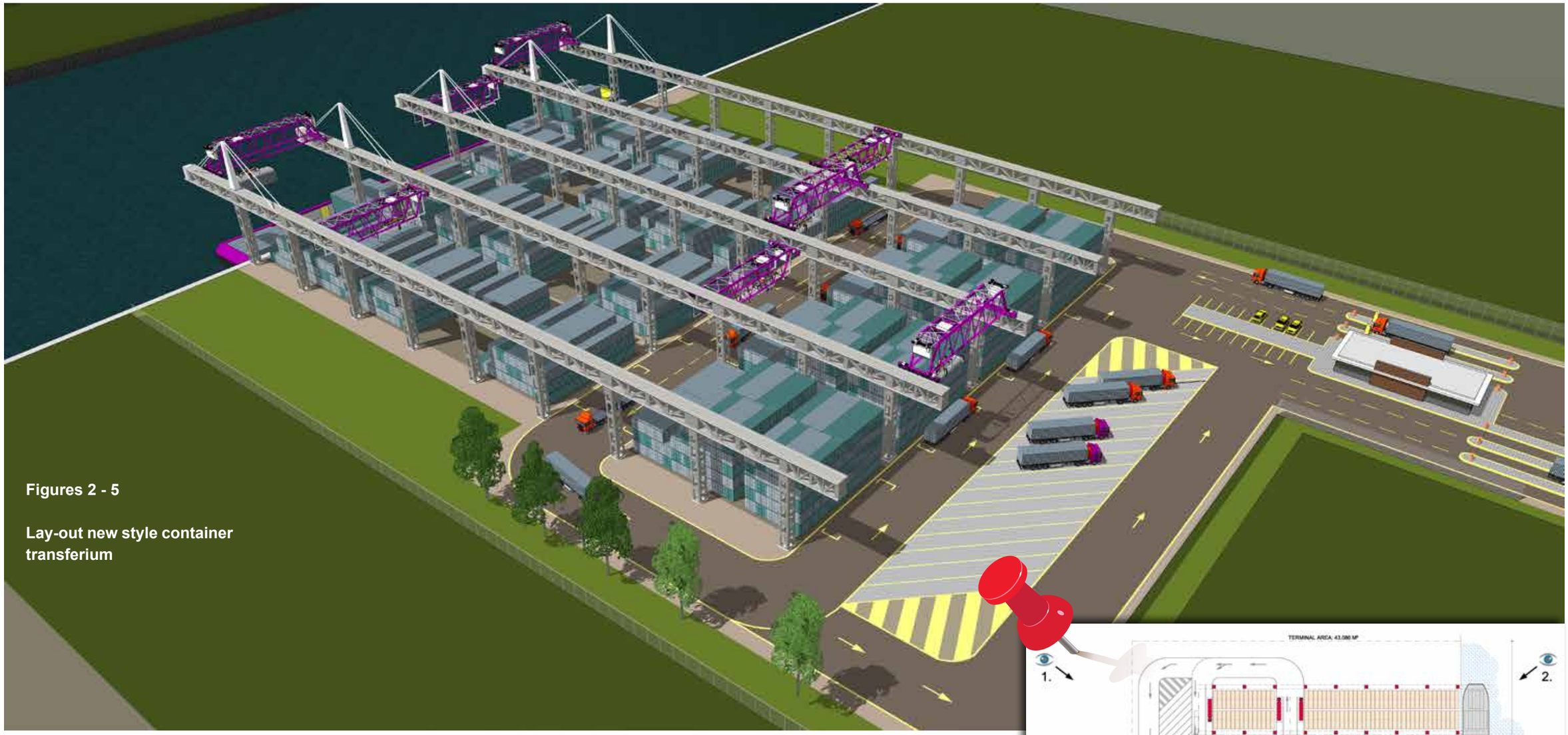
THE OBJECTIVE OF A CONTAINER TRANSFERIUM

The objective of a container transferium is to take containers that are being transported from a deep sea port to the hinterland off the road and to transport them from and to the deep sea terminal by inland shipping, in both directions – import and export. One of the side effects of this is that the throughput time for containers to be delivered by road or inland shipping will be improved significantly.

Current waiting times will vanish like frost under the morning sun, when these container flows can be led through the transferium. In order to achieve this, it will be necessary to build one or more transferia within a seaport area where road transport companies can deliver and pick up their containers. Obviously, in terms of location choice, a location where the container road transport already more or less passes in the current situation, is preferable. The advantage for the transport company lies in the fact that the amount of truck kilometres is being reduced and waiting times on the deep sea terminal are being avoided.

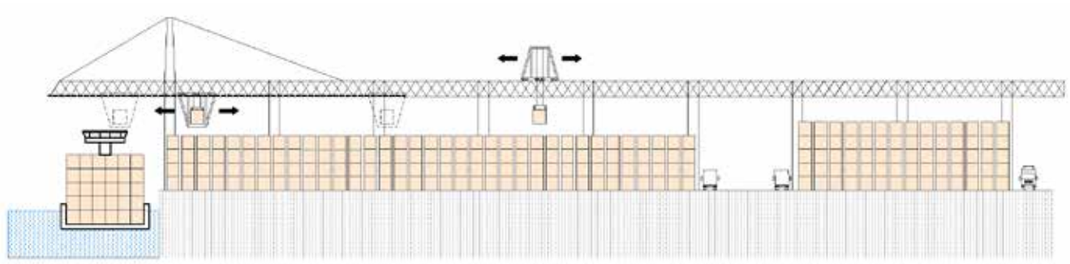
The deep sea terminal operator gets a regular and continuous flow of inland ships with large call sizes, probably even with volumes of seagoing vessels supplied with name and departure date, which not only heightens the efficiency of quay cranes, but also improves the dwell time on the deep sea terminal due to the fact that there are far fewer containers that are delivered much too early or much too late.





Figures 2 - 5

Lay-out new style container transferium



ADDITIONAL SOCIAL OBJECTIVES

A container transferium in an advantageous location will result in a decrease of the container transport on already congested roads; with a reduction of the traffic jam pressure on the roads in the port area and a reduction of the environmental impact as positive side effects.
The extra handling capacity of a container transferium also anticipates the ongoing increase in scale in maritime shipping that presumably also results in an intensification of the hinterland traffic.

A CONTAINER TRANSFERIUM TAKES 150,000 TRUCKS OFF THE ROAD

The primary function of a container transferium is, as mentioned before, the bundling of truck transports to the deep sea terminal and vice versa. In order to not increase the duration of the transport, the handling speed and throughput speed are of great importance. This is what sets a container transferium apart from a regular inland terminal. The length of stay of an export container (brought in by truck) at the transferium could be limited to several hours to one day maximum and cross-docking will be no exception.

The length of stay of an import container (brought in by ship from the deepsea terminal) will in actual practice be somewhat longer (1 to 3 days) because picking up the container from the road transport company has to be planned. As an additional function within the transferium services, a separate empty depot is favourable, but is not considered here.

Another difference between a container transferium and an inland container terminal is that the operator of the transferium doesn't occupy himself with transports before and after. The business management should ensure that changing part of the transport by road to transport over water, is not experienced as an interruption of the normal route but as a speed-up. In fact, it needs to be guaranteed that every container has to be delivered at the deep sea terminal of choice within one day.

Therefore a container transferium needs to have specific qualities at their disposal which benefit the transporters and the shippers. If, on top of that, a container transferium is equipped with customs facilities, that part of the process of the deep sea terminal can be relocated.

NEW DIRECTIONS OVER OLD ROADS?

Even though Port of Rotterdam and TU Delft carried out two studies [1] and [2] in 2008 and 2009 into specific set-ups for a transferium, the switch to a new concept appeared to be seen as too big a risk by the terminal operators. As long as no volume guarantees are given, the obvious thing to do is to set up a container transferium as a copy of a traditional, larger inland terminal and situate it in longitudinal direction of the waterway.

This means a quay with a length that enables two ships to moor one behind the other and with two large gantry cranes. In order to keep waiting times of trucks to a minimum, 1 to 2 reach stackers will be necessary too. The gantry cranes are designed to perform both ship and truck transhipment, but to do so simultaneously is not possible.

When the productivity of both gantry cranes is assumed at an average of 20 moves per hour for the longer ships and 25 moves per hour for the shorter ships, 40 to 50 container moves can be achieved per hour at the quay.

If shuttles the size of a large Rhine ship with a length of 110 meters and a width of 11,40 meters and 204 to 224 TEU loading capaci-

Figures 2 - 5

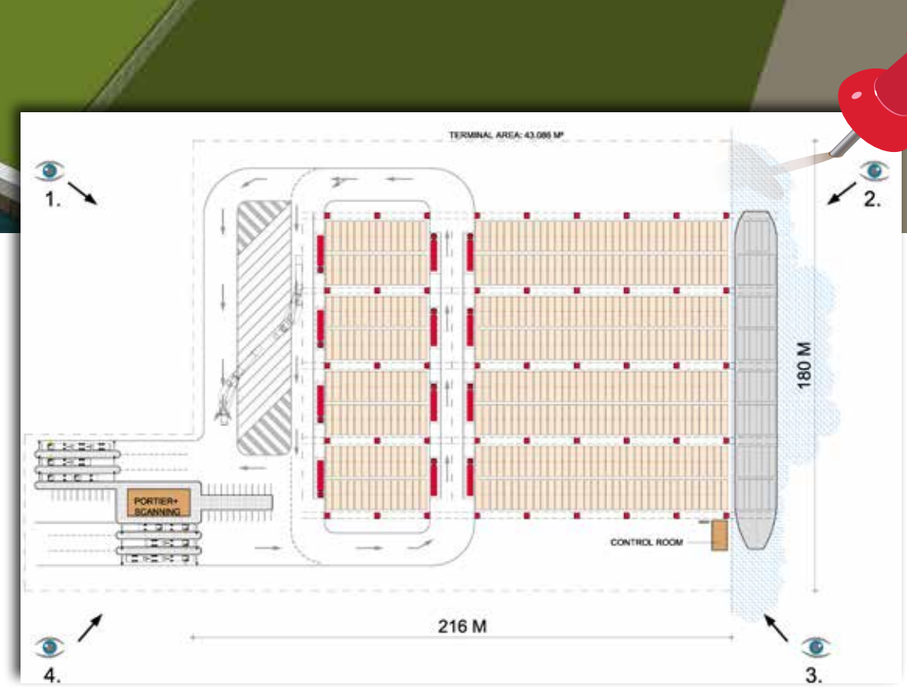
Lay-out new style container transferium

ty are used, the mooring time for a 100% call size (400-448 TEU, so 200-224 TEU unloading and 200-224 TEU loading) and with one gantry crane per ship, will be approximately 13 hours, taking into account a TEU conversion factor of 1.5. Assuming that no transhipment takes place (container transfer from an inland ship to another inland ship laying alongside), the same amounts will have to be processed on the landside. Considering this whole process, the conclusion can be drawn that a quay capacity of 200,000 TEU per year is the maximum for such a transferium. On the land side of the transferium, processing the trucks will take more than an average amount of creativity, as the direct surroundings can limit the operational time per twenty-four hours.

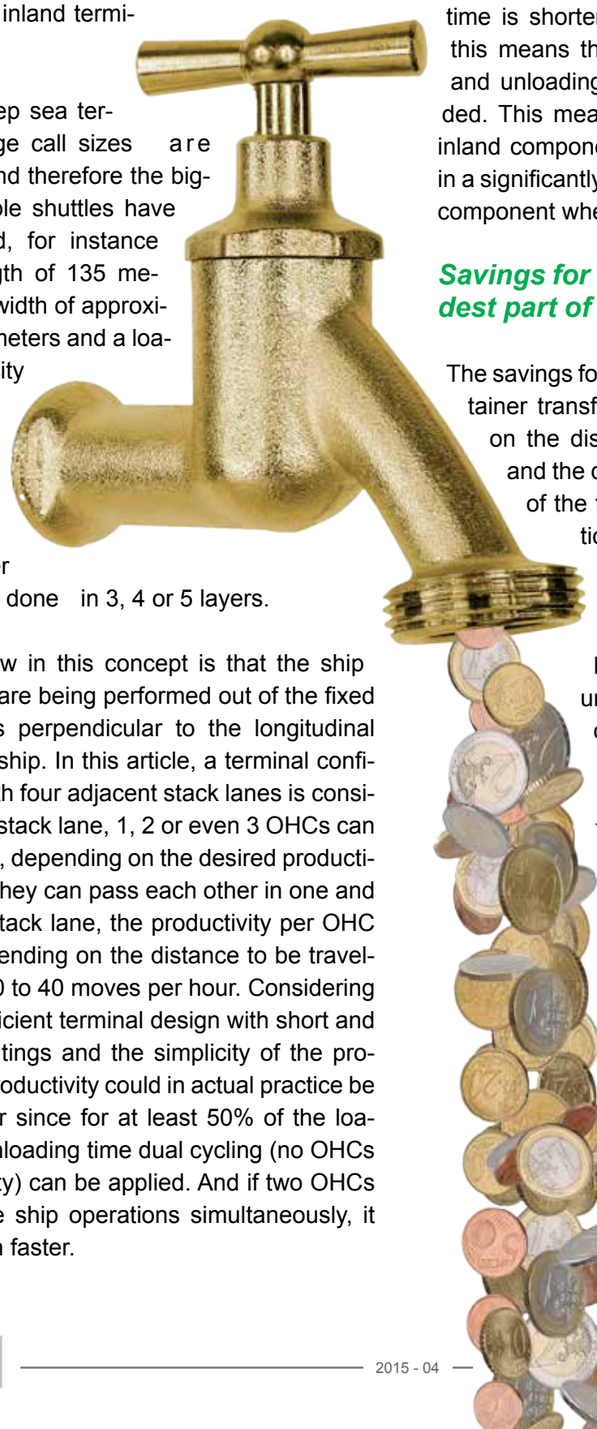
THE GOALS CAN BE ACHIEVED WITH A NEW STYLE CONTAINER TRANSFERIUM

Higher speed at lower costs as a condition

The distinctive quality of a container transferium



should lie in a throughput speed that is higher than on a traditional inland terminal. And because a transferium only takes care of the change to another transport modality, the total costs of loading / unloading and storage and transhipment should be considerably lower than those on existing inland terminals.



For the deep sea terminals, large call sizes are essential and therefore the biggest possible shuttles have to be used, for instance with a length of 135 meters and a width of approximately 17 meters and a loading capacity of 288, 384 or 480 TEU respectively, depending on whether loading is done in 3, 4 or 5 layers.

What is new in this concept is that the ship operations are being performed out of the fixed stack lanes perpendicular to the longitudinal axis of the ship. In this article, a terminal configuration with four adjacent stack lanes is considered. Per stack lane, 1, 2 or even 3 OHCs can be installed, depending on the desired productivity. Since they can pass each other in one and the same stack lane, the productivity per OHC varies, depending on the distance to be travelled, from 20 to 40 moves per hour. Considering the very efficient terminal design with short and straight routings and the simplicity of the process, the productivity could in actual practice be even higher since for at least 50% of the loading and unloading time dual cycling (no OHCs return empty) can be applied. And if two OHCs perform the ship operations simultaneously, it will go even faster.

Short mooring time, big savings for the inland shipping company

Even if only four OHCs with an average of 25 moves per hour (= 100 moves per hour) are working on a ship, this means that the mooring time is shortened by 75%. In actual practice this means that instead of 10 hours loading and unloading time, only 2.5 hours are needed. This means concrete time saving in the inland component and this time saving results in a significantly higher productivity of the inland component when the figures are added up.

Savings for road transport as the hardest part of the ride is skipped

The savings for road transport in using the container transferium in the first place depend on the distance between the transferium and the deep sea terminal and the extent of the traffic jam pressure on that particular route. In the second place, the handling speed on the terminal will have a big impact.

Each transport company undoubtedly has their own calculation method as regards the fixed and variable costs of trucks and chassis, the costs of the driver and the waiting times and handling times on the deep sea terminal.

Savings for the deepsea terminal operator

The costs for the deep sea terminal operator without interference of a container transferium are obviously different for each terminal. Each terminal is unique and has unique parameters. Furthermore, the margin between costs and rates is a confidential matter of which no information is available.

The savings due to the interference of a transferium lie in a much faster handling of the larger call sizes by barges, the continuous flow of the shuttle and the possible custom made delivery. The advantage for the deep sea terminal operator can however be even bigger, if this deep sea terminal also switches to the NGICT-system with regard to processing the inland barges.

The economics of the shuttle service

The operator of the shuttle will calculate the exploitation of, for instance a large inland ship of the JOWI-class based on the TEU-achievement per time cost unit, in which push-towing in the operation described here will very probably be even more appealing as regards productivity.

The advantage for the shuttle lies in the much shorter loading and unloading time at the transferium. For a call size (unloading and loading) or for instance 240 TEU, this can be approximately 7 hours shorter each time.

Considering the scalability of the NGICT-system, a similar operation can also be set up on deep sea terminals in order to handle both the shuttle and the remaining (larger) inland shipping.

In doing this, the same speed can be achieved as on the transferium, so again 7 hours time saving each time for a call size of 240 TEU.

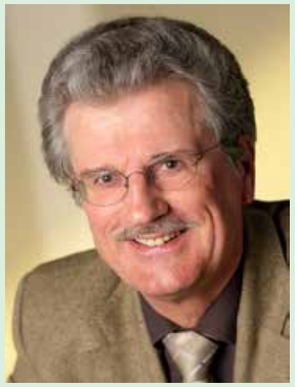
The savings can, depending on the frequency of the timetable, quickly reach several € 100,000 on a yearly basis.

Frans Koch

After having fulfilled several management positions at large engineering companies for twenty years, he set up his own multidisciplinary engineering and architectural company, which currently employs approximately 25 people. Trained as a civil engineer and specializing in constructions, he advises on very diverse projects on a daily basis.

After the integral design of a large deep sea container terminal in 2007 - 2009 he started to research the logistic processes in container terminals and particularly concentrated on an alternative for the traditional STS cranes, which resulted in the design for the New Generation Integrated Container Terminals.

Koch Adviesgroep, Engineers & Architects with offices in Goes and Terneuzen, is a multidisciplinary, all-round consulting company for industry, the transportation world and port authorities. It delivers a total package in consultancy, engineering, architecture and project management. As regards project development, dry and wet industrial premises are designed and guided from the initiation phase up to occupation. The activities in product development have led to the NGICT-concept, a new and innovative system for container handling, both on deep sea and inland terminals and integral transport from warehouse to ship.



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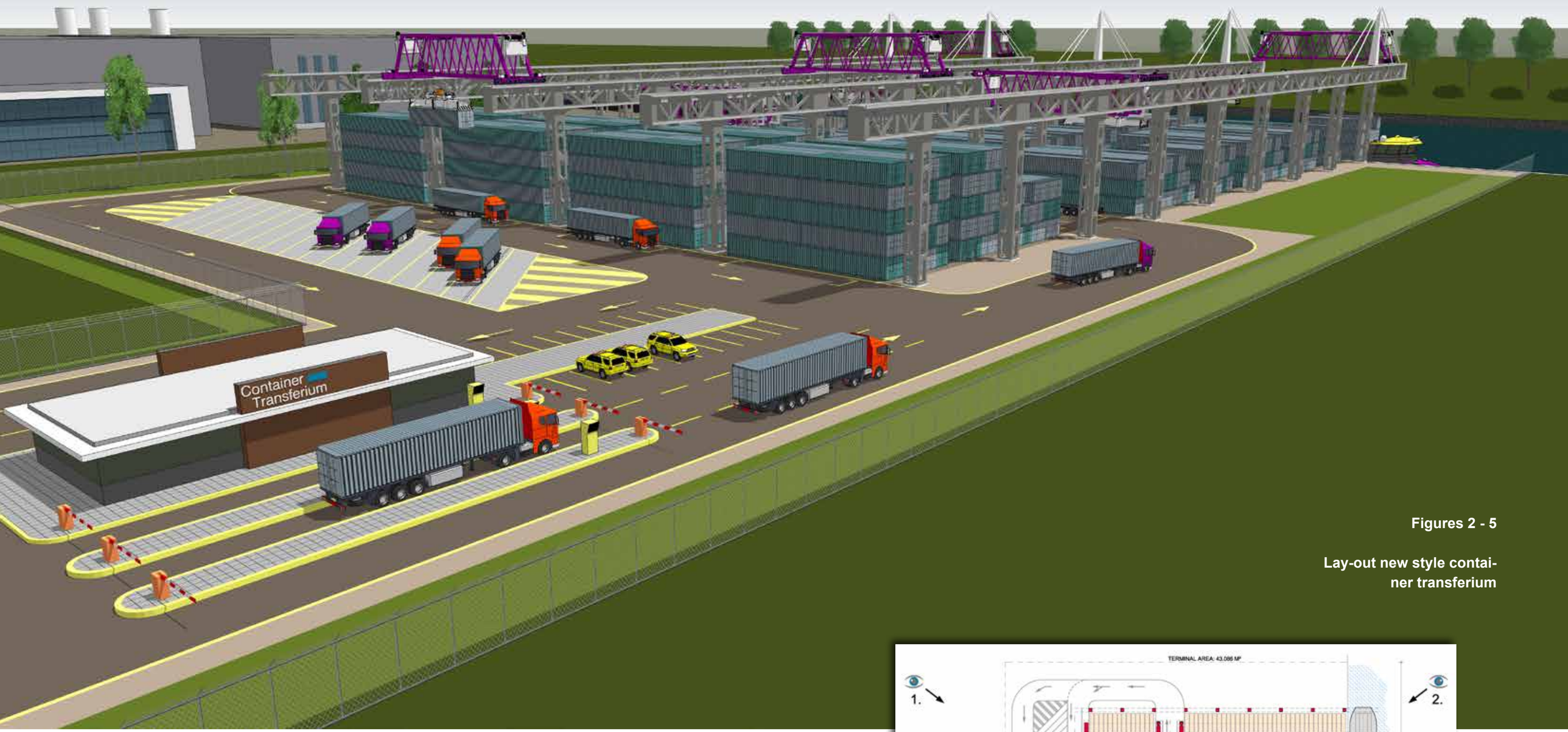
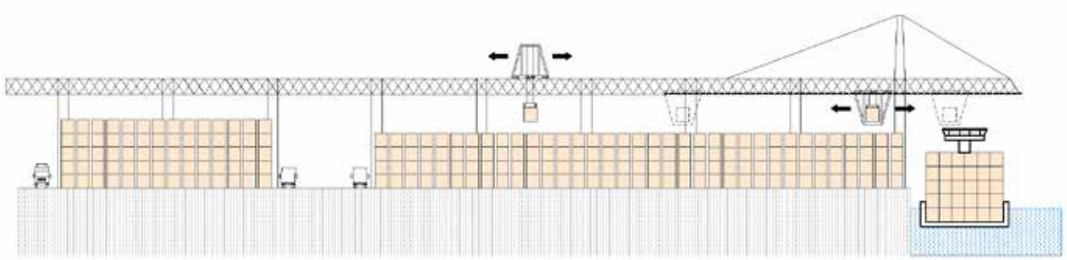
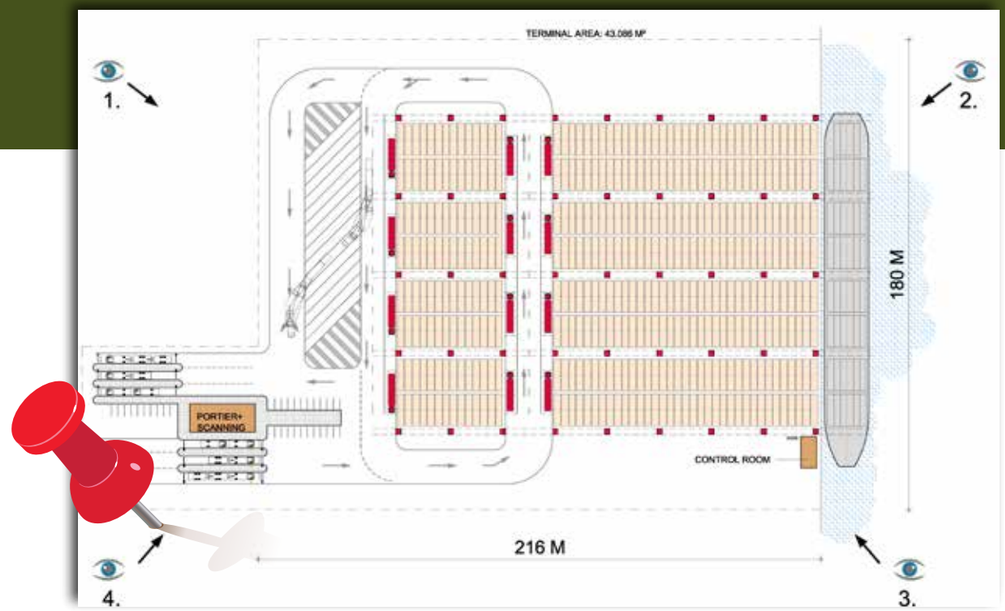


Figures 2 - 5

Lay-out new style container transferium





Figures 2 - 5

Lay-out new style container transferium

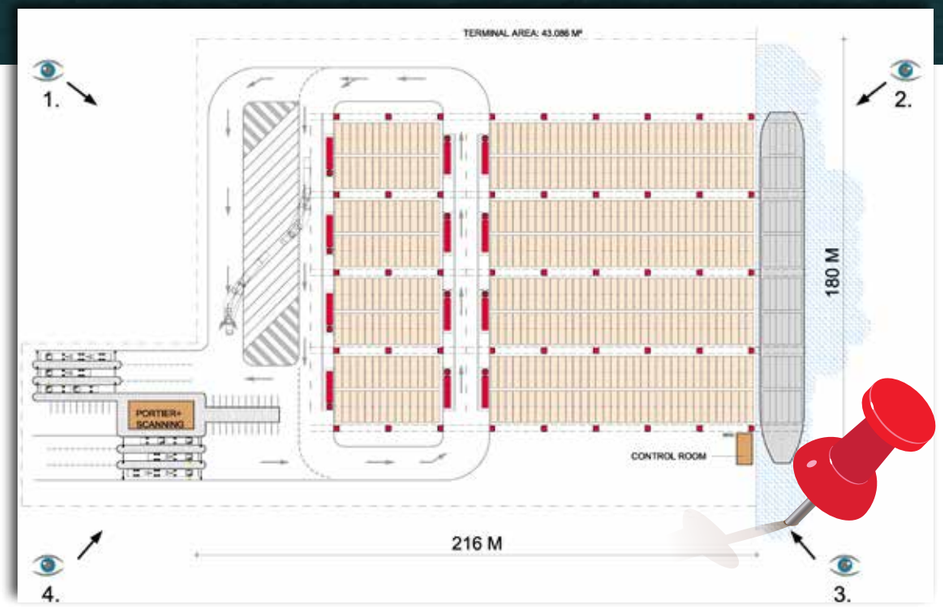
BUSINESS-ECONOMIC PERSPECTIVE

by Marieke Vavier
Port Solutions Rotterdam

The technical and logistic clarification described in this article clearly explains the positive effects of the NGICT. The business-economic perspective however is also important in the decision-making regarding the layout of a container terminal.
In an economic investigation, the differences between a regular container transferium and a container transferium using the NGICT-system have been researched. Although the initial investment for the terminal operator in the NGICT-system is, in this exemplary project, higher than in the case of a regular terminal layout, an investment in a terminal with the NGICT-system is more interesting from a business-economic point of view.

Investment

The principles and assumptions of both investigations are equal. However, a bigger investment is required in the NGICT-system, due to the support structure and the two extra cranes.



The investment in this business case is approximately 25% higher than for a regular container transferium with two gantry cranes.

Costs

The fixed costs for both transferia mainly consist of long lease and maintenance. Maintenance is assumed as a percentage of the total investment sum. With that, the maintenance costs for NGICT will (in theory) be higher than for a regular transferium layout.

The long lease costs are however presumed to be higher for the regular transferium. The reason for this is the double quay length that needs to be built by the port authority or the facilitating municipality. These costs are recharged directly to the transferium operator through the long lease. As regards variable costs, the NGICT-system is at an advantage due to lower energy consumption per TEU and lower labour costs.

Income

The difference between both methods is that with the NGICT-system a much higher throughput can be achieved. According to expectations, this is 2.5 times as high as with a regular transferium layout. (For a clear economic comparison, equal rates are assumed for both transferia.)
A higher throughput increases the income, thereby significantly reducing the pay-back time of an investment.

Return

With the above-mentioned assumptions and differences in data, the economic investigation has shown that the return on the investment in NGICT is nearly twice as high as on an investment in a regular transferium layout.
The conclusion as a result of this economic investigation is that from a business-economic point of view the NGICT-system is a very interesting development with which the objective of 40% inland shipping can be accomplished in a very cost-effective way.

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After having worked at the Port of Rotterdam Authority as an investment manager for years and after that as a teacher at the master class business economics of the Scheepvaart en Transport College in Rotterdam, she founded Port Solutions Rotterdam in 2014.
Trained in business administration at the Erasmus University in Rotterdam, she advises various parties in the field of maritime and logistic issues, with a strong focus on return.

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Port Solutions

Port Solutions Rotterdam is a new consultancy business in the field of maritime and logistic issues with a strong focus on return.
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