KAUNAS UNIVERSITY OF TECHNOLOGY

MECHANICAL ENGINEERING AND DESIGN FACULTY

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Analysis and development of cloud-based system for logistics chain management

Final project for Master degree

Supervisor
Assoc. Prof. Dr. Jolanta Baskutienė

KAUNAS, 2015

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Final Degree Project (T000M016)

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(Title and code of study programme)

Analysis and development of cloud-based system for logistics chain management

DECLARATION OF ACADEMIC HONESTY

29 May 2015

Kaunas

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Kaunas, 2015. 77 p.

SUMMARY

The goal of this project was to create a cloud based prototype for logistics chain management. To fulfil this goal we made researches, gathered and analysed data. Presented project considers software principles for logistics chain management and analysis of existing logistics management software products by most needed features. Research of transportation types and transportation freight registration forms analysis as other essential shipments standards is proposed to creation of resource registration forms and request forms for "TransProto" prototype. In conclusion a cloud based prototype for logistics chain management was created with Justinmind prototyping program, description of prototype system with visual information is presented in work. Determination of system users and their intercommunion method is proposed quotation system for combining users, resources and quotes. Also proposals ranking system was created. Conclusions are presented at the end of work

Dargenavičius L. ir Kubeldzis E. Logistikos grandinės analizė ir valdymo sistemos kūrimas pagrįstas debesų sprendimais. Magistro baigiamasis darbas/ vadovė doc. dr. Jolanta Baskutienė; Kauno Technologijos Universitetas, Mechanikos inžinerijos ir dizaino fakultetas, Gamybos inžinerijos katedra.

Kaunas, 2015. 77 p.

SANTRAUKA

Šio projekto tikslas logistikos grandinės valdymo sistemos prototipo sukūrimas pagrįstas debesų sprendimais. Siekiant įvykdyti šį tikslą mes tyrėme, rinkome ir analizavome duomenis. Pateiktas projektas susideda iš logistikos grandinės valdymui naudojamų programinės įrangos veikimo principų apžvalgos ir egzistuojančių logistikos valdymo sistemų analizės pagal labiausiai reikalingas funkcijas. Transportavimo tipų tyrimas ir krovinių transportavimo registracijos formų analizė kartu ir kiti esminiai siuntimo ir logistikos standartai buvo išgryninti, kad galėtume sukurti išteklių registracijos ir paklausimų formas “TransProto” prototipui. Apibendrinant naudojant Justinmind prototipų kūrimo programą sukurtas prototipas paremtas debesų sprendimais logistikos grandinės valdymui, darbe vizualiai pateikėme prototipo sistemos koncepciją. Sukūrėme paklausimų vertinimo sistemą. Aprašėme sistemos vartotojus ir jų tarpusavio ryšius, taipogi sukūrėme paklausimų sistemą kuri apima vartotojus, išteklius ir paklausimus. Darbo pabaigoje pateikėme išvadas.

INTRODUCTION

Transportation market compared to 1990's grown 3 times. In this rapid growing environment, big international logistics companies pushing small freight companies from the market. For this reason SMEs of logistics are uniting forces and trying to collaborate between themselves. The recent trends of the global sharing economy are evolving and recent experience shows, that union of small players and IT, could give great benefits. Example of this success could be cloud based system "Uber" which provide taxi services all around the world, Uber's taxi driver could be any person with car and mobile phone. This system is so successful, that in some areas it almost pushed taxi companies away from the market. This example shown, that sharing economy products have very bright perspective.

In this project we want to lay the foundation for another global sharing economy product – "TransProto". "TransProto" is global logistics system based on shared economy principles. Currently there are a lot of software products for logistics, which help to optimize logistics operations, but there are only few products which help to streamline collaboration process. We aim to improve communication between all supply chain members to provide best possible value to shippers for competitive price. If we succeed, individuals: shippers and carriers can dictate the rules of tomorrow.

The main aim of the final project is:

To analyze and create a cloud based system prototype for logistics chain management.

Tasks:

1. Overview software principles for logistics management.
2. Analysis of existing logistic management software products.
3. Research of transportation types and creation of resources registration forms.
4. Research of transportation freight registration and creation of request forms.
5. Describe system users and intercommunion method.
6. To create a prototype and describe a concept.

Both authors Evaldas Kubeldzis & Linas Dargenavičius contributed equally to this work.

KAUNAS UNIVERSITY OF TECHNOLOGY

FACULTY OF MECHANICAL ENGINEERING AND DESIGN

Approved:
Head of Production Engineering Department

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(Signature, date)

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(Name, Surname)

MASTER STUDIES FINAL PROJECT TASK ASSIGNMENT
Study programme INDUSTRIAL ENGINEERING AND MANAGEMENT

The final project of Master studies to gain the master qualification degree, is research or applied type project, for completion and defence of which 30 credits are assigned. The final project of the students must demonstrate the deepened and enlarged knowledge acquired in the main studies, also gained skills to formulate and solve an actual problem having limited and (or) contradictory information, independently conduct scientific or applied analysis and properly interpret data. By completing and defending the final project Master studies student must demonstrate the creativity, ability to apply fundamental knowledge, understanding of social and commercial environment, Legal Acts and financial possibilities, show the information search skills, ability to carry out the qualified analysis, use numerical methods, applied software, common information technologies and correct language, ability to formulate proper conclusions.

1. Title of the Project

Analysis and development of cloud-based system for logistics chain management

Approved by the Dean 2015 y. May 11 d. Order No. ST17-F-11-2

2. Aim of the project

To analyse and create a cloud based system prototype for logistics chain management.

3. Structure of the project

Overview of logistics management software principles; Researches of logistics for "TransProto" prototype creation; Creation of resources registration and request forms; Description about system users and intercommunion method; Creation of prototype; Conclusions.

4. Requirements and conditions

Cloud based system prototype creation for logistics chain management. Should help all logistic users collaborate globally.

5. This task assignment is an integral part of the final project

6. Project submission deadline: 2015 June 1st.

Given to the students Evaldas Kubeldzis & Linas Dargenavičius

Task Assignment received Evaldas Kubeldzis _____

Linas Dargenavičius _____
(*Name, Surnames of the Students*)

Supervisor Assoc. prof. Dr. Jolanta Baskutienė _____
(*Position, Name, Surname*) (*Signature, date*)

1 Software principles for logistics management

Logistics business is made up of many tasks from order to delivery to satisfied customer. Figure 1 shows the overall logistics business process. After receiving customer's order, a logistics company plans the delivery schedules with consideration for delivery destinations and appointment time. In the case of long-distance transportation such as between the central distribution centers and the regional distribution centers (RDC), the load optimization is important because the number of operational vehicles can be significantly reduced. In the case of regional delivery, the route optimization is required because it has multiple delivery points from RDC. Warehouse management system makes it more efficient through accurate inventory management and scheduling. The freight charges between shippers and logistic companies should be computed and the path of the vehicle by GPS (Global Positioning System) also should be monitored. By monitoring vehicle movement, route breakaway can be prevented and a sudden accident can be taken action quickly. In order to forecast freight volume and to reflect in the delivery schedule, the analysis of completed delivery data is also necessary.

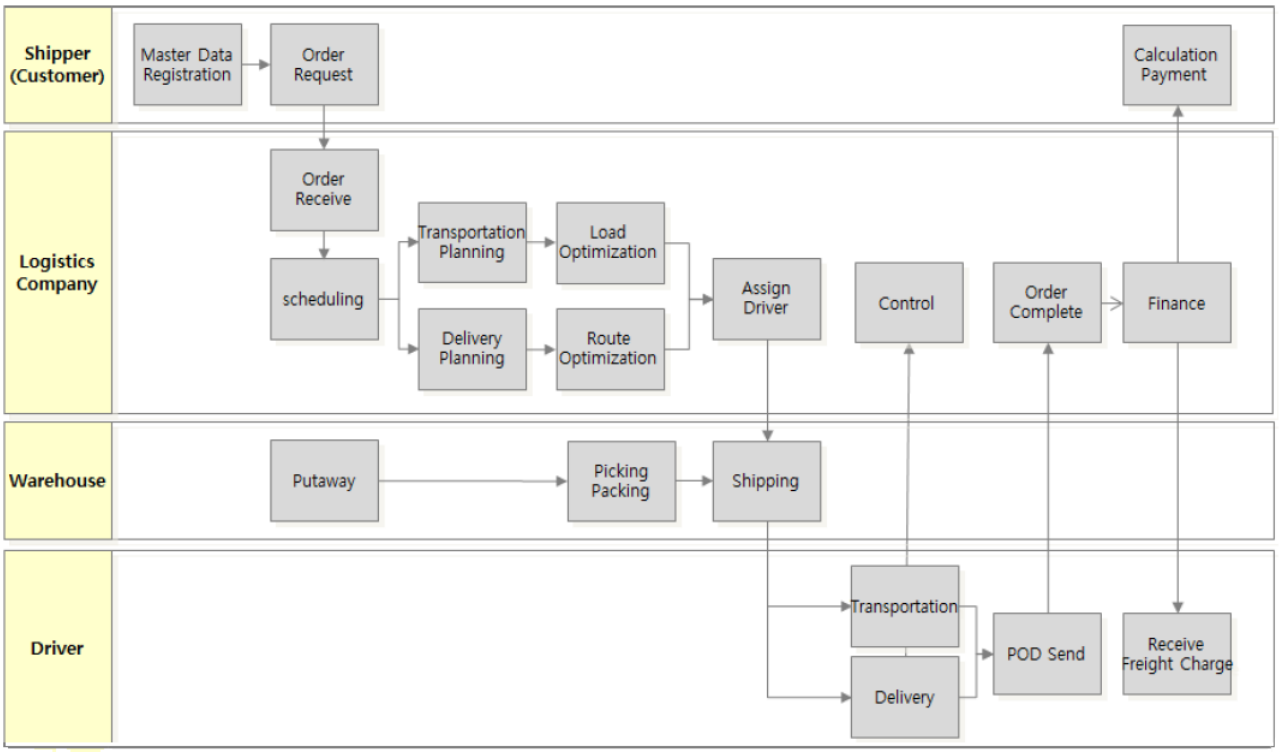


Figure 1 Overall logistics business process [1]

The logistic companies wish to integrate the load optimization solution with the route optimization solution within a single system. Therefore, the integrated logistics information system (ILIS) is necessary to the logistics company. But most of third-party logistics companies are small

and medium sized scale, so they are hard to establish and operate IT system in the respect to the cost. In this study, we suggest the design of the main components of ILIS in the shape of SaaS in cloud computing environment.

Describing in terms of system, the stakeholders of the ILIS are shippers, logistics companies, warehouse managers and vehicle drivers. The main function of the system consists of master data management, order management, transportation management, warehouse management, freight management, vehicle monitoring, analysis reports, mobile business management, and system management. The core functions are considered to delivery scheduling, dispatching, load optimization for transportations between CDCs and RDCs, route optimization for delivery to customers. Figure 2 is overview of the ILIS. This shows interaction between main functions of the system. As shown in Figure 2, the ILIS is essential to the logistics business because real time data processing between stakeholders is important.

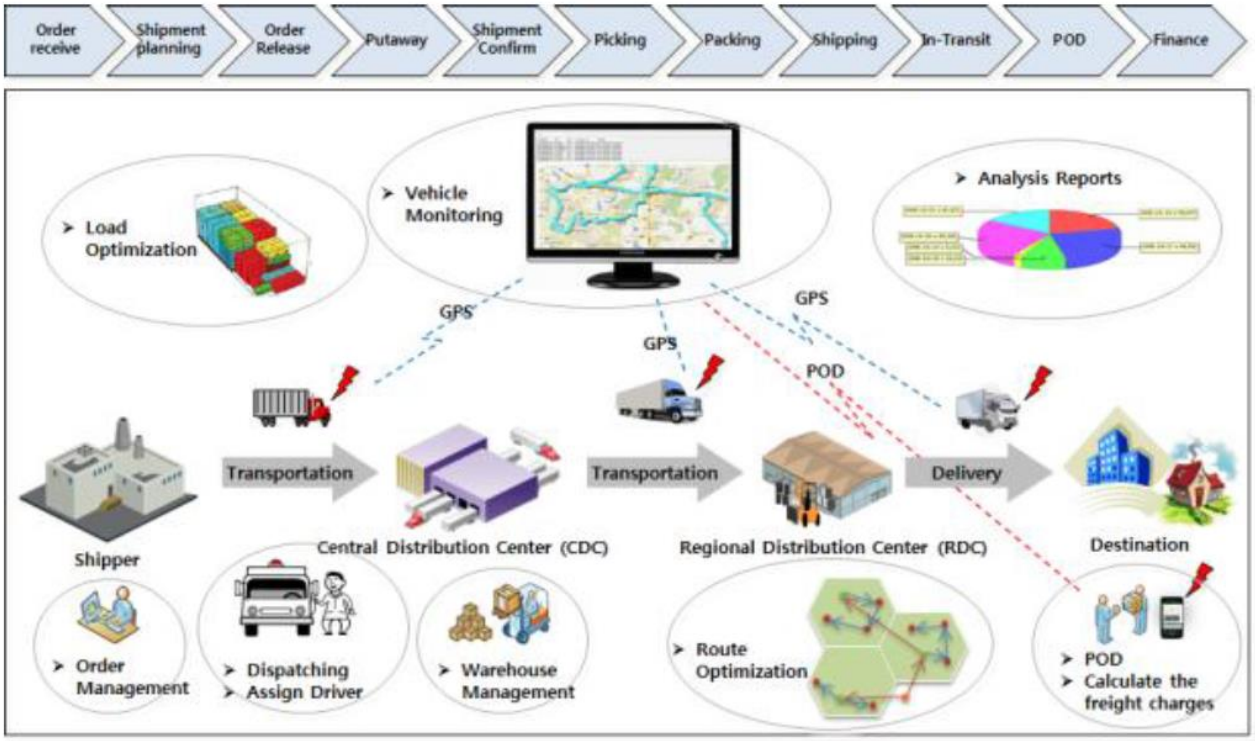


Figure 2 Overview of the ILIS [1]

1.1 Understanding freight forwarding system

Multimodal transport refers to the transportation of goods by two or more different modes of transport (such as road, rail, air or inland waterway, and short-or deep-sea shipping) as part of the contract where often a multimodal transport operator (MTO) is responsible for the performance of the entire haulage contract from shipping to destination. The movement of goods

could be within one country or international with additional procedures such as goods clearance at customs. Figure 3 illustrates the whole international transport process where goods are moved from a country A to final destination in country B and the Involvement of MTO during their journey.

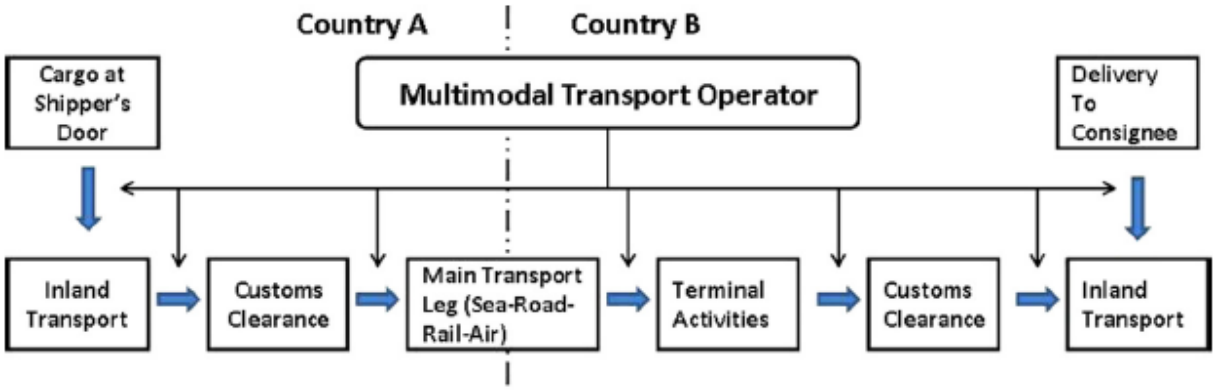


Figure 3 Multimodal transport operator [2]

Its aim is to transfer goods in a continuous flow through the entire transport chain to make a transportation journey more efficient from a financial, environmental and time perspective. With the massive growth in containerization and the great shift in thinking from a conventional unimodal to a system concept multimodal transport approach, multimodal is currently the main method used in the international transportation process as it enables the optimization and organization of all transport modes into an integrated continuous system in order to achieve operationally efficient and cost-effective delivery of goods in the supply chain.

By using technology in the cloud as a service, organizations are freed from the burden of managing the complexities of ICT applications and are able to focus on their core business strategies. This is of strategic importance to small and medium enterprises which otherwise cannot afford or do not have in-house capability and expertise to deploy sufficient ICT solutions to support business needs. On the other hand, the users of on-demand services should also be aware of the security implications before using these facilities where cost gains could be offset by potential risks. For example, International Asset systems (2013) developed a suite of on demand integrated logistics management applications based on best practice which could be implemented to allow their customers to gain immediate benefits from connecting to intermodal partners. The system utilizes a number of industry standards and integrates with a number of commercial and engaging software packages.

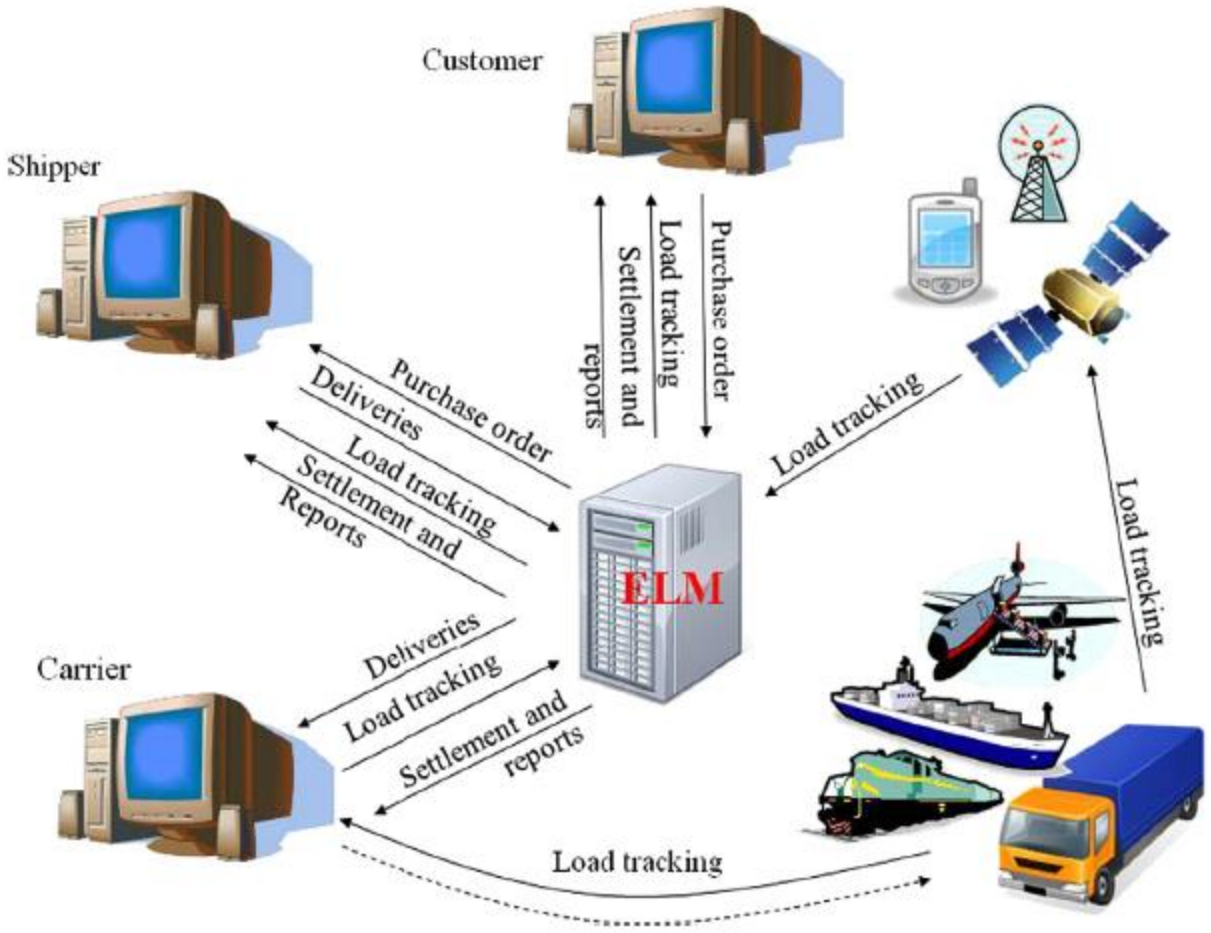


Figure 4 ELM demonstration [2]

Figure 4 demonstrates how a closed ELM can be used to manage the order fulfilment process and speed up communications across the whole supply chain. The process starts with the customer generating a purchasing order in the ELM and the order is automatically transferred to the shipper. Following this, transport planning and execution takes place between the shipper and carrier. During the goods-in-transit period, the system gives a constant update on the status of this consignment (for instance via real time tracking using GPS) to all parties involved. A closed ELM could be either hosted in house or by a third party technology service provider based on cloud computing. The latter is often referred to as a cloud-based ELM [2]. One of the major advantages of using a cloud-based ELM is that it provides centralized management of all the data relating to a particular consignment. Also, any change can be simultaneously communicated to all the different parties involved. This increased visibility enables companies to be in more control of the supply chain and be proactive in responding to exceptional events. The system can also facilitate financial settlements and performance reviews such as total delivery cost and on-time delivery. By changing the structure of communications between shippers, carriers, an ELM integrates various modes of

transport into an interconnected streamlined supply chain and brings multiple benefits including cost reduction and customer service improvement.

In conclusion these systems as integrated logistics information systems (ILIS) or electronic logistics marketplace (ELM) are used by logistic members. This theoretic information of these systems gives brief understanding what system we are creating. We use cloud-based ELM principle and it has some ILIS features included. This ELM example given in Figure 4 don't have users as warehouses it is important to logistics systems to implement warehouses as system users to manage a full logistic process.

1.2 Infrastructure for internet technologies in logistics chain management

Since the demand for high speed Internet services for processing voluminous data, there is a need for high speed Internet Portals. There are many Internet Portals (Yahoo, AOL, JUNO, etc.) offer services to companies to have their products on e-marketplace. However, the system is slow during peak hours. Although companies develop their e-commerce web site with the animation and 3D view of their products/services to improve the quality of interactive marketing with customers. However, this makes the system slow and customers have to wait long to open or view the page. They may lose their patience in buying products online. Hence, there is a need to trade-off between the quantity and quality of information that should be made available on their web site and the speed of access. Developing IT infrastructure requires investment in Internet services, web development and updating. There are many strategies to overcome this; for instance, strategic alliances with partnering IT firms and other partners would help to overcome the technology problems.

Companies should decide the type of networks (Intranet and Extranet) that would be suitable for their business. Also, they need to invest in developing the IT skills of their employees. IT migration is required from time to time based on the changes to the business process and organizational objectives and strategies. This highlights the importance of being learning organization that obviously supports agility in Internet-enabled SCM.

Given the rapid accessibility to customers and suppliers around the world, businesses appear to be turning towards networks of co-operation rather than external control structures. Global supply chain with uncertainty driven new network orientation. A network orientation will encourage more integrated levels of the Internet Commerce adoption that in turn further strengthens the relationship between a network orientation and its implementation. A dense networking infrastructure to support digital communications is the obvious backbone of any information society. New broadband and wireless technologies are being funded and developed so that eventually all citizens and businesses will be connected.

The infrastructure question has been crucial for the successful application of IT in SCM. Many companies fail to recognize their weaknesses and strengths in terms of their streamlining their business processes, and lack of knowledge and computer skills. A guidebook could be developed by researchers to assist practitioners in developing infrastructure for achieving an IT-enabled SCM. The optimal investment areas need to be identified in a company taking into account the business goals and financial strength. An intelligent simulation model using object-oriented modeling would be useful for this purpose. Government and industry consortium support are essential for developing (1) B2B e-commerce, (2) e-commerce policies and ethics, and (3) costing system.

Knowledge management has become one of the strategic uses of IT in today's business environments. Many companies are considering building KM system for organizational learning. However, in networked economy, many companies lack a suitable framework for effectively managing the knowledge and IT considering their life cycles. This requires a systemic evaluation of various knowledge and IT management strategies and techniques. There are different ways to manage the knowledge and IT. These include strategic alignment with partnering firms, collaboration with local universities and training and education in IT. Knowledge about market and customer expectations can be acquired with web-based information systems. This opens up the whole world of information. However, it is unlikely that companies can let their employees to spend unlimited amount of time in searching through voluminous information. Therefore, data mining and data warehousing techniques will help to improve the speed of data processing and hence make available the right information for making timely and more accurate decisions.

Researchers are yet to come up with precise strategies and methods for managing knowledge and IT in supply chain environment. The management of knowledge and IT requires planning, coordinating and controlling of activities. This requires constant updating of the knowledge and IT available in an organization. No company has unlimited resources, therefore, suitable and critical areas need to be identified with the objective of optimizing the investment in knowledge and IT projects and at the same time achieving maximum benefits. Various decision models need to be developed for decision making in the areas of knowledge and information technology management. Tools such as project management can be used to optimize the completion time with the limited resources available. Common industry fund needs to be established for training and education on new technologies and strategies of IT in SCM. [16]

Implementation issues of IT in SCM. Implementation of IT to achieve agility in a supply chain requires a strong team that can include key and IT knowledgeable managers from all functional areas. A well-documented implementation plan is required for IT in developing an effective supply chain. Moreover, the top management support and involvement are essential for the

successful implementation of IT in SCM. Implementation may require making necessary changes to organizational business processes with the objective of absorbing the IT system such as SAP and CAD/CAM. Before implementing IT, there is a need to look at the business model and then identify suitable IT systems required to support the objective of achieving agility in a supply chain.

There are several tools and methods available for effectively managing the implementation of IT for responsive supply chain and some them can include QFD, CE and life cycle approach. Top management should encourage the empowered implementation team to cut across the functional barriers and provide with necessary technical and financial support to achieve a productive supply chain with suitable IT systems. Suitable performance measures and metrics should be developed to monitor the implementation of IT over a time period. This will also include planning phase, pilot phase and go live.

Besides, business process reengineering has been considered as one of the most important strategies for streamlining the business process. IT is an important component of reengineering business process by eliminating non-value-added activities in a supply chain. BPR and IT complement each other in their efforts to achieve dramatic improvements by radical changes. IT plays an important role in BPR as the speed, information processing capabilities and connectivity of computers can increase the efficiency of business processes and communications in the SCM systems.

Implementation of IT for achieving an effective supply chain warrants suitable framework that is based on theoretical analysis and past experiences. More case studies and benchmarking studies would be useful. Strategic alliances and benchmarking studies on implementing IT for SCM would be helpful. Lack of case studies and empirical research continue to put the companies behind in terms of coming forward to implement various IT for achieving an integrated SCM. [16]

In conclusion group of firms with low level of effective supply chain practices and information quality performs well on both sale revenue and return on sales revenue. It suggests that what firms really need to pursue is the desirable level of effective supply chain practices and information quality [23]. The desirable level is not always a high level of most effective supply chain.

1.3 Clustering of logistics companies

The geographical clustering of economic activity can impact on the productivity of firms in a number of different ways. It is expected that firms in a cluster can benefit from productivity improvements due to reduced transport costs, access to a common pool of labor (skilled or unskilled), technology spillovers and increased competitive pressure.

While the focus of most empirical work is on identifying the productivity gains from clustering, it is also possible that there are disadvantages associated with the clustering of firms, particularly for firms that compete to sell to customers located in the same geographic area. Increased competitive pressures will drive down the price of goods and services and erode mark-ups. Only the most productive firms will survive and many firms will be forced to locate far away from each other as a result.

We consider two main mechanisms through which clustering could impact on the performance of firms: a competition mechanism and a spillover mechanism. First, consistent with the standard Cournot competition result, which suggests that the greater the number of firms in a market the lower the price, we expect that firms located in clusters with large numbers of firms in the same sector will face tougher competition and must operate more efficiently in order to survive. These firms will be forced to cut slack and use costs more efficiently and as a result should, ceteris paribus, appear more productive than firms located in markets with fewer local competitors. However, as is common in developing country settings, the adjustment process may be slow and competition in prices may first lead to an erosion of mark-ups before significant exit of firms is observed. Moreover, small-scale informal firms are unlikely to exit production even if they are loss-making as many are household enterprises with diversified income sources that may act as substitutes and serve both as sources of revenue and as risk coping mechanisms. As such, more intense competition in clusters may in fact lead to negative effects on measured firm performance. Second, we consider whether firms experience spillover effects from other firms producing the same output that are located in close proximity. These are commonly referred to as localization economies. The extent of such spillovers will depend on the characteristics of the cluster but also the characteristics of the firm.

In conclusion the system that we are creating is helping for all small and medium logistic enterprises to manage their logistics in affordable price. The system is like cluster of logistics it makes all providers equal for fair competition between them.

2 Researches of logistics for “TransProto” creation

Production capacity is growing year after year worldwide (

Figure 5). That means, that global transportation sector is growing too. Our aim is to create tool which help shippers and carrier to find the best way to ship goods.

We want to create system which offers for shipper’s fast way to find qualities carriers for competitive price. For carriers we offer large number of shipments, possibility to collaborate and feature to find exact freight their need (by location).

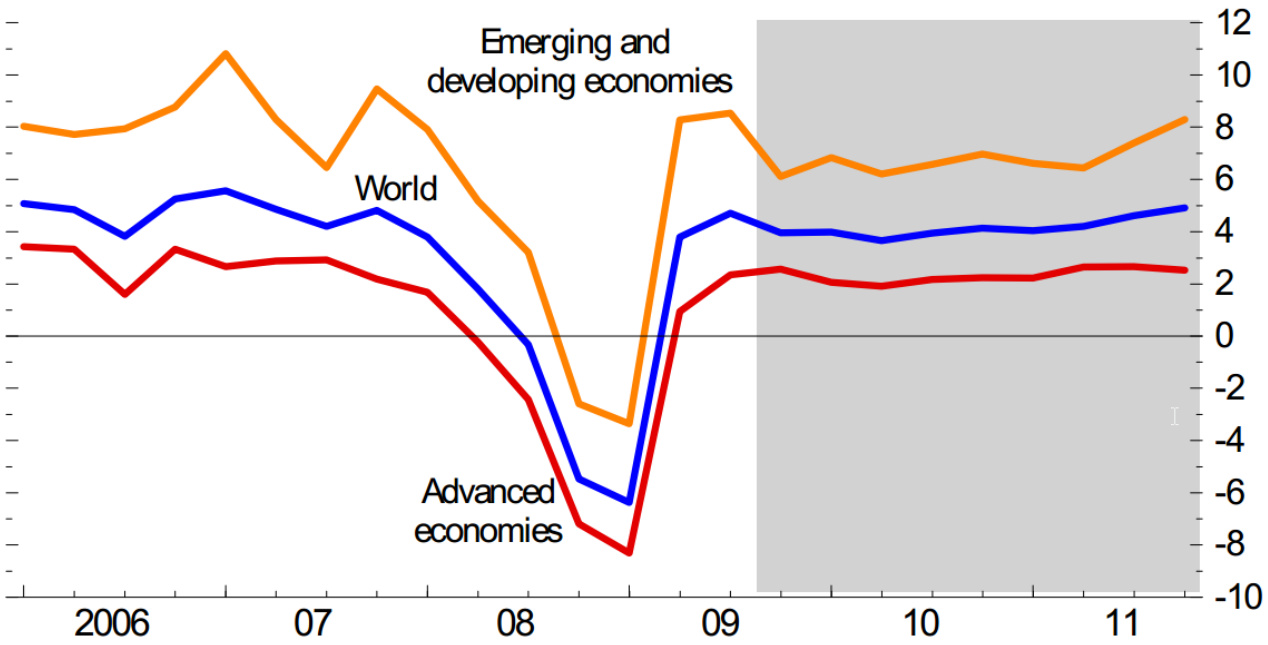


Figure 5 Global GDP growth [25]

Transportation is collaboration of two sides: sender-receiver and carriers. Both sides have some issues:

1. First of all there are problem in dissemination of information. Carries don't have information about all cargos around. In turn sender don't have information about transport around him. In other words, there is no constantly updated global data base with cargos and transport in it. There is some products, but they are specific: for sea, truck or rail transportation. Generally for senders is not important the transportation method. By lack of information by two side's sender and carrier appears broker between them - freight forwarders. Freight forwarders is the companies with information carriers come to their for cargos senders for transportation. Another way for send cargo is to communicate with big international transportation company. Both ways have some advantages and disadvantages, carrier's price is better, but they lack of flexibility.
2. Senders and carriers "language" does not mach. In senders mind pickup point is destination point and time. In carrier's "language" it becomes more technical: type of container, type of transportation (sea, land, and rail). Basically this doesn't matter for senders, but it matters for carriers. Freight forwarders or large international companies are able to solve this problem, but by this communication issue decrease carriers profit and increase price for sender.
3. Reliability problem consists of mistrust. When shipper sends cargo he doesn't know if carrier is reliable.

Logistics maintain from 3 main parts:

1. Transportation
2. Courier service (optional)
3. Warehousing (optional)

Transportation is the process when production of company is moving from one place to another. There are four types of transportation:

1. Marine shipping
2. Rail transportation
3. Trucking
4. Air transportation

All these types have same pluses and minuses. Marine shipping is cheapest way to transport goods, but this way is slowest and it's impossible to reach some places, because in same places there are no ports. Rail transportation is cheap too, and much faster than marine shipping, but in many cases it's need for additional warehousing (like marine shipping). Trucking it's very dynamic and fast way to ship goods, but is quite expensive. Air transportation is the quickest way to transport product, but it also the most expensive.

Figure 6 Logistics infrastructure example

Warehousing is very important part of logistics. In many cases there is no possibility for example from ship directly to truck which will transport shipment directly to end customer. So warehouses are lethal to modern logistics. There are few types of warehouses, basely they are for shipments collection, storage and is like distribution centers. Different warehouses do different operations.

Distribution is the final part of logistics. It's the process when goods from distributions centers are delivered for end customer.

Warehousing is one of most important part of logistics. Warehouse can have a lot of options: for example packaging or it can be distribution center, or can have refrigerator option. So in our job warehouse options is attributes.

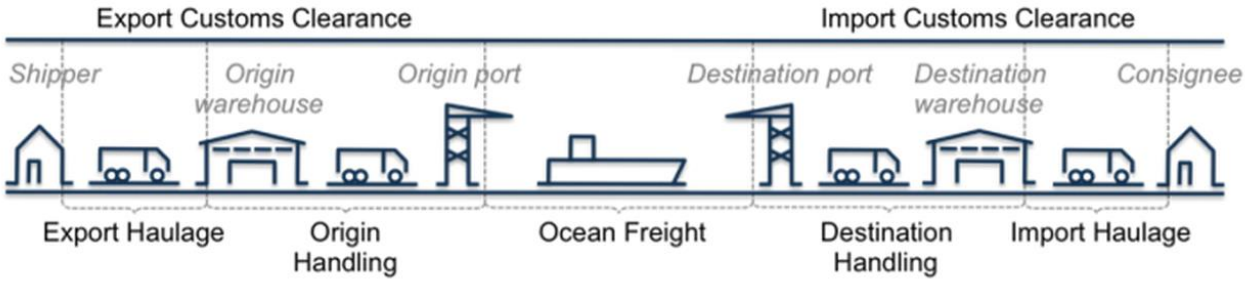


Figure 7 Basic scheme of offshore logistics

As you can see in Figure 7 that can be few type of collaboration: Warehouse – Transportation - warehouse, Warehouse – distribution, collection - warehouse. Warehouse in this statement is much wider, warehouse can be production plant warehouse or final destination point.

In many cases for example intercontinental logistics, there can be few steps for warehouse – transportation – ware house. In Figure 7 you can see basic scheme of this example. Courier service is the optional link of logistics. The main object of courier service is to collect or distribute goods.

2.1 Analysis of existing logistic management software products

Analysis is made by analyzing 12 features of each software bellow. We analyzed 20 logistics management and freight forwarders software, data taken from http://www.capterra.com/freight-software. Features consists of most needed usability's:

Tracking (Barcode/RFID scanning). Is essential to any system to maintain track of products, packages on the way to the receiver and in warehouse.

Quoting. This feature gives possibility to know the price before order.

User friendly and easy to use. It should be easy to use for novice users and also the systems should be menu-driven, more graphical.

Global and local carrier selection. Possibility for users to fulfill their shipping through all other the world.

Accounting integration. Particularly it means that users gets personal space to all usability's, also collection of data to simplify feature processes.

Inventory management. Used to keep track of existing inventory and its use.

Order management. Usability to manage/change the order.

Scheduling. This features gives carriers a planning opportunity, to schedule their capacities and inventory, plan future works.

Shipping management. Usability to manage all shipping and keep a track.

Based on cloud solution. Web based. Cloud resources are usually not only shared by multiple users but are also dynamically reallocated per demand.

Freight brokering. Connecting shipper to carrier, order fulfillment without this feature software is just management tool.

Billing and Invoicing. Possibility to get Invoice.

In best case all software would have each described feature, we would say it would be ideal and that software would be our direct competitor. Figure 8 shows frequency of features, 15 software products are cloud based, that means these software's can run without installation from any part of the world. From 20 software products in analysis we can see that 7 of them has freight brokering feature. This feature is main in our platform without it the software can be used just for managing, calculating and control. It gives main principle of connecting shippers to carriers within platform. Global and local carrier selection is needed for global shipping, 15 software products has it. To use software also as a managing tool we need shipping management, this feature has 11 software products. Also inventory management is necessary to manage and keep track of inventory, 9 software has it. Scheduling is necessary to organize and plan future orders, 7 software products has it. Tracking of packages or pallet is needed in every managing driven platform for all customers weather its shipper, broker, warehouse, carrier or recipient. 14 software products has tracking possibility, barcode or RFID scanning.

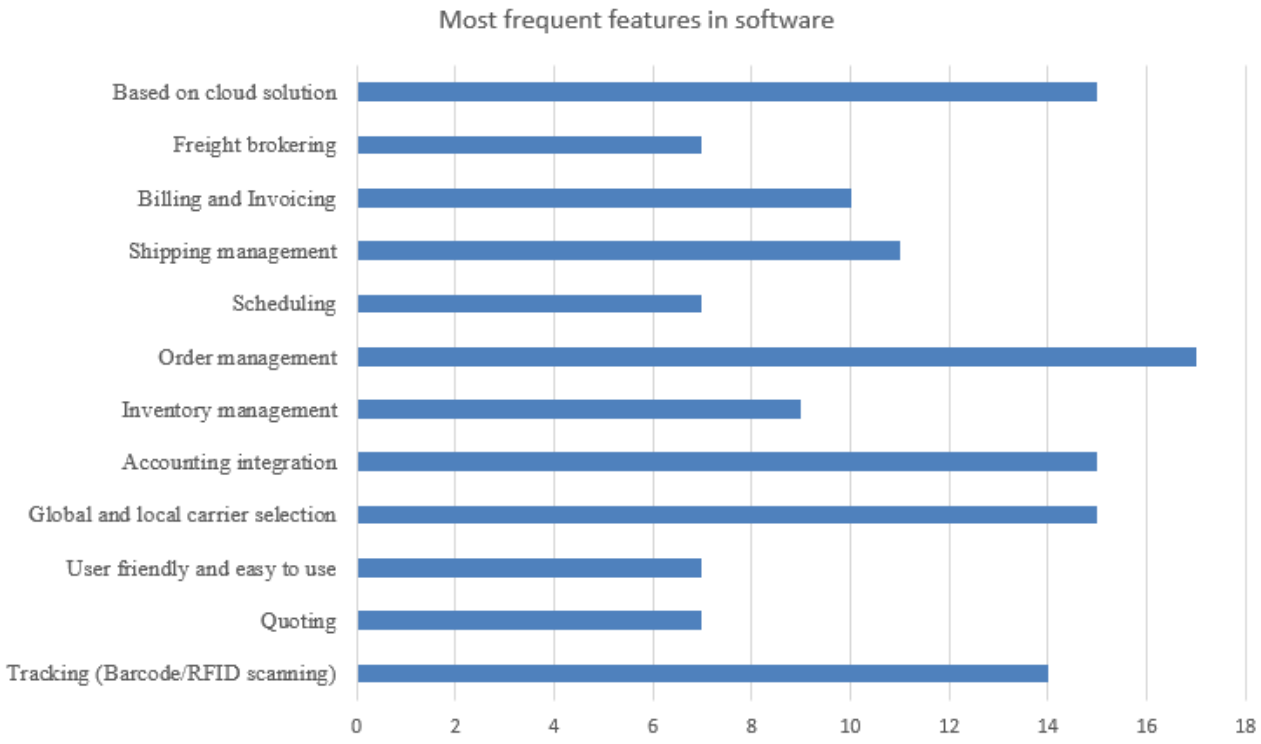


Figure 8 Frequency of 12 features in software

Every system has to help faithful users to simplify their processes by account integration, to help them not repeat the same process by collecting their user data. 15 software products has account integration. Billing and invoicing feature is included in 10 software products. One of our best features is quoting, 9 software products has this feature. It's always good to check the prices, for calculation and planning also as to know that you are not overpaying for logistic services. Figure 9 shows quantity of usability's within each software. From total 12 features two software products has 11 features it is Awery Airline Management software and 3Plink.

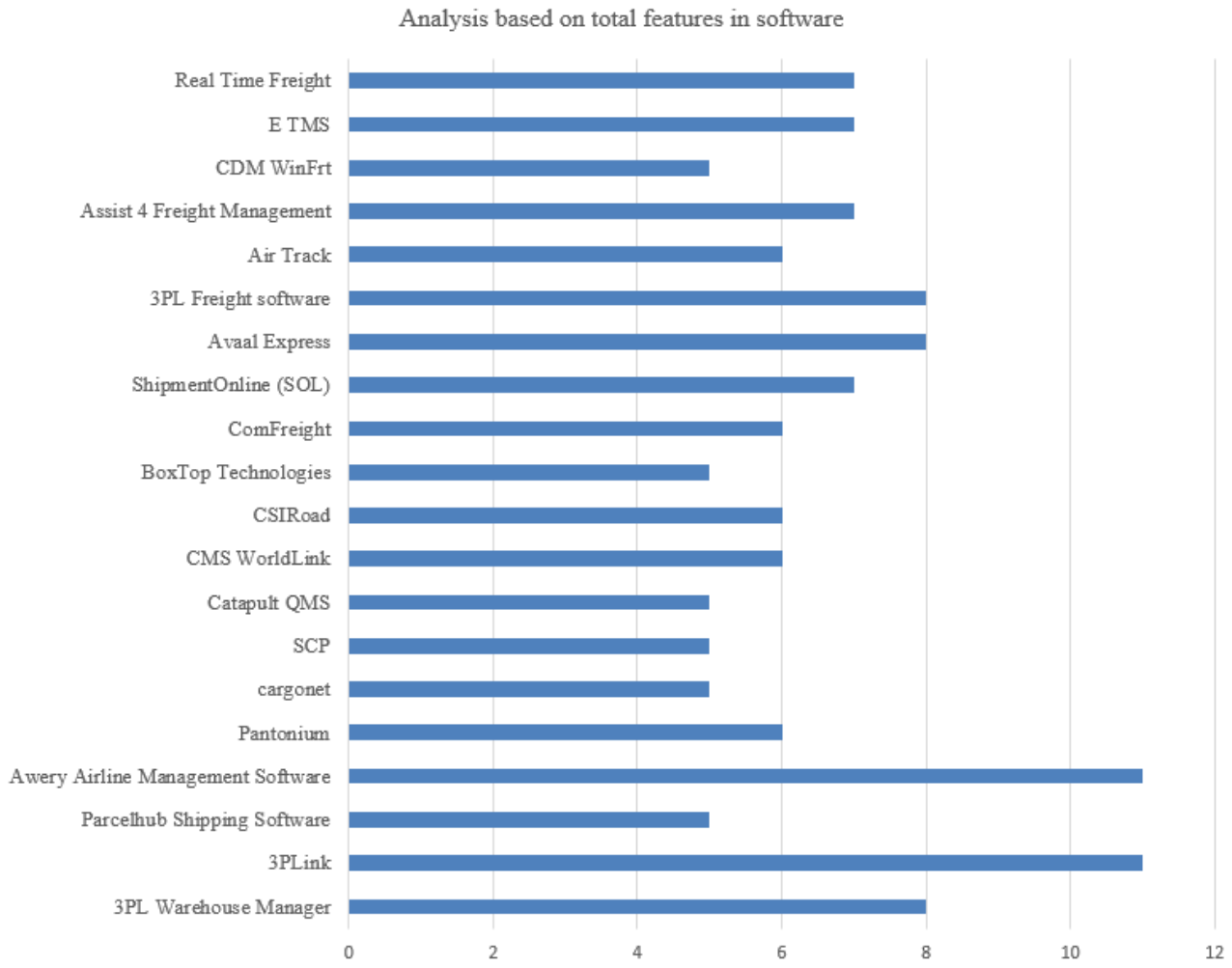


Figure 9 Frequency of 20 software products showing features quantity

For further analysis we use 7 software products with freight brokering feature as shown in Figure 10, all table can be found in APPENDIX III. Awery Airline management software is good software product it has all most needed features but it's just for air transport management.

Software	Tracking (Barcode/RFID scanning)	Quoting	User friendly and easy to use	Global and local carrier selection	Accounting integration	Inventory management
3PLink	1		1	1	1	1
Awery Airline Management	1		1	1	1	1
ComFreight			1	1		
Avaal Express	1	1		1	1	
3PL Freight software	1	1		1	1	
E TMS				1	1	
Real Time Freight	1	1		1	1	
Software	**Order management**	**Scheduling**	**Shipping management**	**Billing and Invoicing**	**Freight brokering**	**Based on cloud solution**
3PLink	1	1	1	1	1	1
Awery Airline Management	1	1	1	1	1	1
ComFreight	1		1		1	1
Avaal Express	1		1	1	1	
3PL Freight software	1			1	1	1
E TMS	1		1	1	1	1
Real Time Freight				1	1	1

Figure 10 Features checklist of 7 software products with freight brokering

Avaal Express software is not easy to use for first time user, no gamification in it. It doesn't have scheduling and inventory control. The software is not cloud based so to use it you need installation. We like the principle of ComFreight software it easy to use and affordable for shippers it's free, monthly cost for carriers is 15 US dollars and for brokers 19 US dollars per month. It's main minus is that it's just in truck logistics, mostly in United States. 3PL Freight software has a good quoting feature, but is difficult to use, also it lacks scheduling and shipping management features. 3Plink is good software with a lot features starting from 10 000 US dollars one-time cost. It has 11 features from our list, it lacks just quotation feature, it is a good system but used more for managing not freight brokering. There are a lot of logistics management systems but not like ours we want to give new simple approach to logistic.

The ideal software in our case must have all described features and be cloud based accessible globally to all main devices: computers, smart phones, tablets. It all should be supplied with gamification in user friendly surrounding and be easy to use for first time users. Our platform should connect all logistic users: shippers, carriers, brokers, warehouses and recipients. It should be network driven, an example of similar system would be Uber, its biggest taxi company in the world without owning any vehicles just connecting drivers to clients.

2.2 Transportation types analysis for resources registration forms

Marine shipping. The global marine shipping sector is responsible for approximately 1.5 percent of global greenhouse gas emissions from anthropogenic sources.

Under "business-as-usual" conditions, emissions from the global shipping fleet are expected to double by 2050. The international dimension of global shipping complicates policy

efforts to reduce emissions. Working with and through transnational actors will be an essential step to forging meaningful, global regulations.

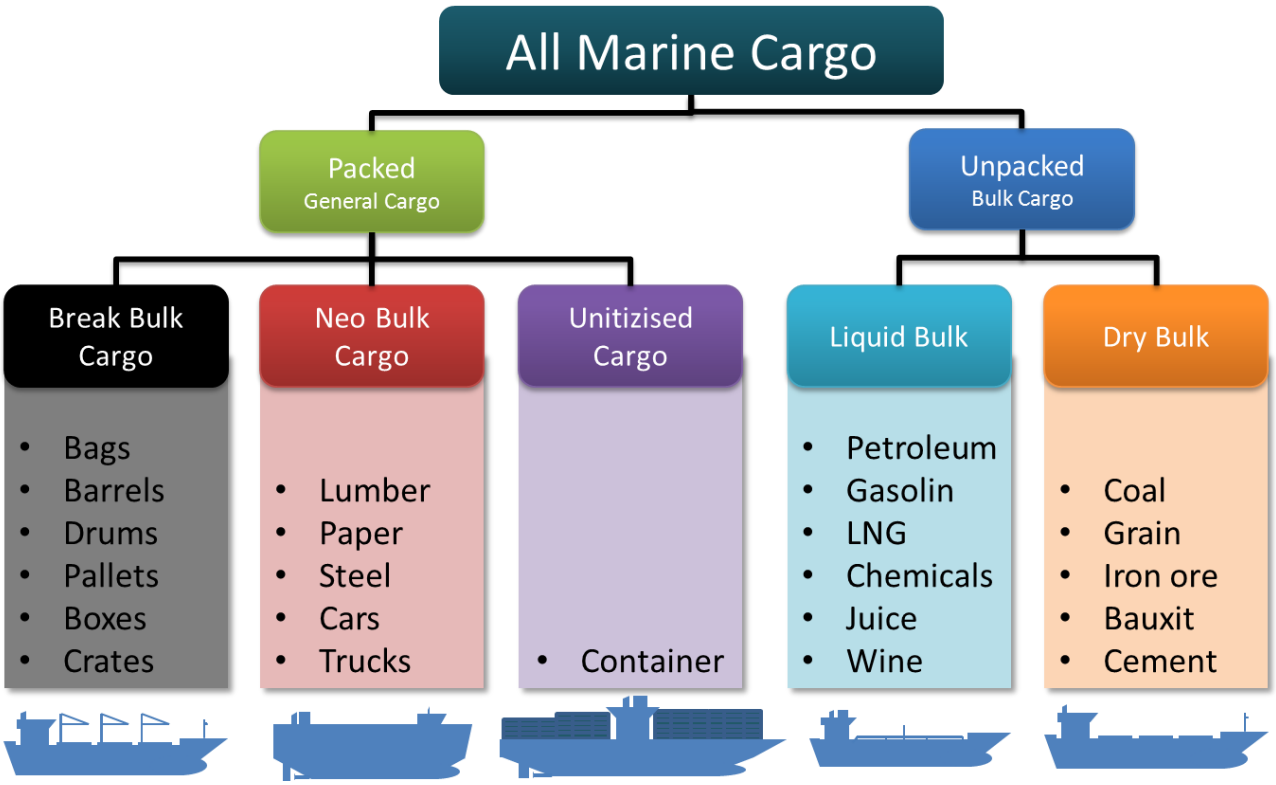


Figure 11 Marine cargo types

Marine shipping both domestic and international plays a vital part in the globalized world, moving goods both within and between countries. Demand for global shipping has steadily risen to transport goods between markets as international trade has increased.

At Figure 12 you can see all container types. These types can be divided into 5 groups:

1. Standard containers (for pallets, packages etc.)
2. Platforms (for transport, custom industrial parts, etc.)
3. Refrigerated containers (for food)
4. Tank containers for liquid products
5. Opened – top containers for brittle products

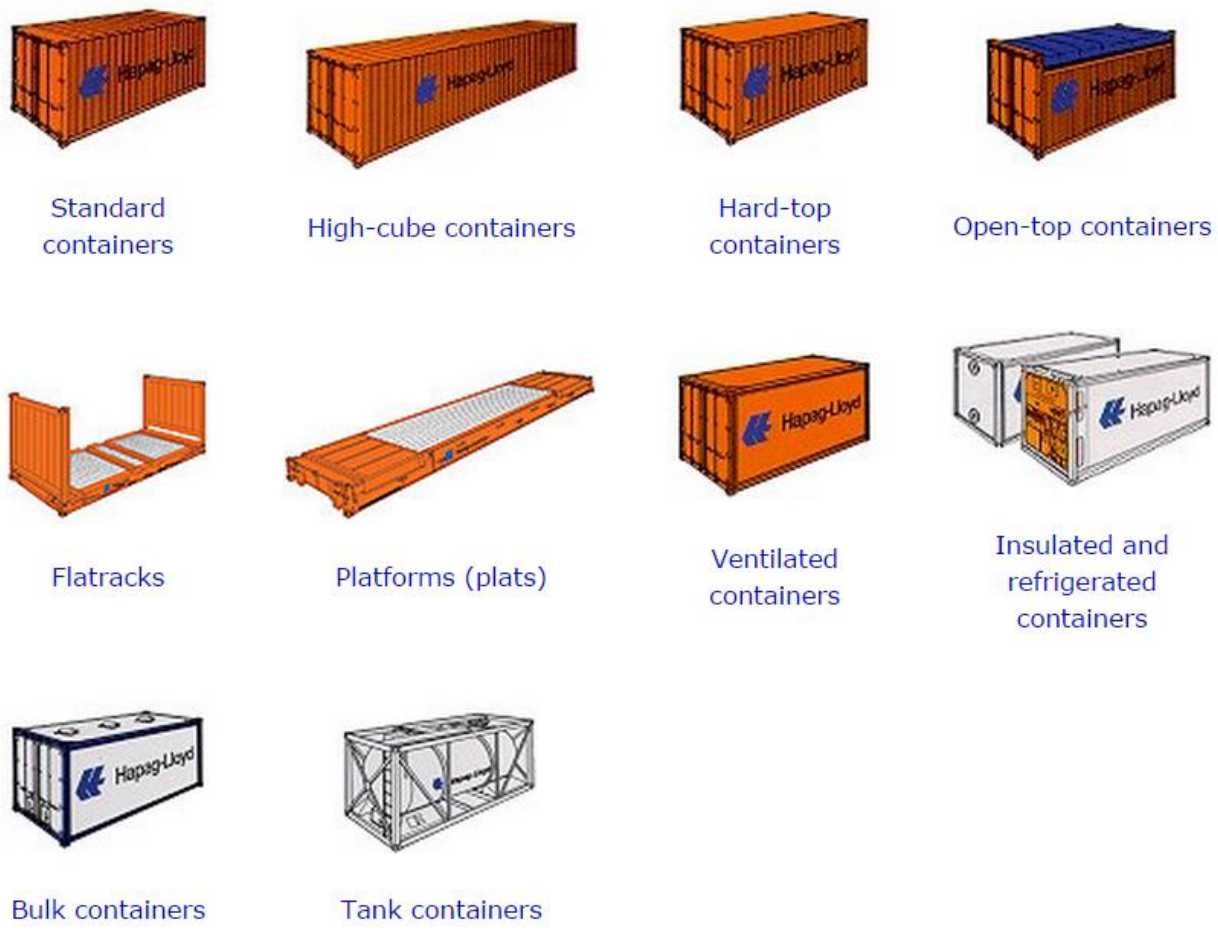


Figure 12 Container types [22]

Truck transportation. As you can see transportation by trucks holds very big part of transportation market. For our product we must analyze what types of lorries is most usable by truck companies. We decide that the quickest way to get not precise but approximate information is get data from sale portal of semi-trailers [36]. Below in Table 1 you can see their information:

Table 1 Semi-trailers quantity [37]

Closed body	Qty.	Open body	Qty.	Tanks	Qty.	Special	Qty.
Closed box semi-trailer	424	Chassis semi-trailer	84	Bitumen tanks	134	Animal transport semi-trailer	68
Isothermal semi-trailer	91	Container chassis semi-trailer	608	Cement tanks	217	Auto transporter semi-trailer	35
Refrigerator semi-trailer	1608	Flatbed semi-trailer	314	Chemical tanks	152	Concrete mixer	43
Tilt semi-trailer	3496	Platform semi-trailer	528	Flour transports	25	Glass transport semi-trailer	25
Curtainsider	1292	Timber transport	129	Food tanks	230	Grain truck semi-trailer	41

		semi-trailer					
		Tipper semi-trailer	1598	Fuel tanks	828	Semi-trailer low loader semi-trailer	972
		Walking floor	53	Gas tanks	207	Transport of poultry semi-trailer	6
				Silo tanks	178		
				Tanks	576		

There is total of 13976 semi-trailers for sail. It can be expressed by percentage as shown in Table 1.

Table 2 Semi-trailers qty. by percentage

Closed body	Qty.	Open body	Qty.	Tanks	Qty.	Special	Qty.
Closed box semi-trailer	3,06%	Chassis semi-trailer	0,60%	Bitumen tanks	0,96%	Animal transport semi-trailer	0,49%
Isothermal semi-trailer	0,67%	Container chassis semi-trailer	4,36%	Cement tanks	1,60%	Auto transporter semi-trailer	0,25%
Refrigerator semi-trailer	11,57%	Flatbed semi-trailer	2,23%	Chemical tanks	1,11%	Concrete mixer	0,31%
Tilt semi-trailer	34,24%	Platform semi-trailer	3,75%	Flour transports	0,18%	Glass transport semi-trailer	0,17%
		Timber transport semi-trailer	0,93%	Food tanks	1,66%	Grain truck semi-trailer	0,29%
		Tipper semi-trailer	11,40%	Fuel tanks	5,92%	Semi-trailer low loader semi-trailer	6,91%
		Walking floor	0,38%	Gas tanks	1,48%	Transport of poultry semi-trailer	0,04%
				Silo tanks	1,30%		
				Tanks	4,13%		

Highlighted are the semi-trailers which are more than 3%. In total these Semi-trailers is 97% of all trailers as shown in Table 2.

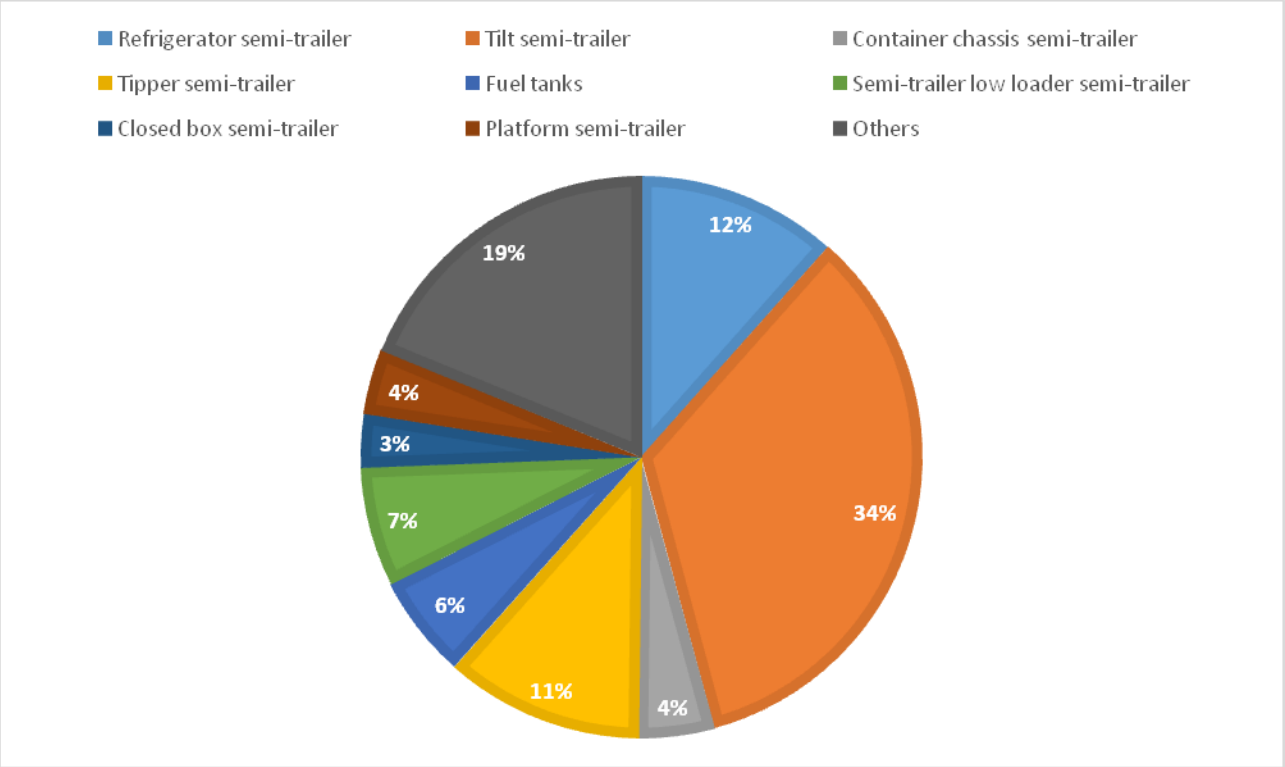


Figure 13 Semi – trailers distribution

There are a lot of types of usable semi-trailers so we have decided to combine some types. Closed box semi-trailer, refrigerator semi-trailer is basically the same semi-trailer but with different attribute refrigerator. Platform semi-trailers can be combined in one group with different attributes (low, flat) flatbed semi-trailer, demi-trailer low loader semi-trailer, Platform semi-trailer. All tanks we combined in one group with attribute for fuel. After the total compilation we get this Figure 13.

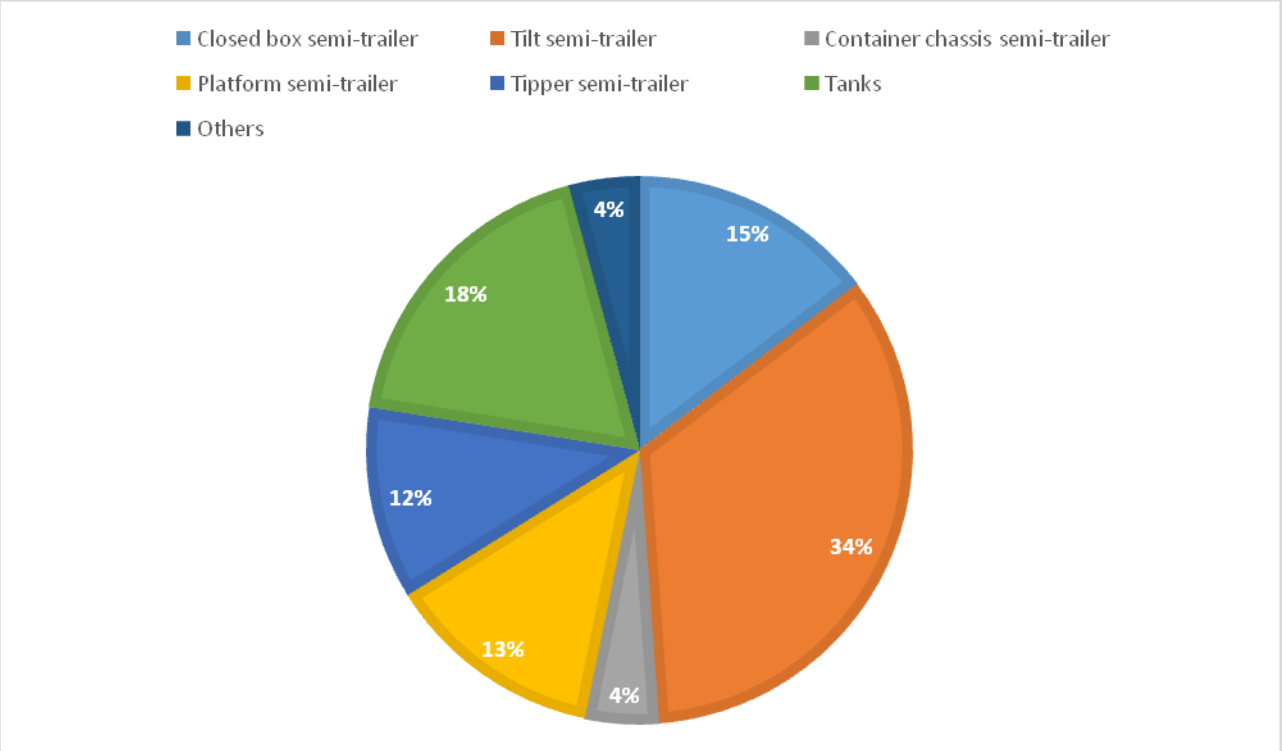


Figure 14 Recombined semi – trailers distribution

This structure as shown in Figure 14 gives to possibility to combine 96% of all semi-trailers.

Rail freight transport. Rail freight transport is the use of railroads to transport cargo as opposed to human passengers. A freight train or goods train is a group of freight cars (US) or goods wagons (UIC) hauled by one or more locomotives on a railway, transporting cargo all or some of the way between the shipper and the intended destination as part of the logistics chain. Trains may haul bulk material, intermodal containers, general freight or specialized freight in purpose-designed cars. Rail freight practices and economics vary by country and region.

When considered in terms of ton-miles or ton-kilometers hauled per unit of energy consumed, rail transport can be more efficient than other means of transportation. Maximum economies are typically realized with bulk commodities (e.g., coal), especially when hauled over long distances. However, shipment by rail is not as flexible as by highway, which has resulted in much freight being hauled by truck, even over long distances. Moving goods by rail often involves transshipment costs, particularly when the shipper or receiver lack direct rail access. These costs may exceed that of operating the train itself, a factor that practices such as containerization aim to minimize.

We have to found wagon type's which is using the most to make useful system for carrier. According to [38] Rail wagons distribution is shown in Figure 16.

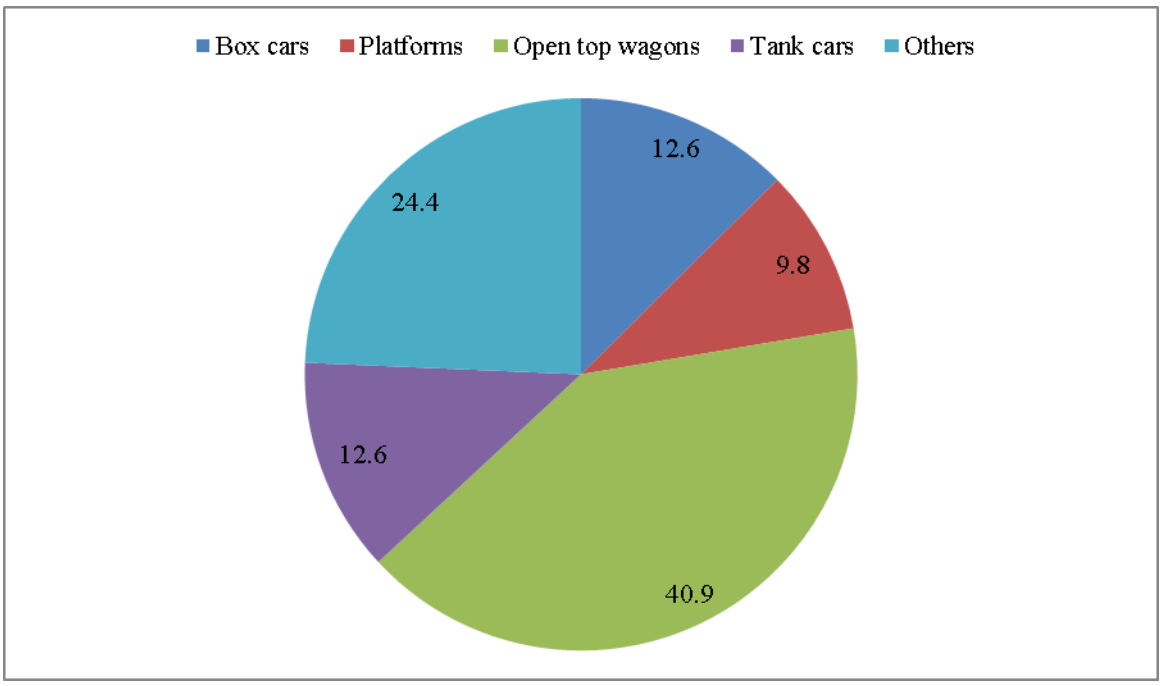


Figure 15 Rail wagons distribution [38]

As you can see only 24.4% of all wagons are in the "other" category, that's means, that almost all of wagons can carry goods. There are 5 types of wagons:

1. Box cars – for solid goods – pallets etc.
2. Platforms – for ship containers, vehicles, and custom things
3. Open-top wagons – for brittle goods: coal, wheat etc.
4. Tank cars – for liquid products: petroleum, oil etc.
5. Special – for cars, timber etc.

We think that is enough to have for main categories. Other categories will be created by users with added creative search.

Air cargo. Air cargo traffic rebounds in 2014 after three years of stagnation after two years of either flat or slightly negative traffic growth, demand for air cargo transport began to grow slowly and steadily during the second quarter of 2013.

The uptick in traffic c continued into the second half of 2013 to end the year 0.9% above the 2012 traffic total. Growth has continued to gather strength in 2014, nearly recovering the long-term trend rate. World air cargo traffic is forecast to grow an average 4.7% per year over the next 20 years to reach a total of more than twice the number of revenue ton-kilometers (RTK) logged in 2013. The number of airplanes in the freighter fleet will increase by more than half by the end of the forecast period.

The traffic growth rates of 12 major air cargo markets in 2013 reveals a few crucial developments for the industry. Domestic and intraregional markets were surprisingly resilient in the face of weak economic and trade growth, helping to spur demand for standard-body freighter airplanes. Traffic on international trade lanes connected to developing world markets generally rose compared with 2012 traffic levels. However, air trade contracted in both directions on nearly all the east-west trade lanes (those that connect Asia with Europe, Asia with North America, and Europe with North America).

Nearly 80% of long-haul air cargo traffic (routes longer than 4,500 kilometers) flows on these east-west trade lanes. Most of the cargo carried on these routes is transported on large wide body freighters. Air cargo traffic on these vital routes slackened during the global economic downturn, causing the yields of most large-freighter operators to fall. In response to flagging demand and declining yields, operators curtailed large-freighter flights, in some cases parking their wide body airplanes. There were as many as 70 parked 747-400 and MD-11 freighters during the slowest period. In the third quarter of 2014, however, operators began to return these two models to service as traffic volumes picked up.

Air cargo usually is used to send packages and pallets. It's very important IMO class, because aircrafts have very big safety requirements.

The International Maritime Dangerous Goods (IMDG) Code was developed as a uniform international code for the transport of dangerous goods by sea covering such matters as packing, container traffic and stowage, with particular reference to the segregation of incompatible substances.

2.2.1 Carriers and shippers interest data sheet

First of all we have to understand that shipper and carrier have different view, of shipping. Shipper only wants to send shipping from one place to another generally on given time. Carrier in his disposal has some recourses (trucks, ships, etc.) and his view of shipping is more technical: which type of semi-trailer shipper wants. Generally for shipper there is no difference between marine, truck, rail or air shipping. He only wants to send shipment from one place to another by given time and price. So general input values must be time, volume and place. The system must translate these inputs for carrier's language – shipment method. So we tried to do this.

Basically shippers want to send:

1. Package
2. Palette or other LTL
3. Full load (>13,5 running matters)

3.1 Standard load (with refrigerated attribute)

3.2 Brittle product

3.3 Liquid product

4. Custom shipments

Carriers want to get:

1. Marine shipping. Ship type:

1.1 Bulk cargo ship

1.2 Container tanker. And container type:

1.2.1 Standard container

1.2.2 Platform

1.2.3 Refrigerated container

1.2.4 Tank container

1.2.5 Opened container

1.3 Liquid cargo tanker

1.4 Brittle cargo ship

2. Truck transportation. Semi-trailer type:

2.1 Closed box semi-trailer

2.2 Tilt semi-trailer

2.3 Container chassis semi-trailer

2.4 Platform semi-trailer

2.5 Tipper semi-trailer

2.6 Tank semi-trailer

2.7 Less than 9 running matters truck

3. Rail freight transport. Wagon type:

3.1 Box car

3.2 Platform

3.3 Open-top wagon

3.4 Tank car

4. Air cargo:

4.1 Package

4.2 Palette

As you can see its very different view of transportation between carrier and shipper. By this breakdown are transporting about 90% ton-miles of all world shipments. Next step is to find relationships between carriers and shippers interests. See Table 3.

Table 3 Carriers and shippers interest data sheet

			Package	Less than truckload	Standard load	Brittle product	Liquid product	Custom shipments
Marine shipping	Bulk cargo ship			X	X			X
	Container tanker	Standard container	X	X	X			X
		Platform						X
		Refrigerated container	X	X	X			
		Tank container					X	
		Opened container				X		
	Liquid cargo tanker						X	
	Brittle cargo ship					X		
Truck transportation	Lorries	Closed box semi-trailer		X	X			X
		Tilt semi-trailer		X	X			X
		Platform semi-trailer						X
		Tipper semi-trailer				X		
		Tank semi-trailer					X	
	< 9 running meters truck		X	X				X
Rail transport	Box car		X	X	X			X
	Platform				X			X
	Open-top wagon					X		
	Tank Car						X	
Air cargo	Package		X					
	Palette			X	X			
	Custom air							X

From this relationship matrix we can easily create communication with both sides without SPAM.

2.2.2 Shipment essential standards

Shipments physical nature affects almost every aspect of logistics and distribution including packaging, material handling, storage, and transport. Both the structure and costs of distribution system for given product directly affected by product particular characters. These characteristics can be classified into for main categories based on:

- Dimensions or volume (dimensions for solid product, volume for brittle or liquid);

- Weight
- Price (for insurance)
- Substability (for example: needs refrigerator)
- Special characters (IMO)
- Pick up location
- Destination location
- Pickup date (optional)
- Delivery date (optional)

That all basic information, which is enough to carry mostly of shipments. After research we suggest that all shipments can be divided into 7 categories:

- Letter (with weight and dimensions limitations)
- Package (with weight and dimensions limitations)
- Pallet (with weight and dimensions limitations)
- Standard sea container
- Brittle product
- Liquid product
- Custom

In additional for packages pallets and etc. must be refereed that if its possibility to put another pallet or package on the top of another.

IMDG Code. The development of the IMDG Code dates back to the 1960 Safety of Life at Sea Conference, which recommended that Governments should adopt a uniform international code for the transport of dangerous goods by sea to supplement the regulations contained in the 1960 International Convention for the Safety of Life at Sea (SOLAS).

For the purposes of this Code, dangerous goods are classified in different classes, to subdivide a number of these classes and to define and describe characteristics and properties of the substances, material and articles which would fall within each class or division. General provisions for each class or division are given. Individual dangerous goods are listed in the Dangerous Goods List, with the class and any specific requirements.

Responsibilities. The classification shall be made by the shipper/consignor or by the appropriate competent authority where specified in this Code.

Classes, divisions, packing groups. Substances (including mixtures and solutions) and articles subject to the provisions of this Code are assigned to one of the classes 1-9 according to the

hazard or the most predominant of the hazards they present. Some of these classes are subdivided into divisions. These classes or divisions are as listed in Table 4.

Table 4 Classes of IMDG codes

	Class		Division
1	Explosives	1.1	substances and articles which have a mass explosion hazard
		1.2	substances and articles which have a projection hazard but not a mass explosion hazard
		1.3	substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard
		1.4	substances and articles which present no significant hazard
		1.5	very insensitive substances which have a mass explosion hazard
		1.6	extremely insensitive articles which do not have a mass explosion hazard
2	Gases	2.1	flammable gases
		2.2	non-flammable, non-toxic gases
		2.3	toxic gases
3	Flammable liquids		
4	Flammable solids	4.1	flammable solids, self-reactive substances and desensitized explosives
		4.2	flammable solids, self-reactive substances and desensitized explosives
		4.3	flammable solids, self-reactive substances and desensitized explosives
5		5.1	oxidizing substances
		5.2	organic peroxides
6	Toxic and infectious substances	6.1	toxic substances
		6.2	infectious substances
7	Radioactive material		
8	Corrosive substances		
9	Miscellaneous dangerous substances and articles		

The numerical order of the classes and divisions is not that of the degree of danger. We briefly gathered the information of IMO class codes to be able to use them in our system. We implemented IMO class codes and other standards from this topic to our prototype “TransProto”. The system needs these standards to be able link shippers and logistic providers to one understandable “language”.

2.3 Carrier companies freight registration forms analysis

We will analyze top ten mostly used logistic companies in the world also it was top ten logistic companies in the world by revenue of 2013 year (The journal of commerce – April 14.2014) it can be found on APENDIX I.

2013 RANK	COMPANY	2013 REVENUE (MILLIONS OF DOLLARS)	BASE COUNTRY
1	**DHL LOGISTICS**	$36,876	Germany
2	**KUEHNE + NAGEL**	$22,575	Switzerland
3	**DB SCHENKER LOGISTICS**	$18,879	Germany
4	**C.H. ROBINSON WORLDWIDE**	$11,070	U.S.
5	**CEVA LOGISTICS**	$8,517	Netherlands
6	**DSV**	$8,138	Denmark
7	**PANALPINA**	$7,289	Switzerland
8	**DACHSER**	$6,475	Germany
9	**EXPEDITORS INTERNATIONAL**	$6,072	U.S.
10	**SNCF GEODIS**	$6,068	France

Figure 16 Top ten logistics companies of 2013 by revenue from journal of commerce

Analysis done of top ten from given list and four more mostly known for fast services. All this analysis is done without user account in all logistic company sites, to see if carrier gives possibility for anonymous users to get price and time quotations. Also to see how fast it can be found in website, also if it has a compare option to other companies. The main point is to find what quotation form would be best and fastest for user/customer to fill and to carrier to get most needed information to give fast answer. With this analysis information we will decide our main site form for global quotations.

Registration form review of analyzed companies. We analyzed 14 companies only 11 have quotation form. Only four companies has fully anonymous quotation form and the same companies has automatic answer system for quotations. Five companies gives price list accessible to everyone. Assuming all five criteria's the DHL, FEDEX, TNT and UPS has them all. Disappointing is that than you fill all information and get price there are no possibility to compare to other carriers, its waste of time to fill information for all carriers, or write to all to get

information. So most companies has one, two or three carriers for their supply chain logistics and if it is not repeatable destination they are wasting time and requesting price and time possibilities each time. And not for the best price, because they are not asking more than five carriers. This problem gives opportunity for our project to combine price and time requesting for shipping in one place. We want to make platform in clouds where customer one time fulfillment of shipping request would be fast accessible to all carriers whose competition would give best price to customer. All registration forms analysis can be found on APPENDIX II.

Table 5 Flow matrix of 14 companies comparison

Numbering	Company	Quotation form	Fully anonnymous quotation form	Has price list	Automatic answer at once	Possible manual quotation	SUM
1	DHL LOGISTICS	+	+	+	+	+	5
2	KUEGNE+NAGEL	+	-	-	-	+	2
3	DB SCHENKER LOGISTICS	-	-	-	-	+	1
4	C.H. ROBINSON WORLDWIDE	+	-	-	-	+	2
5	CEVA LOGISTICS	+	-	-	-	+	2
6	DSV	-	-	-	-	+	1
7	PANALPINA	+	-	-	-	+	2
8	DACHSER	-	-	-	-	+	1
9	EXPEDITORS INTERNATIONAL	+	-	-	-	+	2
10	SNCF GEODIS	+	-	-	-	+	2
11	DPD	-	-	+	-	+	2
12	TNT	+	+	+	+	+	5
13	UPS	+	+	+	+	+	5
14	FEDEX	+	+	+	+	+	5
	SUM	11	4	5	4	14	

From this review the most used method to get location is to set two-three criteria's, first country and second post code but some countries like Honk Kong doesn't have it, than helps third city. This is the main idea; these criteria's should have two sides ship from and ship to.

In conclusion by this analysis we gathered all information needed to create registration forms for shippers and providers as: carriers, warehouses, brokers. Also we used information from this topic to create a quick request and full request forms for transportation and warehouses quotations.

Social networking as example to B2B connecting. The development of social networks should accelerate the development of the business network sector because of the nature of this communication which matches people with similar requirements and ideas to each other in a type of "hauler/user dating". This idea is sharply opposed to that of an auction where the highest or

lowest bidder wins. With social networking, the truck, cargo ships or train best suited to the delivery requirements is recruited without compromising on cost.

With social network sites such as Facebook and Twitter bringing revolutionary changes in the way individuals communicate, the same technological platform could be used in the transport and logistics environment to facilitate instant communications between various stakeholders. For example, a private social network for business called Yammer has recently gained momentum. Companies such as Tesco, Vodacom, and LG Electronics have started to use it for intro-organization communication. "Regular users at LG estimate Yammer saves them approximately three hours per week by getting quicker answers, developing solutions faster, and more effectively connecting with colleagues". For business organizations, social media has helped them to be more effective and innovative in existing tasks such as project management, and staff communication. For instance, Tesco staff use Yammer to share best practices, often by posting photos and management teams use it operationally for sharing messages and asking for feedback [2].

In a multimodal transport chain, it has been a challenging task to obtain an instant update of the status for a particular consignment, due to the fact that multiple players (consignors, consignees, freight forwarders, carriers) are involved in the physical execution of the consignment. Using a private social network to create a community where instant updates and sharing of information between various parties across geographies could largely reduce the time and cost of point-to-point communication. This online community portal concept could equally be applied to the context of ports or railway terminals, which often involves complex activities of receiving and dispatching vessels and freight trains as well as container yard management. The changing business need connection – communication, with users to survive in new era, there cloud communication with users is necessary. One of the newest social networking app is Plague, that whenever a user submits a content, it gets sent to the four Plague users closest to that person, who can either pass it along to the four closest Plague users nearby, or strike it down and stop the spread. So this kind of new approach is different of Facebook and Twitter combining all approaches there are trend for new communication systems for communication, supply chains control in business world and transportation.

3 "TransProto" prototype for logistics chain management

Our logistics chain management prototype called "TransProto" covers all supply chain members. At Figure 17 shows simplified logistics chain: shipper send shipment to recipient, carriers pick it up and present to warehouse, after "n" warehouses, last carrier present shipment to recipient.

Basic process is not very complicated; more complex are interactions between shipments and logistics chain members.

Figure 17 Simplified logistics chain

In this chapter we described our system users, shipment standards and presented our prototype. At first part we presented system users: shippers, carriers, warehouses and recipients. Presented their unique functions, their properties, and methods how they collaborate with each other. Second part is about shipment standards and their properties in our system. At third part we presented system's prototype, its concept and the essence of the system.

3.1 System users of "TransProto" logistics chain

Shipment – is any kind of product, which need to be transferred from one place to another. It could be small item, for example –letter, or very big – container. Also it, could be solid substance or brittle or liquid product.

Case – is any kind of assembly of shipments. For example full container of a lot of shipments. Pallets can be several levels, for example: a wooden pallet of shipments is called "Case", a full container of wooden pallets which contains shipments, would called "Case (1)".

Shipper – any kind of person or organization, which wants, to send shipment or pallet from one place to another.

Carrier – is any kind of person or organization, which can move shipments or pallets from one place to another. Is no different which type of transportation shipper is offering (air, road, train or sea).

Warehouse – is any kind of people or organization which can save shipments or pallets, or could propose additional services (bounding, refrigerated premises, etc.), operations (packaging, sorting etc.) or cross-docking.

Brokers – is any type of persons or organization, which could help system to propose best possible offers of shippers. Brokers can see all service providers of the system and can directly communicate with them (such as shippers), also they can to make proposals for the system customers.

Recipient – is any kind of person or organization receives, shipment. Recipient in our system also could be shipper.

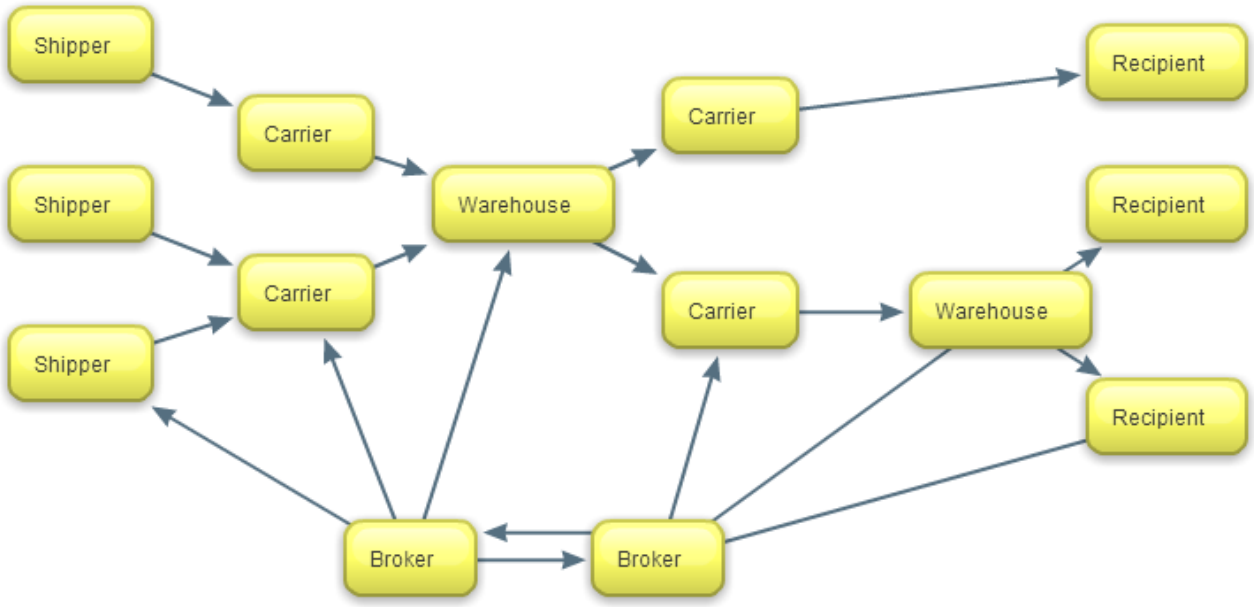


Figure 18 Example of complex supply chain

There are 4 types of users:

1. Service providers (Carrier, Warehouse)
2. Service customers (Shipper, Recipient)
3. Service assistant (Broker)
4. Service object (Shipment, pallet, etc.)

Data bases. In any IT project is very important at the beginning decide how many and how structured are data in project. Those bases have updatable fields and are linked together. Basically there are 3 types of data bases in our system:

1. Users
2. Requests
3. Resources

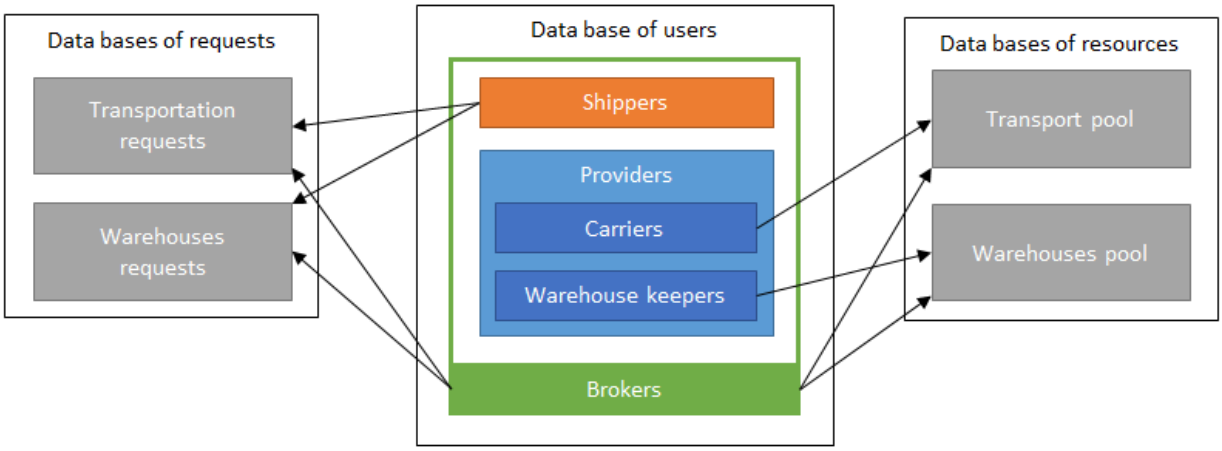


Figure 19 Structure of data with intercommunion

In users data base is all information related with users. It consists of basic information of user (contact information, name surname etc.), user event history, links to requests and recourses data bases. As you see at Figure 19 there are three types of users: shippers, providers and brokers. Main function of shippers is to create requests for providers. In turn, providers have some resources on their disposal: transports or warehouses, so they creating events in resources data base. The provider which creating resources and requests called broker.

In data base of requests is all information related with requests. It consist information about type of requests, and their properties. As you can see there are two types of requests: Transportation and warehouses. Information of warehouse requests consists of type, requirements, storage type and cross docking type, required operations, IMO class, comment, carriage parameters and location. Information of transportation requests consists of pickup and delivery locations and times, shipment details, additional requirements, IMO class, comment and photo if it's necessary.

In data base of resources is all information related with transport and warehouses, their properties and capacities. In Transportation resources database is information related with carriage capacity, cargo capacity, transportation type and subtypes, IMO class, ID of resource, routing information and available locations.

3.1.1 Shippers as our system users

All around the world there are a lot of shippers. Basically all shippers can be divided in to two segments:

1. Legal entities
2. Natural persons

In our system the difference between those two is that, legal entities could to make agreement with service providers or brokers about payment method (L/C, T/T, etc.). Natural persons only can pay with credit card or PayPal.

In the term of shipment continuity, the shippers can be spited into two parts:

1. Single shipment
2. Continue shipments

At single shipment case it's not important what shipper is, but it's important what kind of goods and where the sipper wants to send. At continues shipment case it's more complex because for example manufacturer want to send a lot of goods continuously from his site to different locations in the world, so it's important a lot of properties of carrier.

The study [19] results strongly suggest that quality, physical distribution, and relational factors are key considerations in the supplier evaluation process. This implies that the traditional "standards" of quality, price, and service (i.e., primarily delivery), the three issues on which suppliers have been routinely evaluated in the past, are indeed being extended to include channel relationship factors. Quality and Process Control issues are included on nearly one fourth of the forms, suggesting that quality is the single issue considered as most important.

That means that key factor of decision making process is quality, so our system must have very good quality control system. In Internet products, most popular is rating system, when system users could rate every service, that another system user could see the rating, and the rating impacts service user decision. It's important that system for user suggest most value for customer. [4] Suggest that customer value could be calculated by such equation:

$$Customer\ value = \frac{Qualtity}{Costs} \tag{3.1}$$

By comparing customer values system could provide best possible value for the customer. How the whole process works, we would talk further.

3.1.2 Carrier types in our system

There are a lot of types of carrier, for example courier service, lorries, ferries, airplanes, ships etc. In our system there is no big difference between those types, the only difference is the place where carrier could go (on the land, by the sea, on air or on railways) and the limitations of the shipment (size, IMO, etc.). We need basic information for carrier witch are:

- Max dimensions
- Max weight
- Min dimensions
- Additional properties (example: refrigerator)
- Substances which can to carry (letter, pallets, containers etc.)
- IMO class
- Type (air, land, train, ship)

Another important information is routing. Basically there are two major types of routing – regular routing (like a public bus witch have regular routes and periods) and transportation by order (like a taxi). Both of methods have same benefits and shortages, first method mostly used by seaways, airways and railways the second method is mostly used by land transportation companies:

- Regular routing (regular pricing)
- Transportation by order (Rate/quest)

In land transportation is very important if carriers can collect or/and deliver shipments from "from door to door". This is very big difference, because if there is this opportunity, there is possibility to create courier service. Nowadays this service is provided, not only from small trucks in small areas, but from big lorries in large areas too, when shipper carrying LTL. So there are 3 categories:

- Can collect from different shippers
- Can distribute
- Can collect and distribute

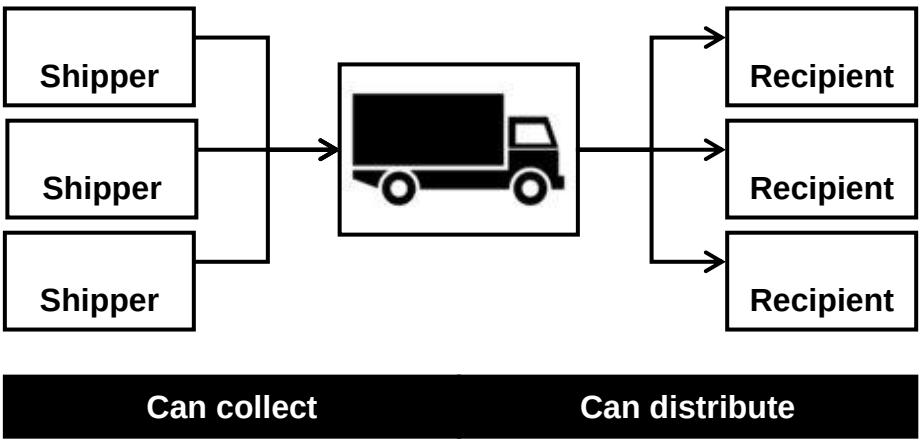


Figure 20 Example of courier service

3.1.3 Warehouses and bounding warehouses

Warehouses around the world is in defriend locations, with different functions and different types of operation. The basic warehouse function was to hold goods. But in now days, as called “warehouses” in some cases (for example: distribution centers), don’t want to hold good for long period of time. Also modern warehouses propose varies of operations, such as packing, sorting etc. Another very important type of warehouses is **bounding warehouses**. To sum up, there is 5 major functions of warehouse:

1. Receive and dispatch goods.
2. Bounding.
3. Storage.
4. Crossdocking.
5. Operations.

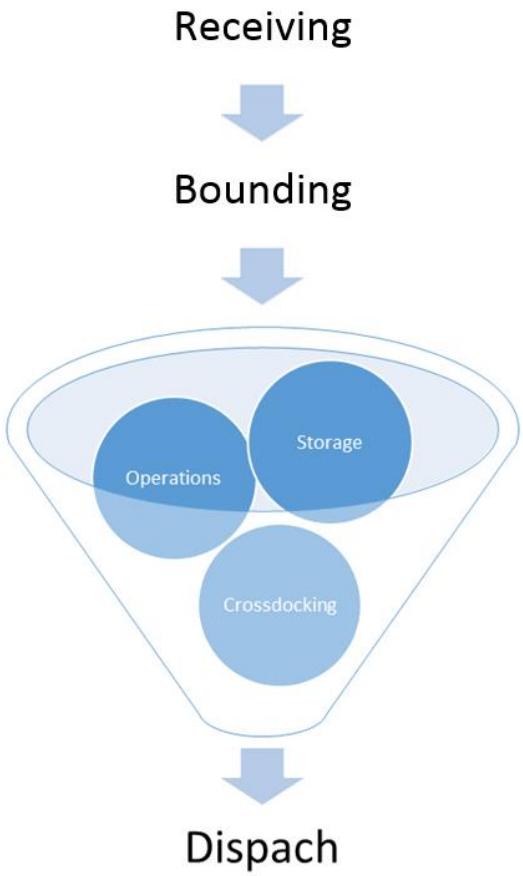


Figure 21 Warehouse services

Warehouse as any other link of logistic system has basic information basic information. Basic information is important for all links of supply chain.

1. Min volume
2. Max volume
3. Max weight
4. Operations (etc. packing, assembly)
5. Substances (letter, pallets, containers etc.)
6. IMO class
7. Additional properties (example: refrigerator)
8. Max warehousing time

3.1.4 Brokers and brokering firms

In our system so called brokers could be the carriers and other options of organizing transferring of goods. Brokers in our system could provide offers for the customers without any capital. They propose their "know how" or providing full service. These entities, whether unimodal or multimodal in scope, include non-operating third parties that provide various services to shippers. The major alternatives are:

1. Freight forwarders
2. Shippers' associations
3. Intermodal marketing companies
4. Brokers
5. Small package carriers
6. Third-party logistics service providers

Freight Forwarders. Freight forwarders or forwarding agents are agencies that organize the freight shipments of other companies or individuals. They often do not own transport equipment except for pickup and delivery operations. Freight forwarders purchase long-distance transport services from truck, rail, air, and water carriers. Then they consolidate numerous small shipments of different shippers into large shipments.

Shippers' Association or Cooperative. A shippers' association is a nonprofit transportation membership cooperative that organizes the domestic or international shipments for member companies. These associations consolidate the small shipments of their members into vehicle load.

Intermodal Marketing Companies. Shippers' agents or intermodal marketing companies (IMCs) are important intermodal links between shippers and carriers. They purchase large quantities of piggyback services at discount rates and then resell the available services in smaller quantities to the shippers

Brokers. Brokers are the intermediaries that organize the transportation of products for shippers, consignees, and carriers and charge a fee to do so. Besides providing timely information about rates, routes, and capabilities to bring shippers and carriers together, brokers also provide other services such as rate negotiation, billing, and tracking

Small Package Corners. Small-shipment delivery services can be important transportation options for many shippers. Electronics firms and cosmetic companies, as well as book distributors and catalog merchandisers, are examples of these shippers. Well-known small package carriers include the US Postal Service's parcel post, United Parcel Service (UPS), and air-express companies.

Third-Party Logistics Service Providers. Nowadays, more companies are outsourcing their logistics functions to third-party logistics service providers, as the emphasis on supply-chain management has increased. Third-party logistics providers, commonly referred to as 3PLs, provide their clients with several logistics services, such as freight forwarding, packaging, transportation, and inventory management, as well as warehousing and cross docking.

Freight forwarders, shippers' associations, shippers' agents, brokers, small- package carriers, and 3PL companies are all viable transport alternatives for a shipper in the same way as the six basic transportation modes and the intermodal combinations.

3.2 Concept of “TransProto” prototype

For prototype creation we chosen Justinmind prototyping program. We chose it from four others creation tools. Justinmind Prototyper is an authoring tool for software prototypes and high-fidelity website wireframes. It offers capabilities typically found in diagramming tools like drag and drop placement, resizing, formatting and export/import of widgets. In addition, it has features for annotating widgets and defining interactions such as linking, animations, conditional linking, calculations, simulating tab controls, show/hide elements and database simulation. There is support for high-fidelity simulation of Rich Internet Applications. The program creates high-fidelity prototypes a step before the first version of a mobile app or website.

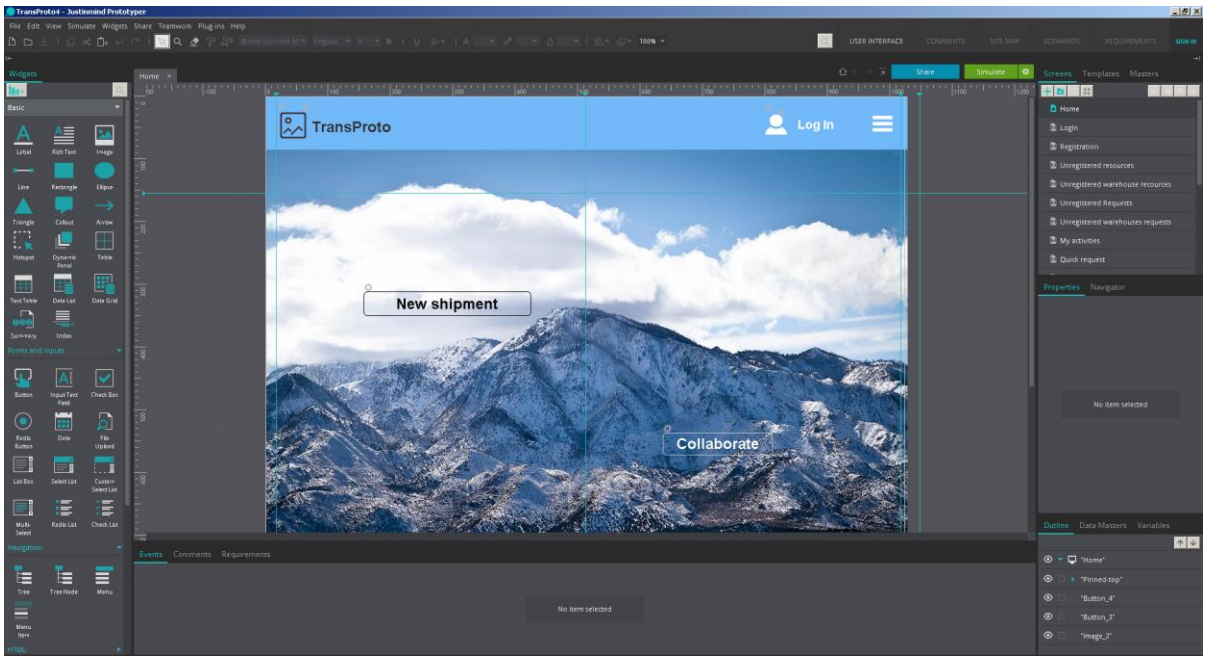


Figure 22 Justinmind prototyping program

Main concept of our prototyped system created with Justinmind prototyping program is shown in this section. We talked before of system hierarchy and users types, in the system there are place for all logistic users types. The system approaches new way of so popularly called sharing economy, the users approaches the software with gamification with user friendly environment. Essential feature is to make a system cloud based to make it accessible globally.

Quotation system. Quotation system is one of key elements in our product. Quotation system has two sub systems inside firs – automatic system which gives propose for inquirer instant by analyzing current resources and their possibilities to complete a request. The second one is tender based system, where inquirer creating request, and brokers send for him proposals. Firs sub system have benefit that it is fast, the second one covers more shipping options. Combining both, we can give best more value to inquirer.

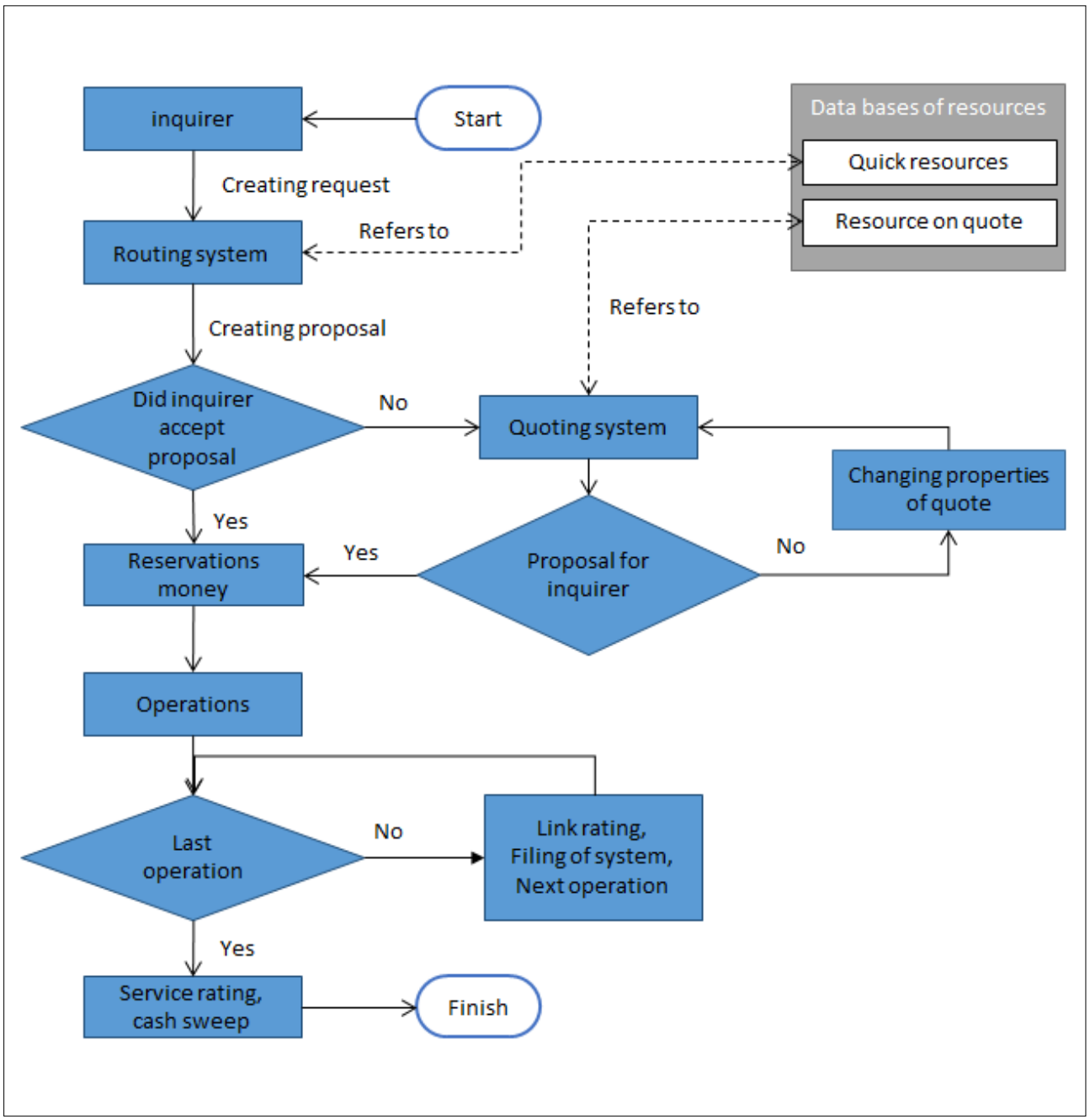


Figure 23 Quotation system

First of all broker or shipper creating request, with their properties (Type of request – transport or warehouse, type of package, IMO class, temperature control and all other properties of requests depending which: warehouse or transport user need). Quotation is transferred in routing system, it refers to data base of quick resources and automatically find solutions for request. If any solution is found, they proposed for the inquirer. If inquirer agrees with proposition, next step is reservation of money. If not, request transfer to quoting system, where solutions are developed by users – brokers and carriers. If inquirer again passes proposals, he must change proposal properties (for example time to give answer, from brokers/carriers). When inquirer agrees with proposal, next

step is reservation of money. Then begins firs operation – for example pick up. If transportation consist from several operations, after each of them next member of chain rate previous. When all operations, recipient rate overall service quality and money will charge from account.

Proposals ranking. To ensure service quality in system must be good quality control system. There are two key elements in our system: feedback and ranking. Feedback is simple services ranking, but it diffident from other, that all distribution chain members could and must rate previous link service quality. All services providers have their ratings witch are average of their services. The rating in our system is number from 0 to 100.

Another system is ranking. Ranking core is that from, providers which have low ranking proposes be as low as possible. For shippers there 3 types of proposal ranking:

1. Time – quality
2. Time, cost – quality
3. Cost – quality

We suggest, that there are 3 types of shippers – those who need to ship shipment as soon as possible, another type is those who want to send as least cost as possible, and those who want to get best cost and time value. Many resources suggest that value for the customer is:

$$Value = \frac{Quality}{Costs} \tag{3.2}$$

We suggest that for firs group costs is time, for second – money and costs, for third – money. To calculate value for customer is firs of all is need to get all proposals. When all proposals are get, next step is rank them by cost, quality, deliver time and get relatively parameters.

If delivery consists of few links, the overall service quality calculating like this:

$$Chain\ quality = \frac{Rate_1}{100} \cdot \frac{Rate_2}{100} \cdot \frac{Rate_3}{100} \dots \frac{Rate_n}{100} \tag{3.3}$$

Chain delivery time a sum of links of delivery chain:

$$Chain\ price = \sum Link\ price_j \tag{3.4}$$

Chain delivery time is sum of all delivery links of delivery chain:

$$Chain\ delivery\ time = \sum Link\ delivety\ time_j \tag{3.5}$$

All rates transferred to relative ranks:

$$Chain\ quality\ rank_i = \frac{Chain\ quality_i}{Chain\ quality_{max}} \tag{3.6}$$

$$Chain\ delivery\ time\ rank_i = \frac{Chain\ delivery\ time_{min}}{Chain\ delivery\ time_i} \tag{3.7}$$

$$Chain\ price\ rank_i = \frac{Chain\ price_{min}}{Chain\ pirce_i} \tag{3.8}$$

Now all 3 groups could be ranked like this:

$$Time - quality\ cofficient_i = \frac{Chain\ quality\ rank_i}{Chain\ delivery\ time\ rank_i} \tag{3.9}$$

$$Time, cost - quality\ cofficient_i = \frac{Chain\ quality\ rank_i}{(Chain\ delivery\ time\ rank_i) \cdot (Chain\ pirce_i)} \tag{3.10}$$

$$Cost - quality\ cofficien_i = \frac{Chain\ quality\ rank_i}{Chain\ price\ rank_i} \tag{3.11}$$

So we have way to rank proposals for customer, that customer at firs see proposals with highest value. It motivates members to meet customers requirements.

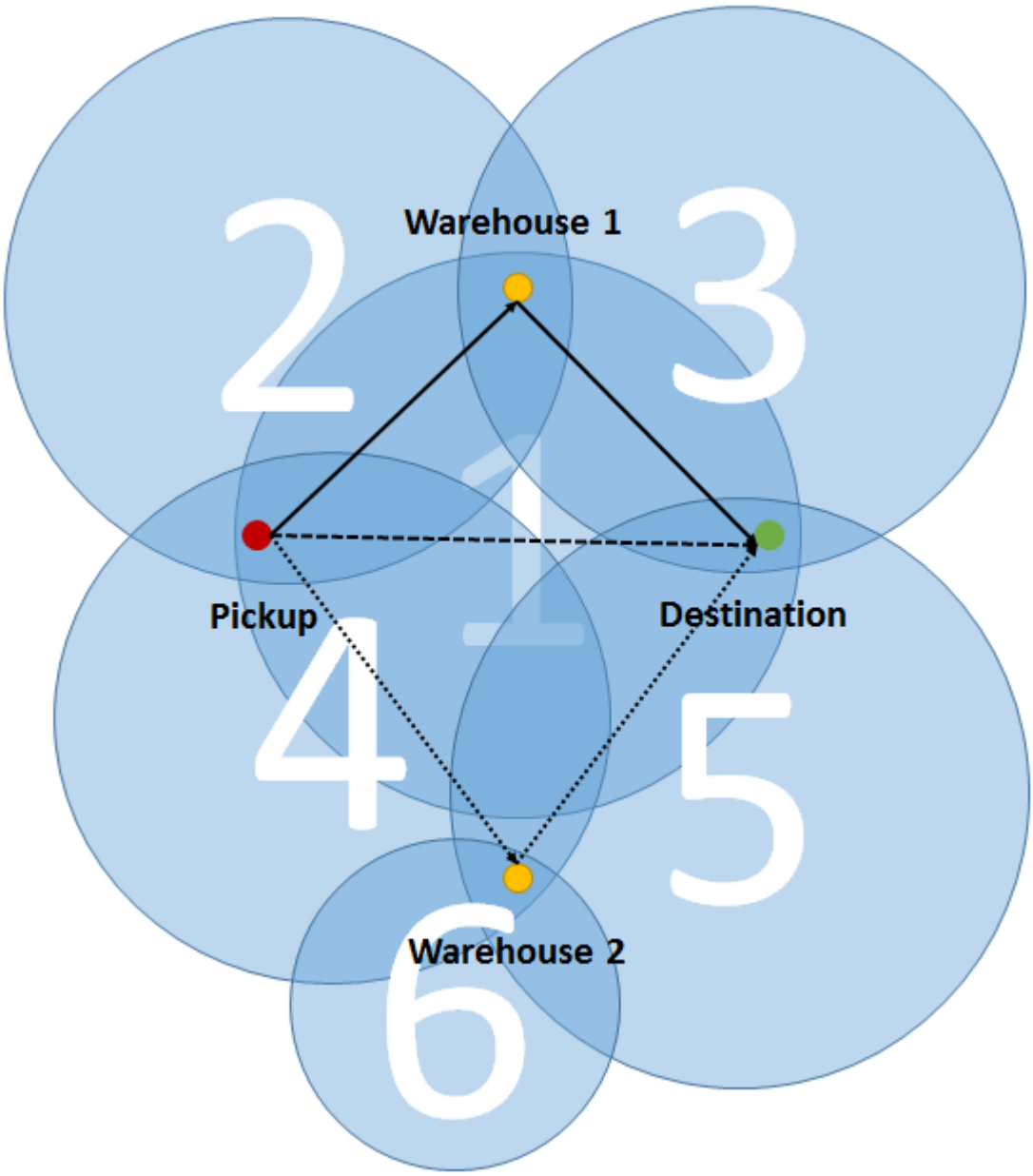


Figure 24 Example of carriers and warehouses collaboration

Figure 24 shows delivery opportunities from one place to another. Red dot is pickup location, green dot is destination location. Yellow dots are warehouses. Blue circles are current carrier's services locations. As you can see from pick up location delivery could go in different ways. Delivery could be delivered no. 1 carrier directly. Also it could pass through warehouse 1 and be carried by no. 1 or no. 2 carrier to warehouse 1 and from warehouse 1 could be delivered to destination location by no. 1 or no. 3 carrier. The third way is through warehouse 2 by no. 4 and no. 5 carriers. So routing systems main task is to find all shipment methods and rate them give best value for the customer.

3.2.1 Unregistered users interaction with "TransProto"

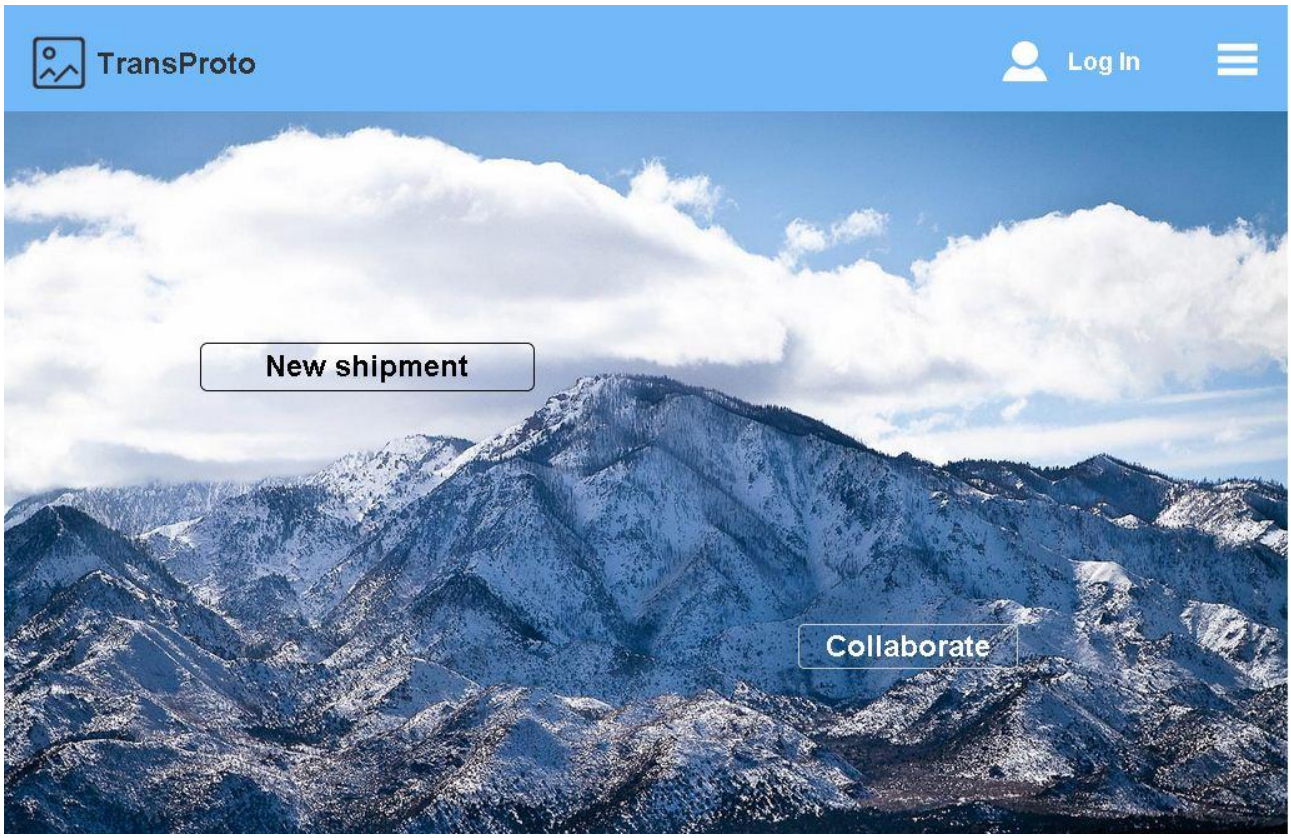


Figure 25 Beginning page of "TransProto" prototype

In Figure 25 is shown landing page of "TransProto" prototype. In this page users can select to create new shipment or choose collaborate button. For first time users after both selections they are transferred to page before registering with restricted features. In this page users can see pending requests and resources in the system. After a fast registration users can fully access all features. For registered users there is a log in button, for instant access to their account, it is shown in Figure 26.

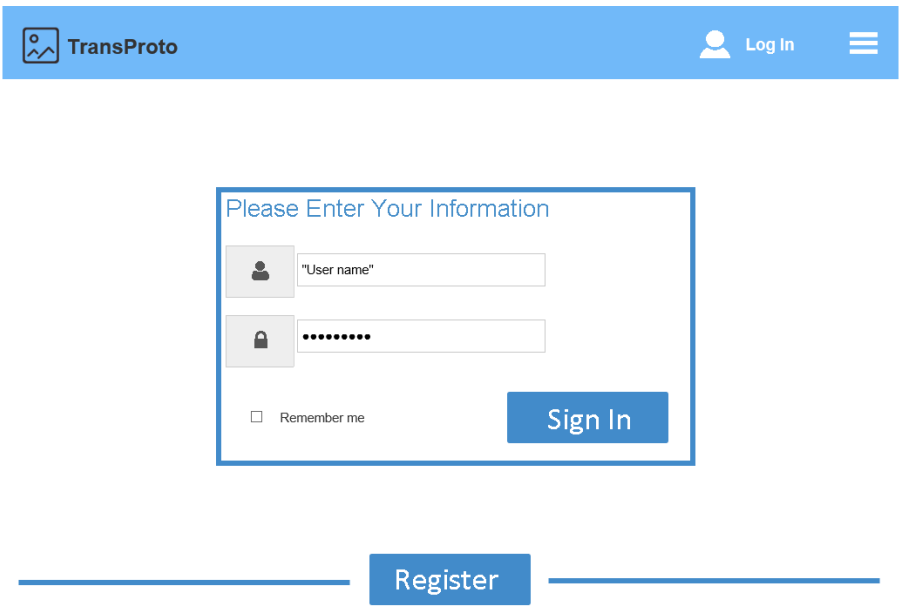
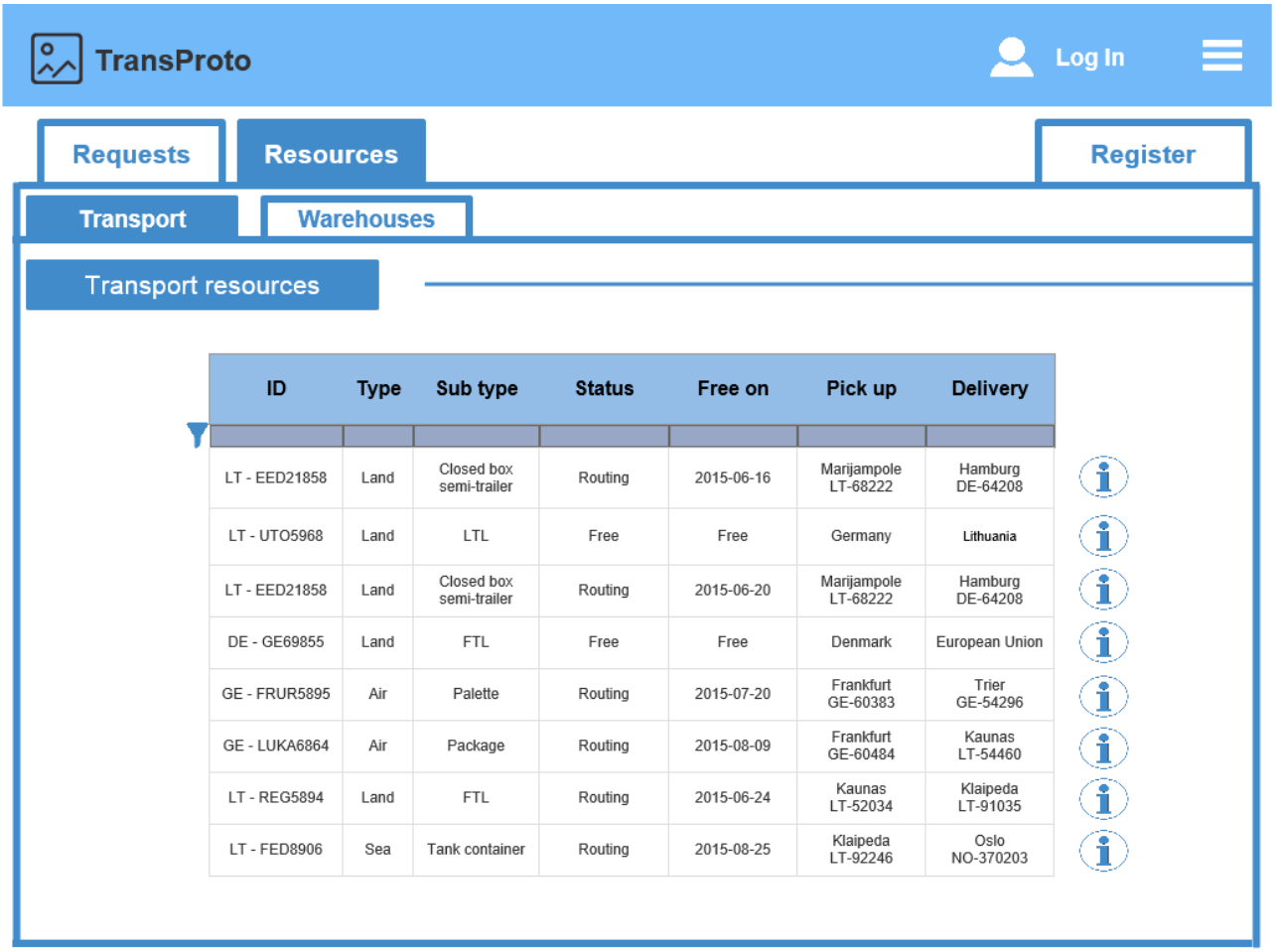


Figure 26 Logging page for registered users



ID	Type	Sub type	Status	Free on	Pick up	Delivery
LT - EED21858	Land	Closed box semi-trailer	Routing	2015-06-16	Marijampole LT-68222	Hamburg DE-64208
LT - UTO5968	Land	LTL	Free	Free	Germany	Lithuania
LT - EED21858	Land	Closed box semi-trailer	Routing	2015-06-20	Marijampole LT-68222	Hamburg DE-64208
DE - GE69855	Land	FTL	Free	Free	Denmark	European Union
GE - FRUR5895	Air	Palette	Routing	2015-07-20	Frankfurt GE-60383	Trier GE-54296
GE - LUKA6864	Air	Package	Routing	2015-08-09	Frankfurt GE-60484	Kaunas LT-54460
LT - REG5894	Land	FTL	Routing	2015-06-24	Kaunas LT-52034	Klaipeda LT-91035
LT - FED8906	Sea	Tank container	Routing	2015-08-25	Klaipeda LT-92246	Oslo NO-370203

Figure 27 Transport resources page for unregistered shipper

In Figure 27 is shown page after selecting new shipment button it gets directly to transport resources page, the unregistered users in this page can see resources in our system filled by providers. Figure 28 displays warehouse resources page also for unregistered users. If the

shipper want to create new shipment from this point he can register with quick registration and then send quotations, requests to “TransProto” system. In Figure 27 users can see public information about resource as ID – unique identification number, type of transportation, sub type of transport, status, employment of transport and when it will be free. Also working location as pickup and delivery zones. Users can filter information by each section and see more information about each resource by pressing information button.

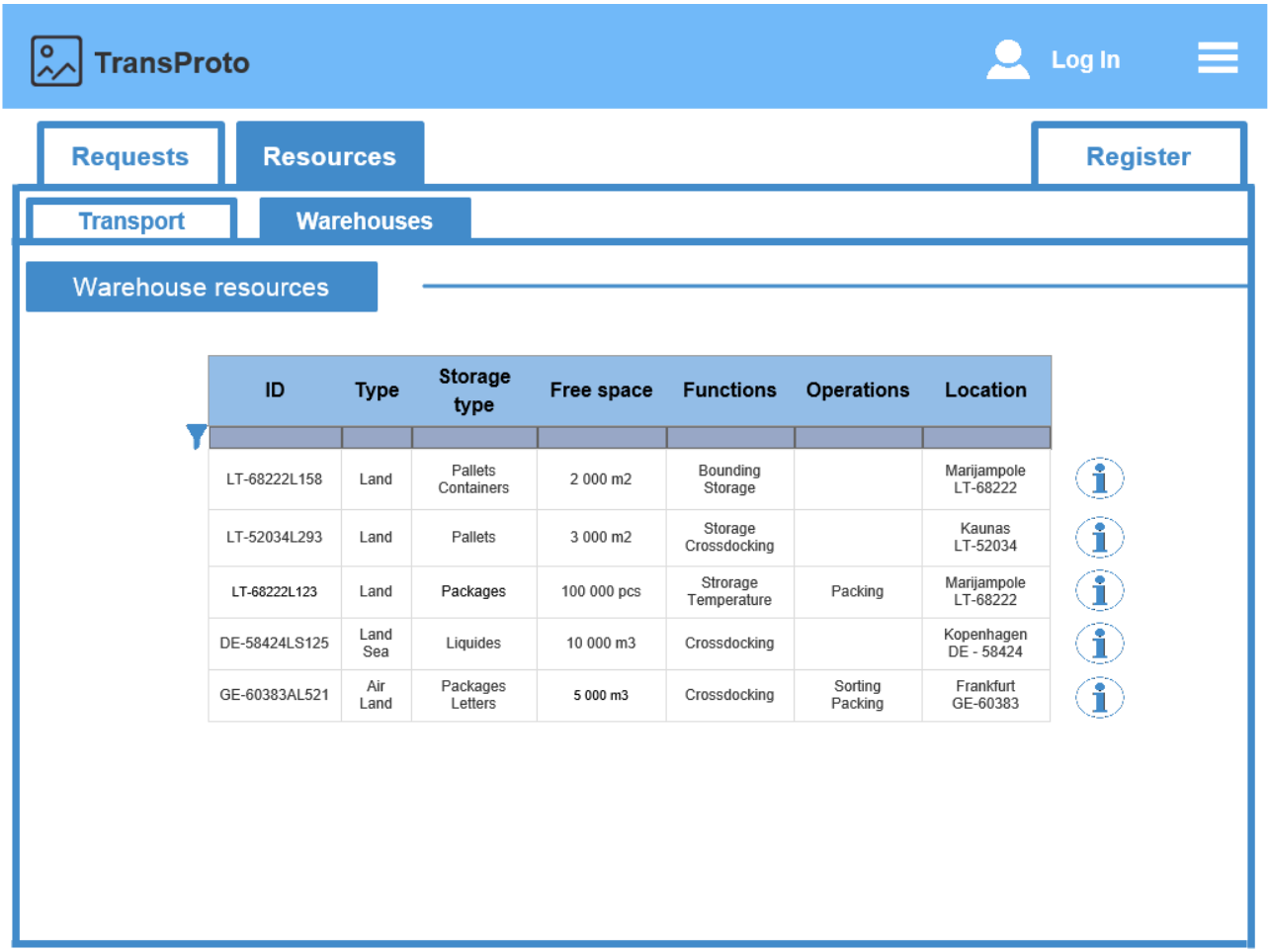
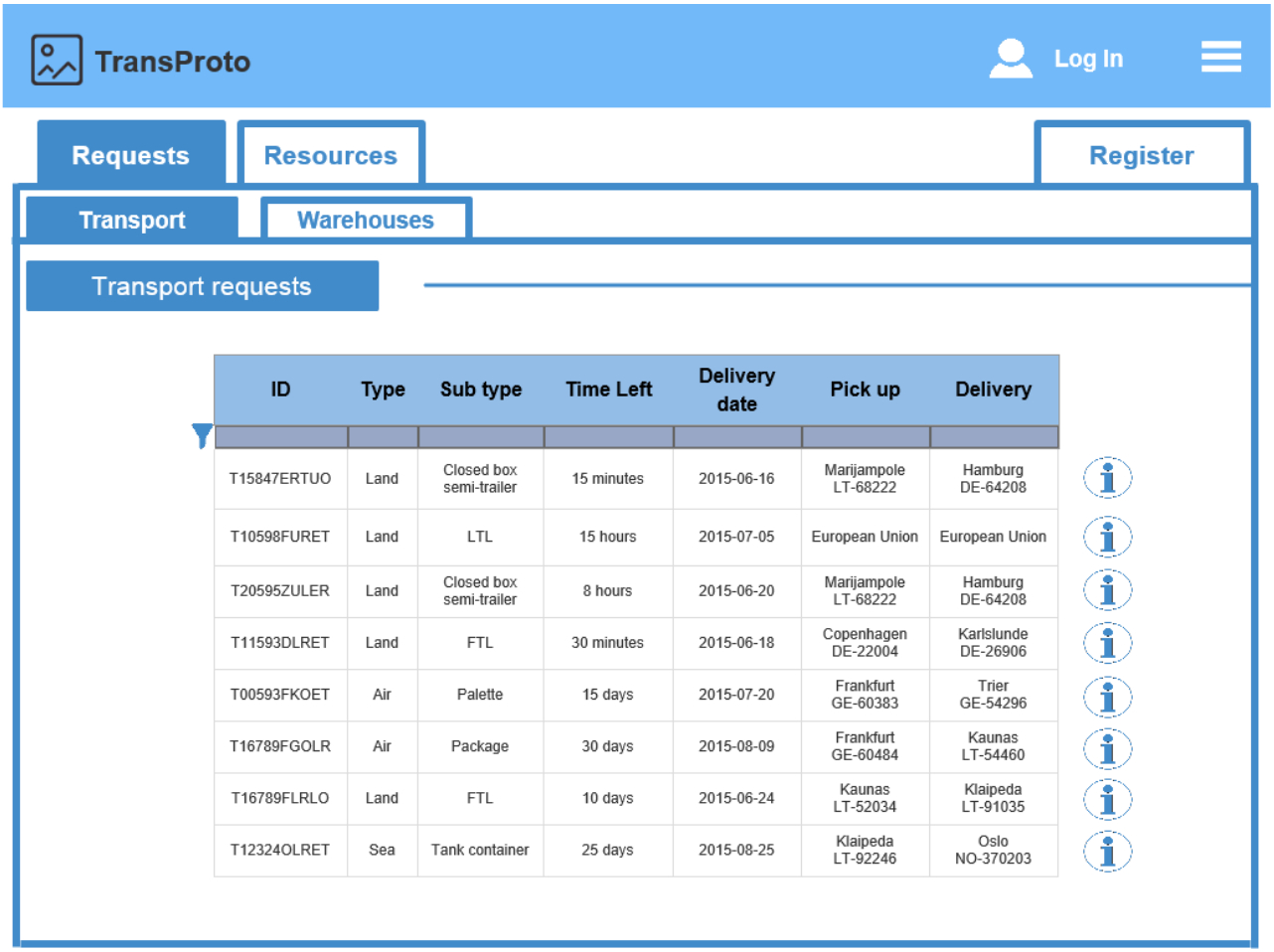


Figure 28 Warehouses resources page for unregistered shipper

In warehouse resources page for unregistered users, it is possible to see warehouses resources information as unique identification number, approach type to warehouse, storage type, current free space in warehouse, functions, additional operations of warehouse and location of warehouse.



ID	Type	Sub type	Time Left	Delivery date	Pick up	Delivery
T15847ERTUO	Land	Closed box semi-trailer	15 minutes	2015-06-16	Marijampole LT-68222	Hamburg DE-64208
T10598FURET	Land	LTL	15 hours	2015-07-05	European Union	European Union
T20595ZULER	Land	Closed box semi-trailer	8 hours	2015-06-20	Marijampole LT-68222	Hamburg DE-64208
T11593DLRET	Land	FTL	30 minutes	2015-06-18	Copenhagen DE-22004	Karlslunde DE-26906
T00593FKOET	Air	Palette	15 days	2015-07-20	Frankfurt GE-60383	Trier GE-54296
T16789FGOLR	Air	Package	30 days	2015-08-09	Frankfurt GE-60484	Kaunas LT-54460
T16789FLRLO	Land	FTL	10 days	2015-06-24	Kaunas LT-52034	Klaipeda LT-91035
T12324OLRET	Sea	Tank container	25 days	2015-08-25	Klaipeda LT-92246	Oslo NO-370203

Figure 29 Transport requests page for unregistered provider

In Figure 28 is shown page for providers to see request filled by system users as shippers. Unregistered providers can see requests for transport (Figure 28) and requests for warehouses (Figure 29). To the page shown in Figure 28 an unregistered user comes after selecting in beginning page (Figure 25) collaboration button. In this page providers can see the information about each transportation resource like: unique identification number, type of requested transport, also as sub type, time left to answer the quotation, desired delivery date, pickup and delivery locations.

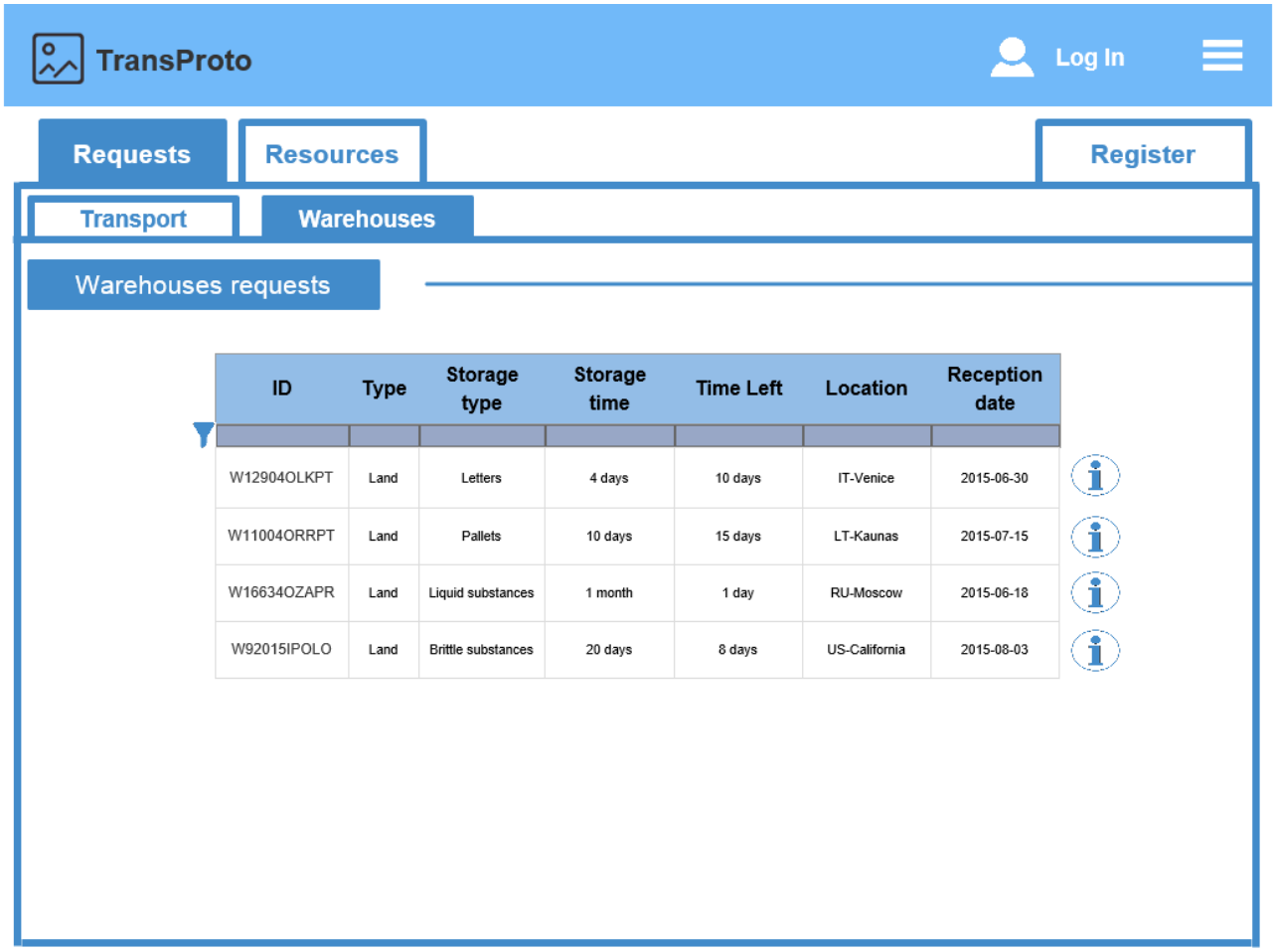


Figure 30 Warehouses requests page for unregistered provider

Figure 30 displays warehouses request page for unregistered providers. In page they can look at created request for warehouses. Each warehouse request has its own unique identification number, type of approach, storage type, storage time, time left till request ends, location and desired reception date. More information is accessible with information button for each resource. If provider wants to join and take requests there is a registration button. After fast registration he can send quotations for requests and take them.

Users registration form. Basic information needed to register to "TransProto" system is shown in Figure 31. In first line the user must choose his type: shipper, provider or both. By this chose system knows, what type of information and what functions will be available for user. If user registers as "shipper" he can get all information related with resources and can create requests. If as "provider" - user can see all information related with requests and can create resource (for example: transport). If user selects both - he can find all information related with resources, requests and can create requests and resources. This type of user called broker. Broker also can create relative resources, because broker, could provide services without any capital. Other information is basic information about user location and contacts.

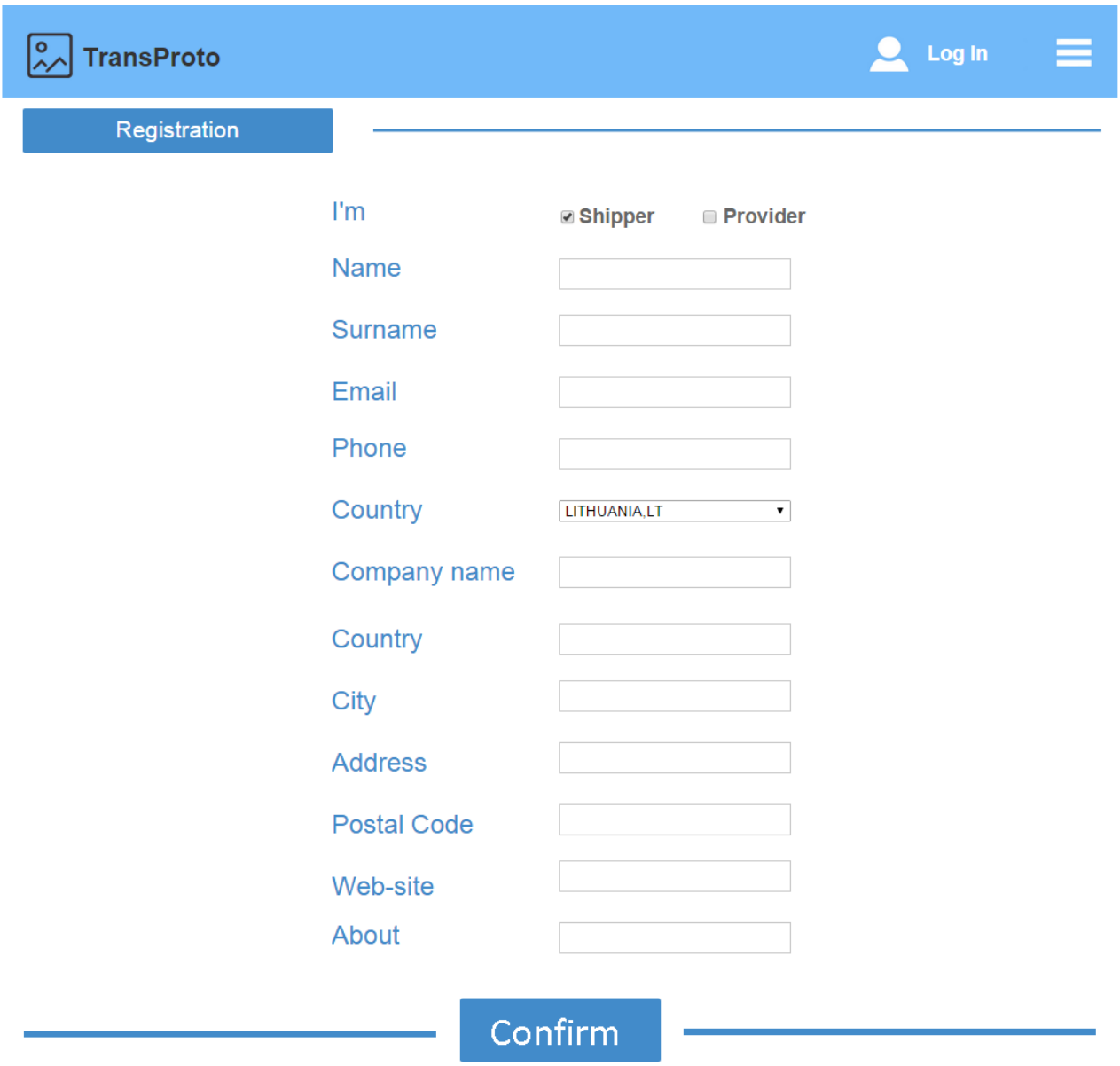


Figure 31 User registration form

3.2.2 "My activities" main window for registered users

The main user window of our system is shown in Figure 32. In this "My activities" page consisting boxes with labels, every of those boxes is shipment. At shipment box user can see basic information about shipment: shipment parameters, pickup and destination locations, and deadlines. More accurate information or detail status can be seen by clicking on information button or update button. The main window is divided into six areas: 2 rows and 3 columns. Lines dividing user's activities. First section as "My services" is for providers, in this section provider can see all activities related to his services as provider. In "My services" and "Requests" section provider gets requests for other system users as shippers or brokers. In the same "My services" row and second "Active" column is for users active shipments. The last in the row is "Finished" this section shows

finished activities and is used to leave and get feedback for both sides. The second row is shippers row, in this row user can see all his created requests and activity of his requests as active shipments. Columns are for shipments statuses. There are three stages of any shipment: tender stage (in request column) is negotiations stage, shipping stage (Active column) is process stage, and rating and feedback stage (Finish column) when shipping is finished. After that all shipments are stored in archive, they easily can be found because of each unique identification number (ID).

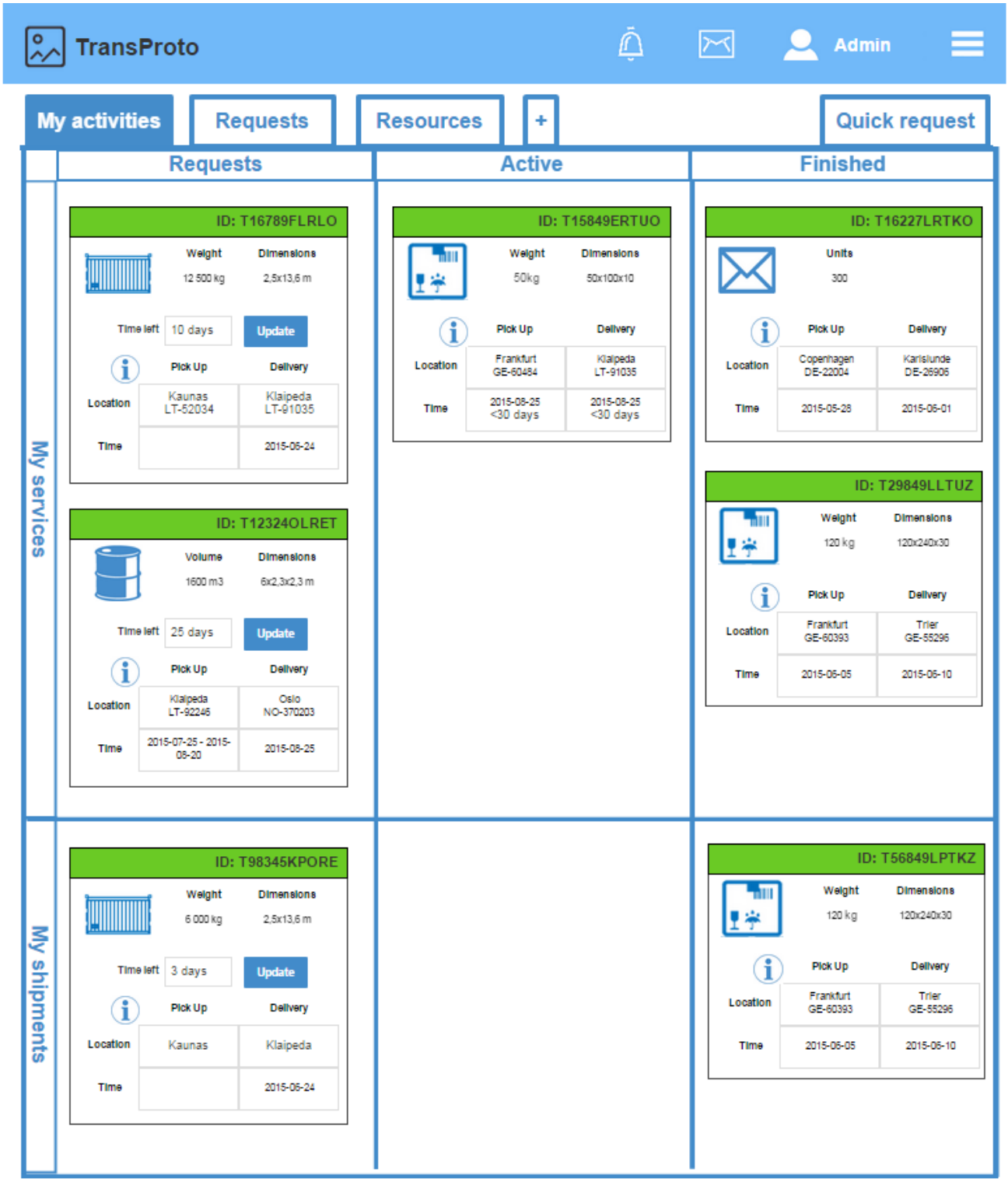


Figure 32 "My activities" page of registered user

Basically "My services" is provider's row, and "My shipments" is shipper's row, the users whose registered both as provider and shipper are called brokers and has them both. Brokers "duty" is to find ways to send shipments whose could not be send by carriers, they must find a way to calibrate with few carriers and organize that shipping goes from pick up to destination location smoothly. So brokers have to see all requests, get orders, see all resources and bet on requests to

take order. Typical brokers working scheme is: reserving of requests, creating route, making requests, negotiating with carriers or warehouses and creating proposals for shipper requests.

3.2.3 Request forms and request system of "TransProto"

We analyzed carrier registration form in 2.3 section, from that analysis we created our „TransProto" system quick transportation request (Figure 33), detail transportation request form (Figure 34) and warehouse request form (Figure 35).

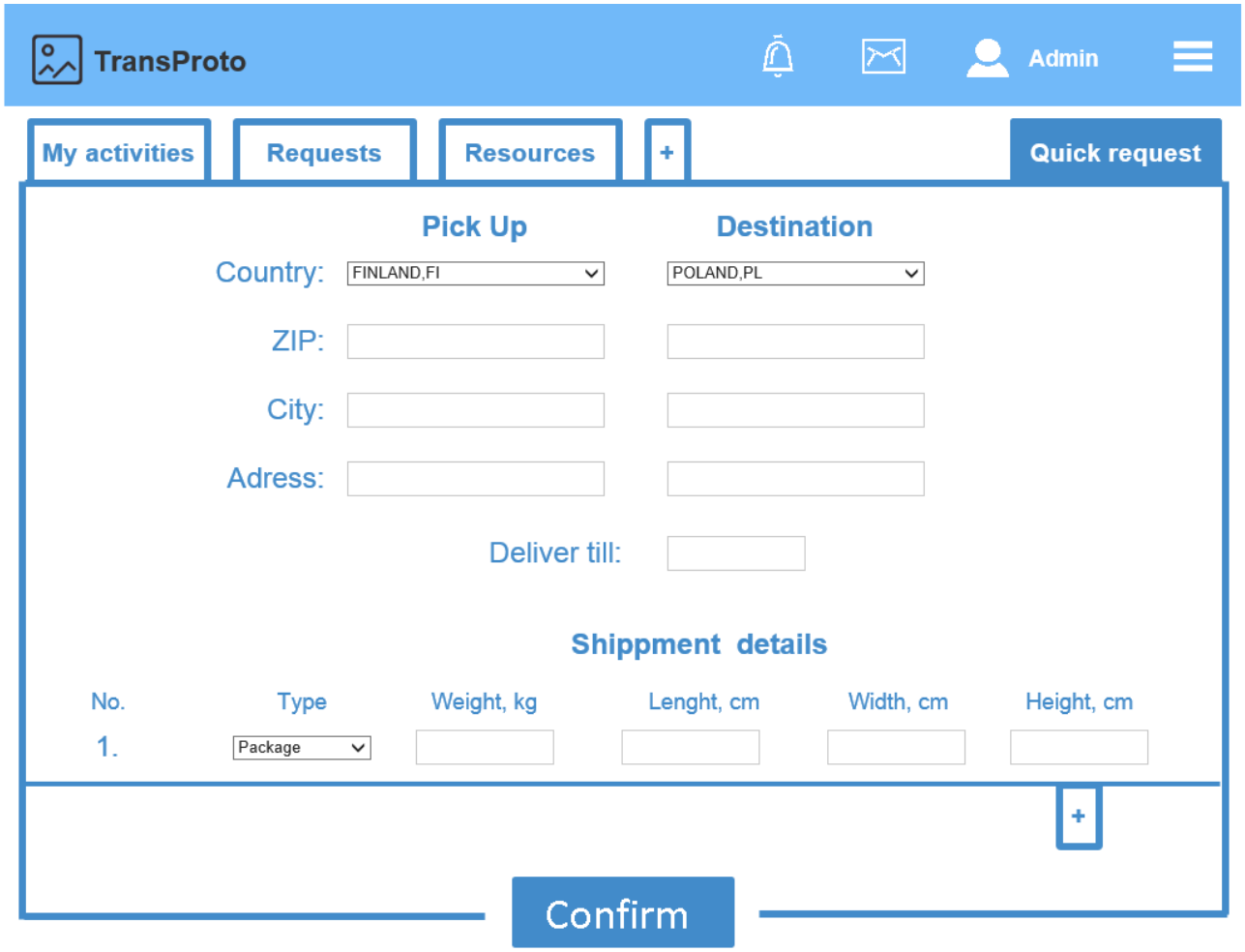


Figure 33 Quick transportation request form

In Figure 33 is shown quick transportation request form page. In this page shippers or providers as brokers can quickly request for transportation. The form is easily filled with main information to give fast quotation request for transportation providers. Shipper just needs to fill pickup and destination locations, choose delivery date and describe shipment details.

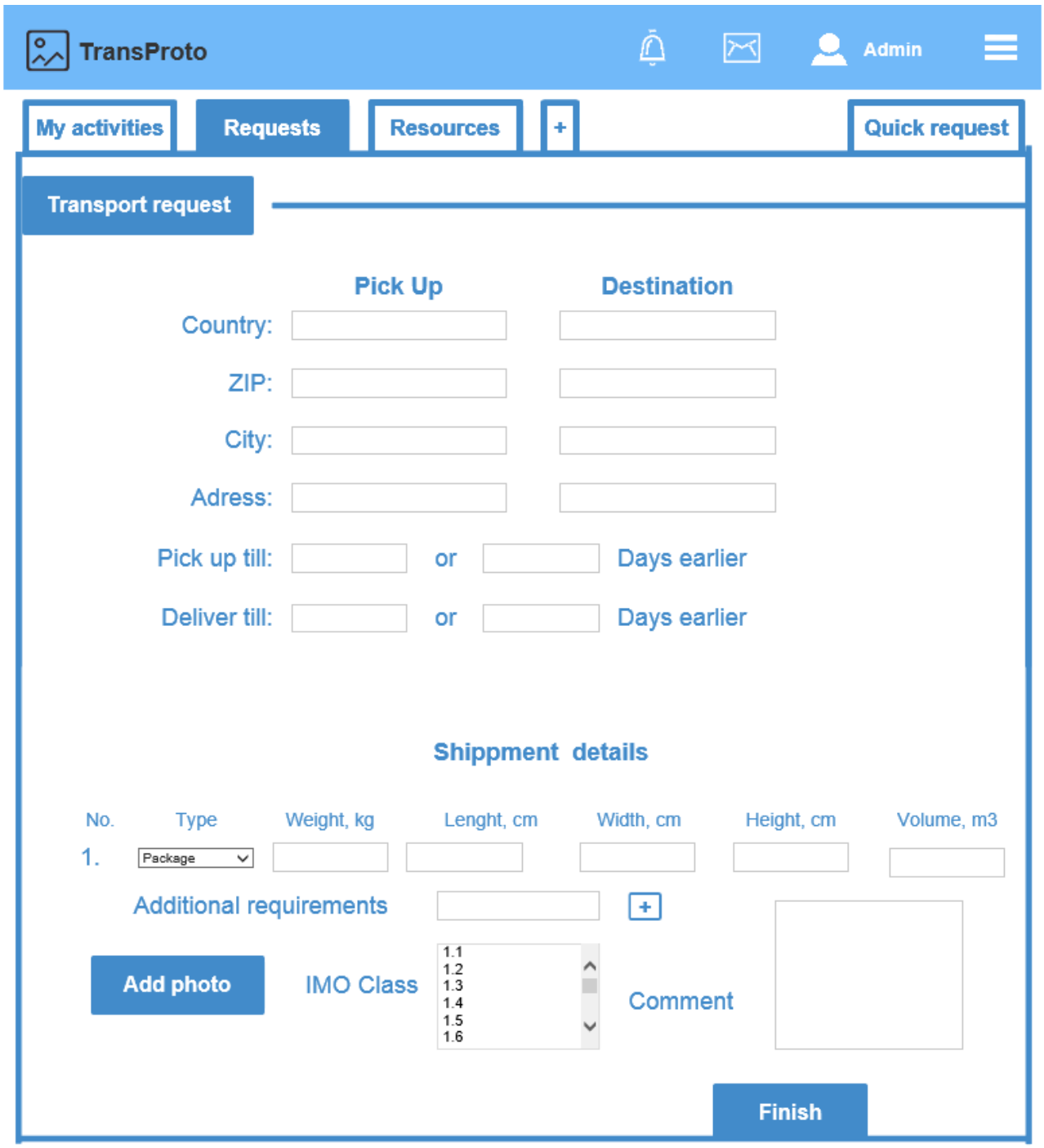


Figure 34 Detail transportation request

Figure 34 displays detail request for transportation. This is more detail request form for transportation; in this form users can add more destination location for pickup and delivery if it's more than point to point delivery. Also they can fill additional requirements, choose IMO class for cargo, add photo of package and other information.

Figure 35 Request form for warehouse

In Figure 35 is shown warehouse request form. In this form user fills main data as approach type to warehouse like: land, air, sea or rail. Required functions in warehouse as storage, bounding or temperature control and additional requirements. Type of storage with crossdocking, required operations and IMO class if needed. Also as the location of warehouse, size and quantity of

cargo. With filled most needed information to describe desired warehousing properties users gets fast answers to their requests.

"TransProto" registered users request system. Main "Requests" page is simple in top of page it has two options "Transport" and "Warehouses" requests.

Transport requests page is divided in two sections "My transport requests" and "All transport requests". In "My transport requests" section user can see all requests created by him in the system. User has ability to update, edit and control them. In "All transport requests" section user can search, filter all transportation requests created by shippers or brokers in the system. Also as look for more detail information about each request or accept request or write to creator (Figure 36).

Figure 36 Transport request page for registered users

As we can see in Figure 36 user has one pending request for transportation which ends after 15 minutes, in this page he can easily update status or time if he wants.

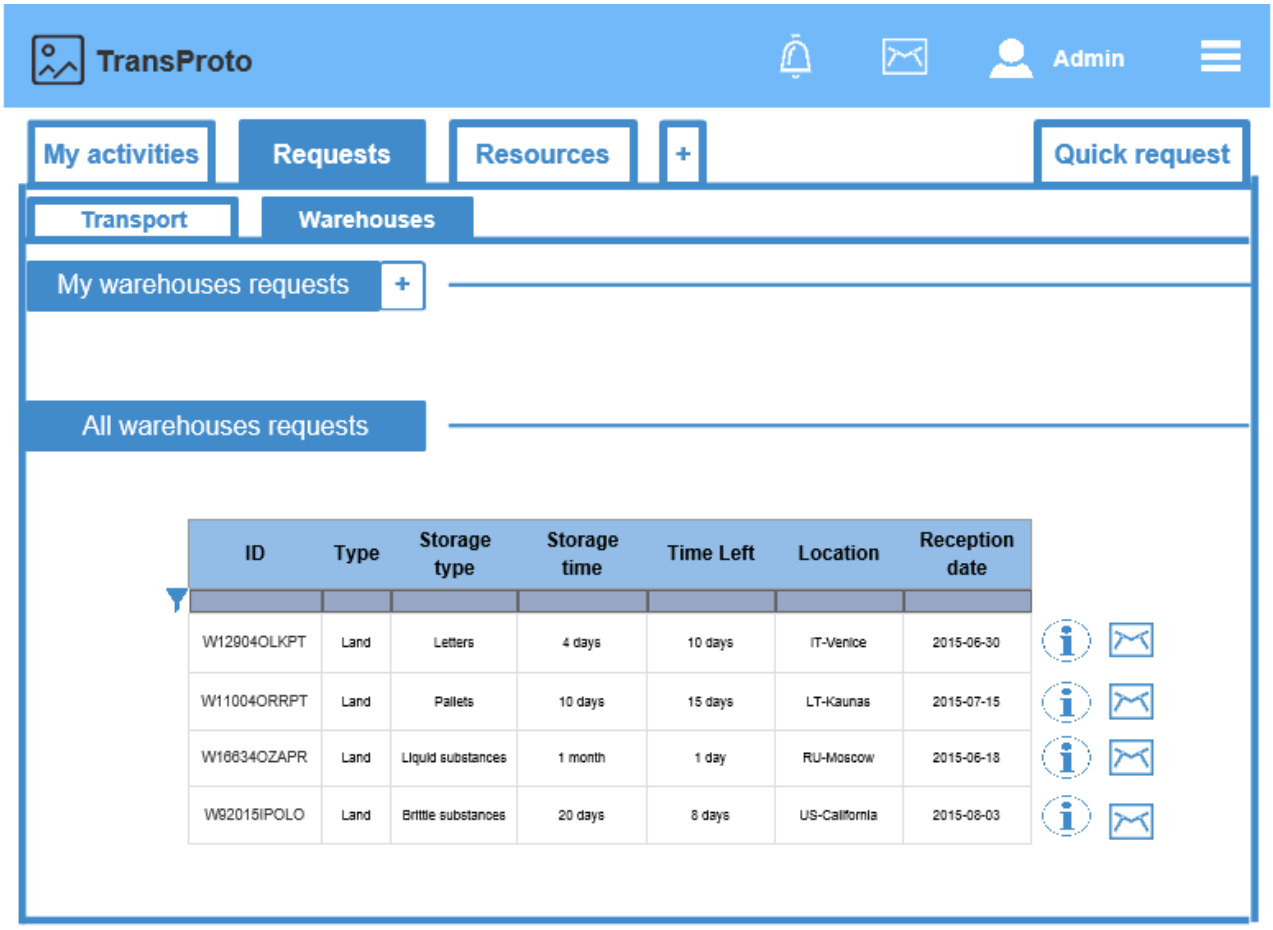


Figure 37 Warehouse request page for registered users

Warehouse requests page is divided in two sections “My warehouses requests” and “All transport requests”. In “My warehouses requests” section user can see all requests created by him in the system. User has ability to update, edit and control them. In particular example in Figure 37 we can see that user hasn’t created any warehouses requests.

In “All warehouses requests” section user can search, filter all warehouses requests created by shippers or brokers in the system. Also as look for more detail information about each request or accept request or write to creator (Figure 37).

3.2.4 Resources registration forms and resources system of “TransProto”

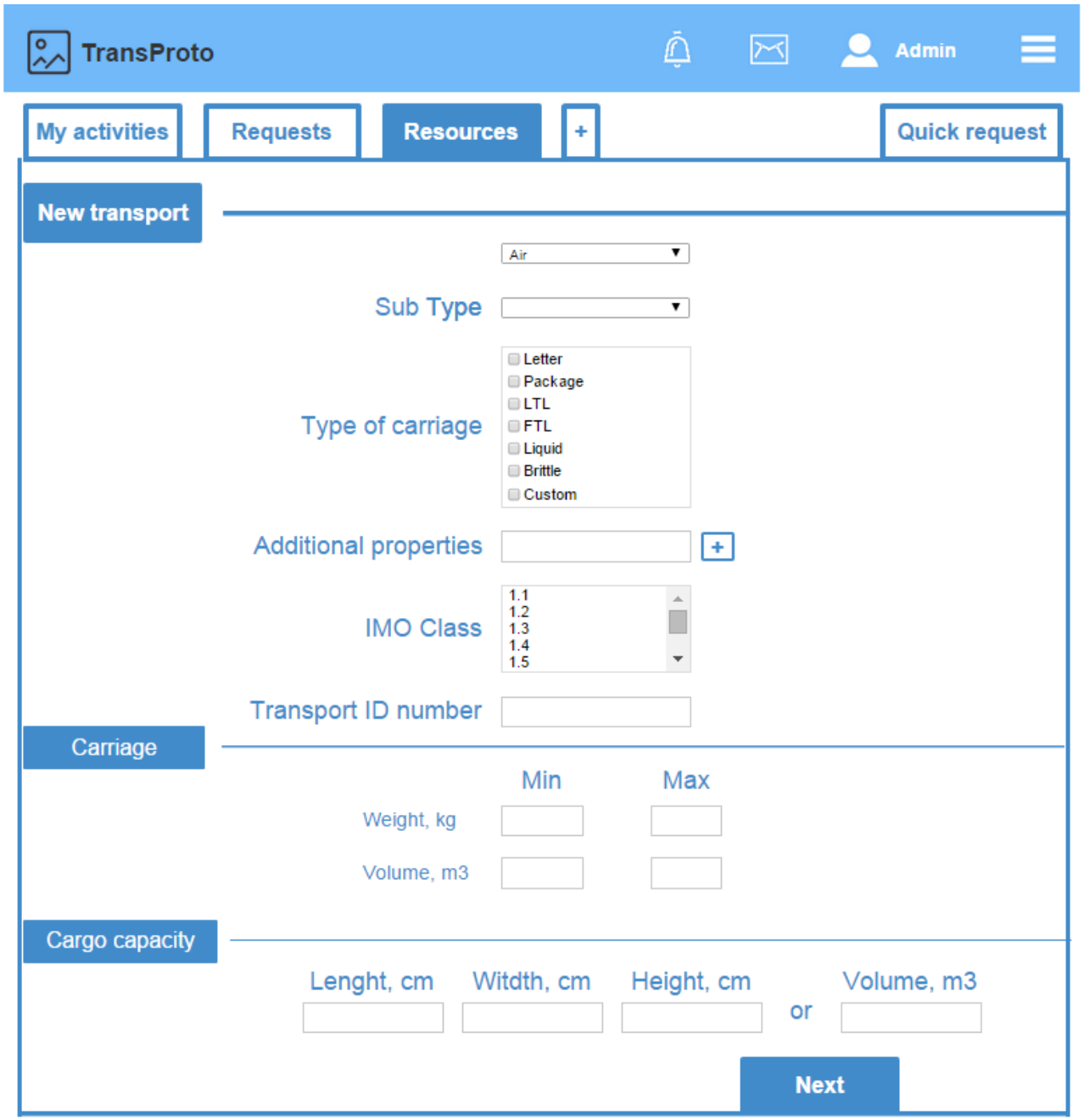


Figure 38 New transport resource creation form

Figure 38 shows page for transport registration as resource form. At this window provider must submit information about what types of transportation he provides (air, land, rail or sea) and information what type of shipments he could work with. He also adds information about what types of IMO class he could work with and what additional properties his transport has. He also describes his transport cargo capacities and smallest and biggest shipment his transport could work with. Another important thing is to submit transport unique identification number as ID, cause

this ID is part of transport ID in our system, without it transport become “Virtual”. Virtual resources is for brokers, which could provide services, but usually don’t have capital.

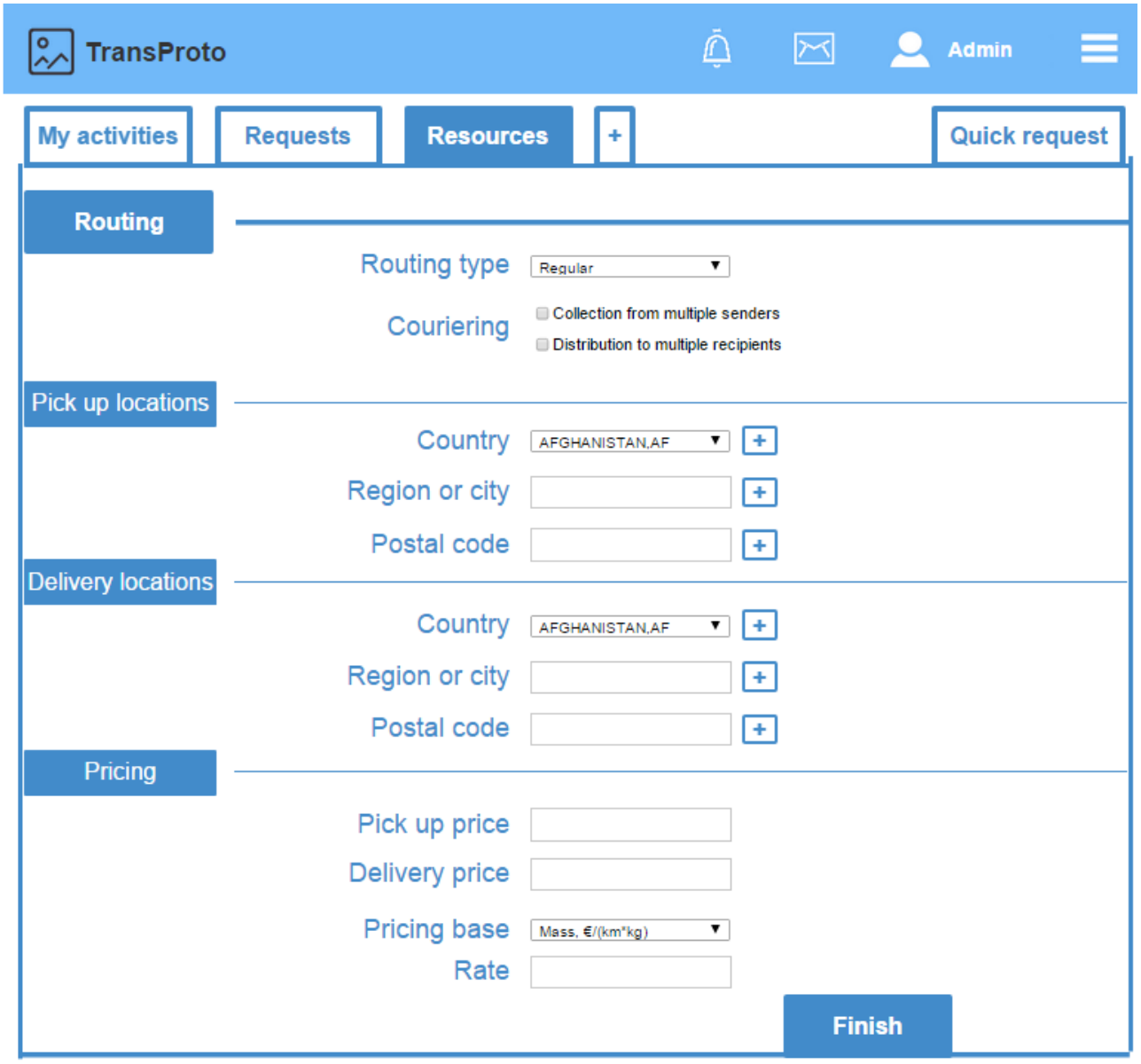


Figure 39 New transport resource creation form second page

Figure 39 displays second window of transport registration form, user comes to this window after filling first page and selecting “Next” button as shown in Figure 38. At this window, resource creator must fill all information related with transport working area and transport. At first part provider select type: regular or on quest. If routing is scheduled resource provider get benefits to publishing his services on our system. If on quest, brokers and shippers can see transport as transport on our system. Couriering is important information, because it describes opportunity to collect or deliver relative small packages to customers directly. At second and third part, resource creator describes working locations, it’s very important feature for shippers whom are searching

resources by themselves and brokers, because by filtering locations they could find what they need. It's also important for our automatic routing system. The final part is pricing, without filling pricing resource would not be as quick resource and would not be in our quick orders system. Pricing basically is from three parts: pick up prices, delivery price and price for one kilometer (of kilogram, cubic matter, square matter or running meter).

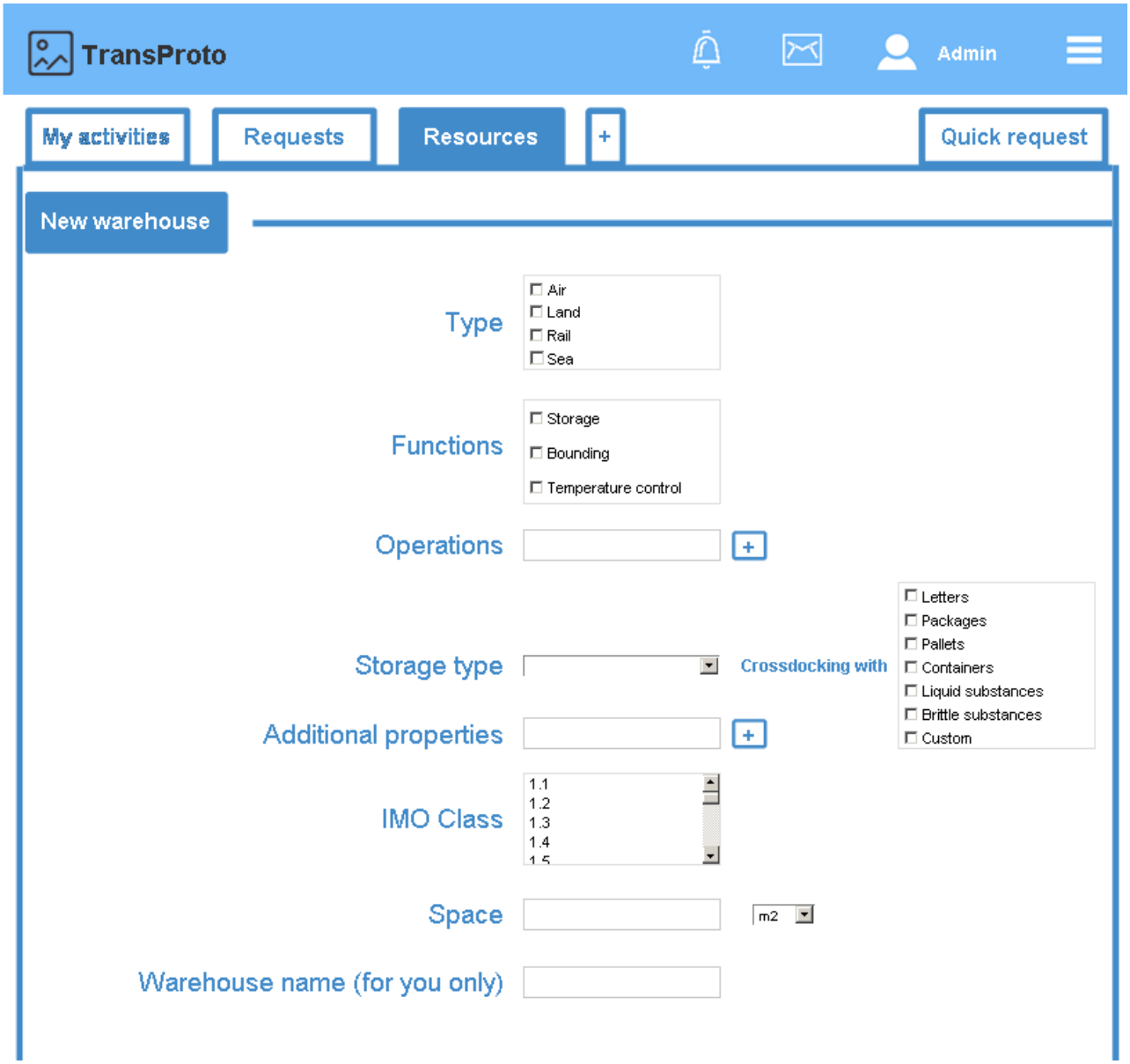


Figure 40 New warehouse resource creation form

At Figure 40 shown first window of new warehouse registration as resource. First of all resource creator must select approach type of warehouse, it could be air, land, rail or sea. It could be one or could be few (for Example Sea - land crossdocking warehouse). Next functions and operations which warehouse provide. Another important thing is types of packages warehouse can work with and what packages types it could crossdock. It's very important for shipments

distribution. Provider also can select IMO classes which his warehouse could work with. He also must fill capacities of warehouse. Very important is to understand that one warehouse could work with several types of packages, so if it does so, few warehouse recourses must be created in our system.

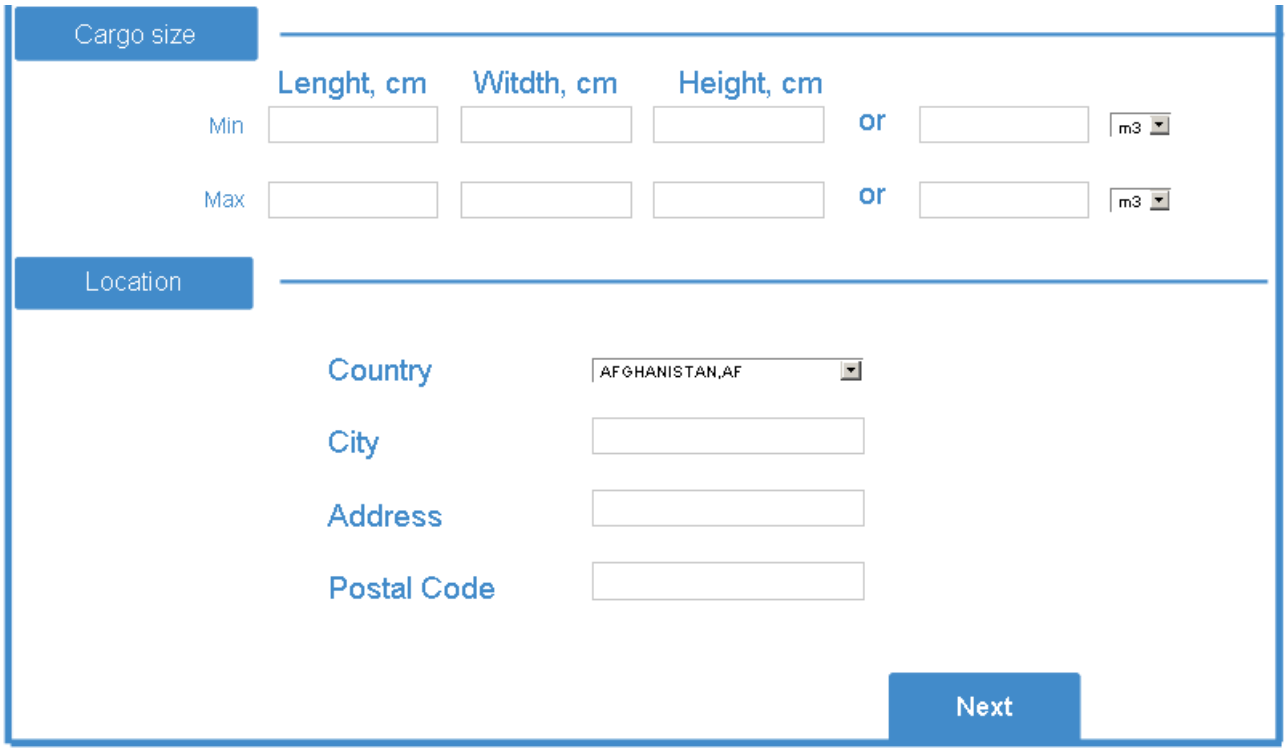


Figure 41 New warehouse resource creation form second part

Figure 41 shows first window of warehouse registration as resource second part. At first warehouse creator must set maximum and minimum properties of shipments to describe warehouse working capacity. It could be dimensions of shipment, volume or mass. Then recourse creator must write location of warehouse. It's important for all shippers and for "TransProto" auto shipping system.

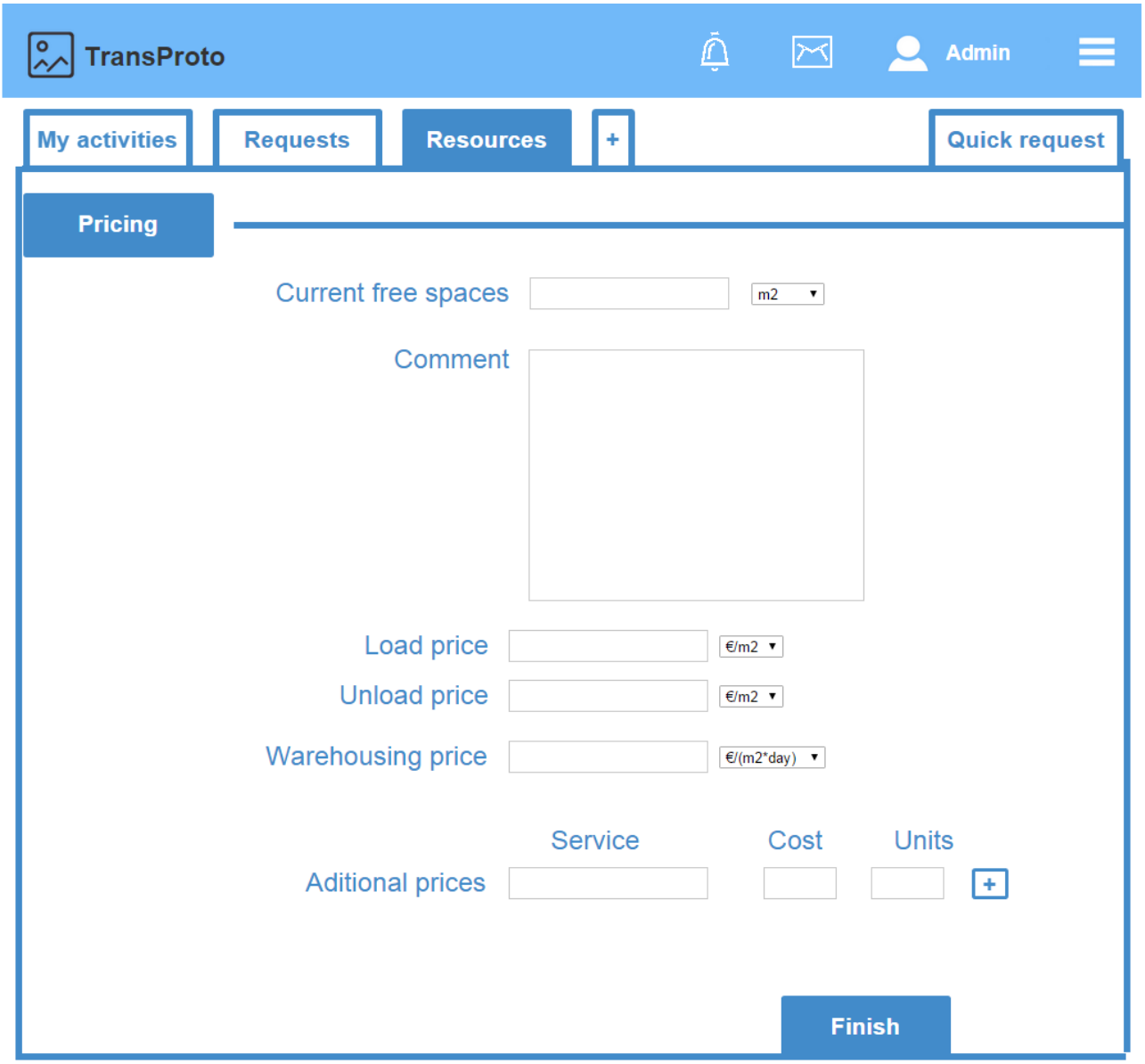


Figure 42 New warehouse resource creation form second page

Figure 42 shows second window of warehouse registration as resource. It contains pricing and current capacity. Resource creator sets current free space. Writes short sum up about his warehouse and sets pricing. Casual services pricing is from three parts: load price, unload price and warehousing price. Load and unload price can be for kilo, cubic meter, square meter or for pieces. Warehousing price is for day of warehousing of kilogram, cubic meter, square meter or piece. Additional services price is for custom additional services.

"TransProto" registered users resources system. Main "Resources" page consists of two sections with options "Transport" and "Warehouses" resources.

In Figure 43 is shown transport resources page of registered user. This page is divided in two sections "My transport" as user created transport and "All transport" as all providers transport resources registered in the system.

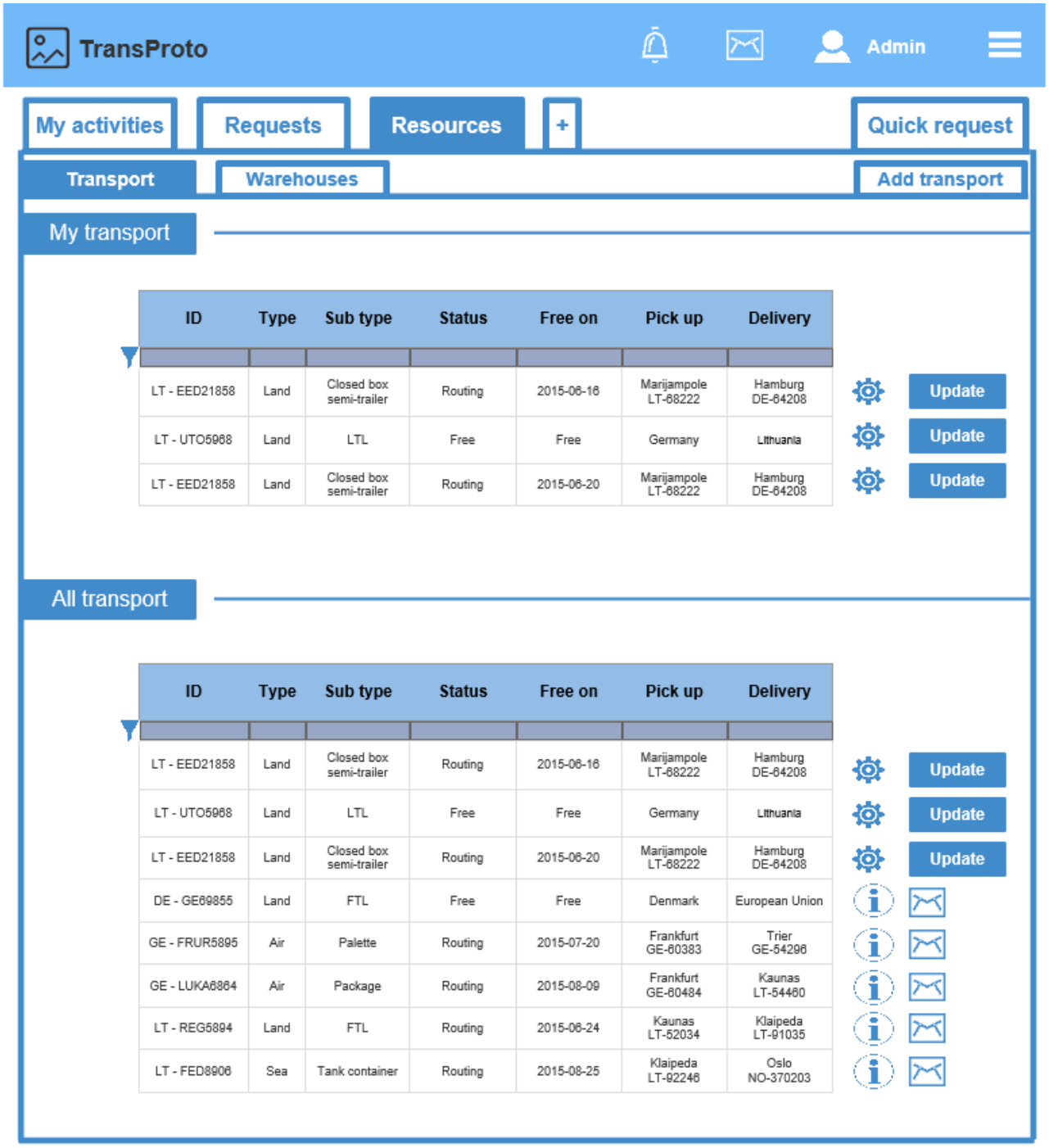


Figure 43 Transport resources page for registered users

In this page users can see public information in “All transport” about resource as ID – unique identification number, type of transportation, sub type of transport, status of transport and when it will be free. Also pickup and delivery locations. In this page also user can filter all transport by any section, look for detail information about each resource with information button or write to resource creator by pressing mail button.

In “My transport” section users can modify their created resources add more information, update them or create new ones.

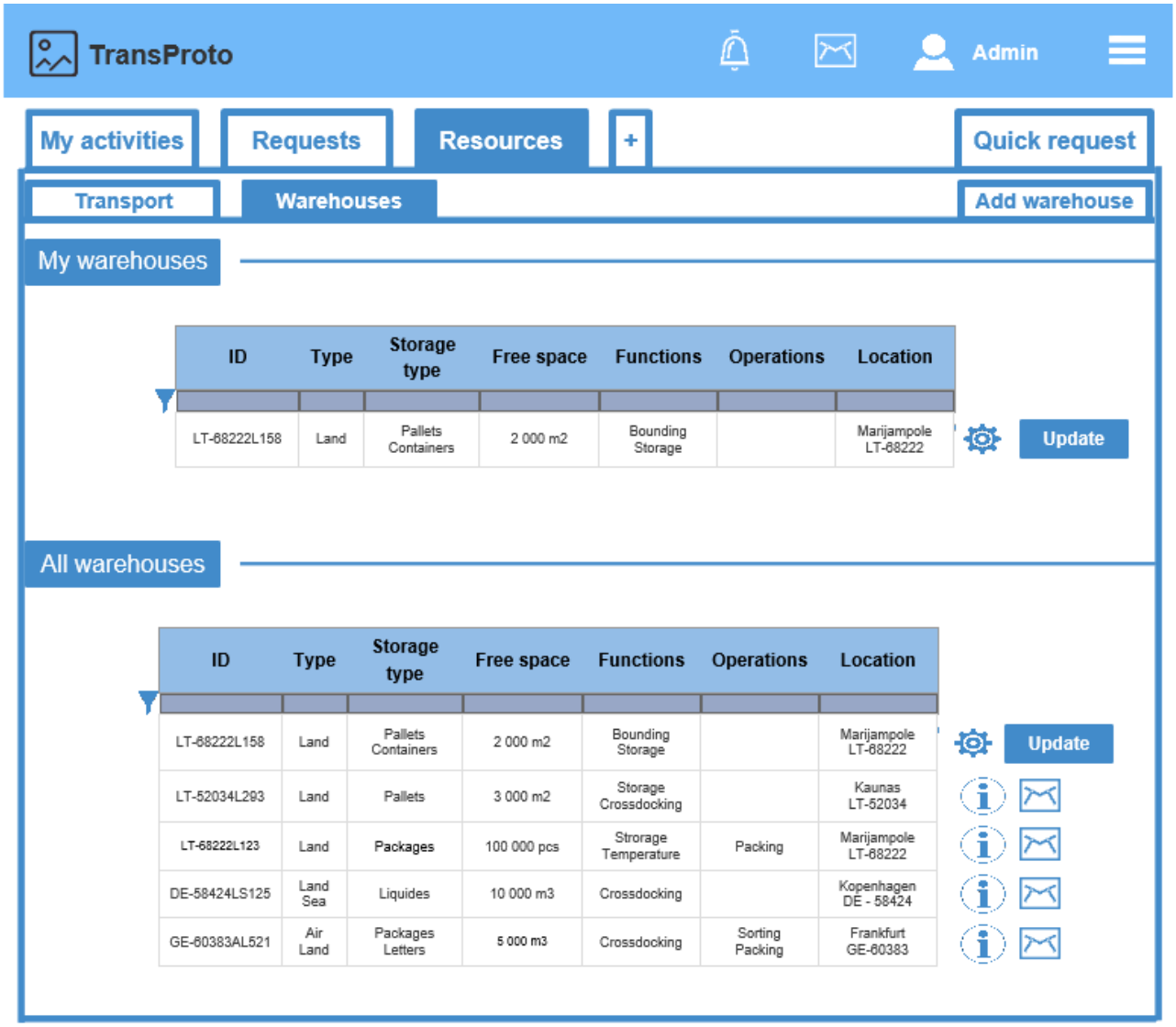


Figure 44 Warehouse resources page for registered users

In Figure 44 is shown warehouse resources page of registered user, as we can see he created warehouse resource in “My warehouses” section. In this warehouse resources section user can create, edit, and update his warehouse resources. In “All warehouses” section user can search, filter for all warehouses created by providers in system. Also as look for more detail information about each resource or write to creator.

CONCLUSIONS

1. SMEs of logistics are uniting forces and trying to collaborate between themselves to compete with big international companies. There are a lot of software products for them, which help to optimize logistics operations. But there are only few products which help to streamline collaboration process.
2. There are two types of software products for logistics chain management – products which helps to optimize logistics processes and freight collaboration systems. We analyzed 20 most popular logistics software and find out, that today there is no all-in-one product which provides all required optimizing features and freight collaboration. By this analysis we find out features which are necessary for our system.
3. We find out, that 90% of all worlds shipments could be divided into six groups: letter, package, pallet, full truck load, brittle product and liquid product. There are four major types of transportation: air, land, rail, and see with their subtypes. By those breakdowns we created recourse registration forms. We also find out shipment's essential standards, by which shipment could be carried smoothly.
4. We analyzed 14 logistics companies only 11 have quotation forms. In conclusion by this analysis we gathered all information needed to create registration forms for shippers and providers: carriers, warehouses, brokers. Also we used information from this topic to create a quick request and full request forms for transportation and warehouses quotations.
5. We described our system users: shippers, carriers, warehouses and brokers, presented their unique functions, their properties, and methods how they collaborate between themselves.
6. We described and created cloud – based prototype of "TransProto" logistics management system. Quotation system which is key element for combining users, resources and quotes was created. Proposals ranking system was created, which prevents shippers from poor quality of providers' services.

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APPENDIX I: Top 40 global logistics providers

TOP 40 GLOBAL 3PLS

2013 RANK	COMPANY	2013 REVENUE (MILLIONS OF DOLLARS)	BASE COUNTRY	COMMENTS
1	**DHL LOGISTICS**	$36,876	Germany	
2	**KUEHNE + NAGEL**	$22,575	Switzerland	
3	**DB SCHENKER LOGISTICS**	$18,879	Germany	
4	**C.H. ROBINSON WORLDWIDE**	$11,070	U.S.	Growth in transportation revenue was driven by volume increases across all modes, as well as the acquisition of Phoenix International in November 2012.
5	**CEVA LOGISTICS**	$8,517	Netherlands	Freight Management revenue declined 11.9 percent on lower air freight volumes out of Asia and lost contracts as a result of a restructuring program.
6	**DSV**	$8,138	Denmark	
7	**PANALPINA**	$7,289	Switzerland	
8	**DACHSER**	$6,475	Germany	Acquired Spanish logistics providers Azkar and Transunion, with combined revenues of 470 million euros, in 2013.
9	**EXPEDITORS INTERNATIONAL**	$6,072	U.S.	
10	**SNCF GEODIS**	$6,068	France	
11	**SINOTRANS**	$5,892	China	
12	**UPS SUPPLY CHAIN SOLUTIONS**	$5,492	U.S.	Revenue fell 8.1 percent, driven by decline in volume and rates in international air forwarding segment.
13	**J.B. HUNT**	$5,224	U.S.	
14	**TOLL HOLDINGS**	$5,025	Australia	
15	**GEFCO**	$4,817	France	
16	**AGILITY LOGISTICS**	$4,594	Kuwait	
17	**UTI WORLDWIDE**	$4,419	U.S.	
18	**YUSEN LOGISTICS***	$4,275	Japan	
19	**BOLLORÉ**	$4,139	France	
20	**RHENUS**	$3,983	Germany	Completed the acquisition of Wincanton's German and French operations in January 2013.
21	**HELLMANN WORLDWIDE LOGISTICS**	$3,604	Germany	
22	**HUB GROUP**	$3,374	USA	New customers boosted revenue in the logistics segment by 32 percent.
23	**DAMCO**	$3,212	Denmark	
24	**NORBERT DENTRESSANGLE**	$2,783	France	Acquired Fiege's logistics operations in Italy, Spain, and Portugal.
25	**KINTETSU WORLD EXPRESS***	$2,711	Japan	
26	**PANTOS**	$2,619	South Korea	
27	**NEOVIA LOGISTICS**	$2,548	U.S.	
28	**NIPPON EXPRESS***	$2,535	Japan	
29	**RYDER**	$2,383	U.S.	
30	**SANKYU***	$2,331	Japan	
31	**HITACHI TRANSPORT SYSTEM***	$2,015	Japan	Acquired 51 percent of the shares of Turkish-based Mars Logistics Group in July 2013.
32	**BDP INTERNATIONAL**	$2,013	USA	
33	**SCHNEIDER**	$1,920	USA	
34	**FIEGE**	$1,892	Germany	Sold logistics operations in Italy, Spain and Portugal to Norbert Dentressangle.
35	**WINCANTON**	$1,668	U.K.	
36	**LOGWIN**	$1,619	Luxembourg	
37	**APL LOGISTICS**	$1,586	Singapore	
38	**MENLO WORLDWIDE LOGISTICS**	$1,540	U.S.	Transportation management revenue declined 18.4 percent on lower volume and the conclusion of contracts.
39	**BLG LOGISTICS**	$1,509	Germany	
40	**GENCO**	$1,502	U.S.	
TOTAL TOP 40 GLOBAL LOGISTICS COMPANIES		**$225,183**		

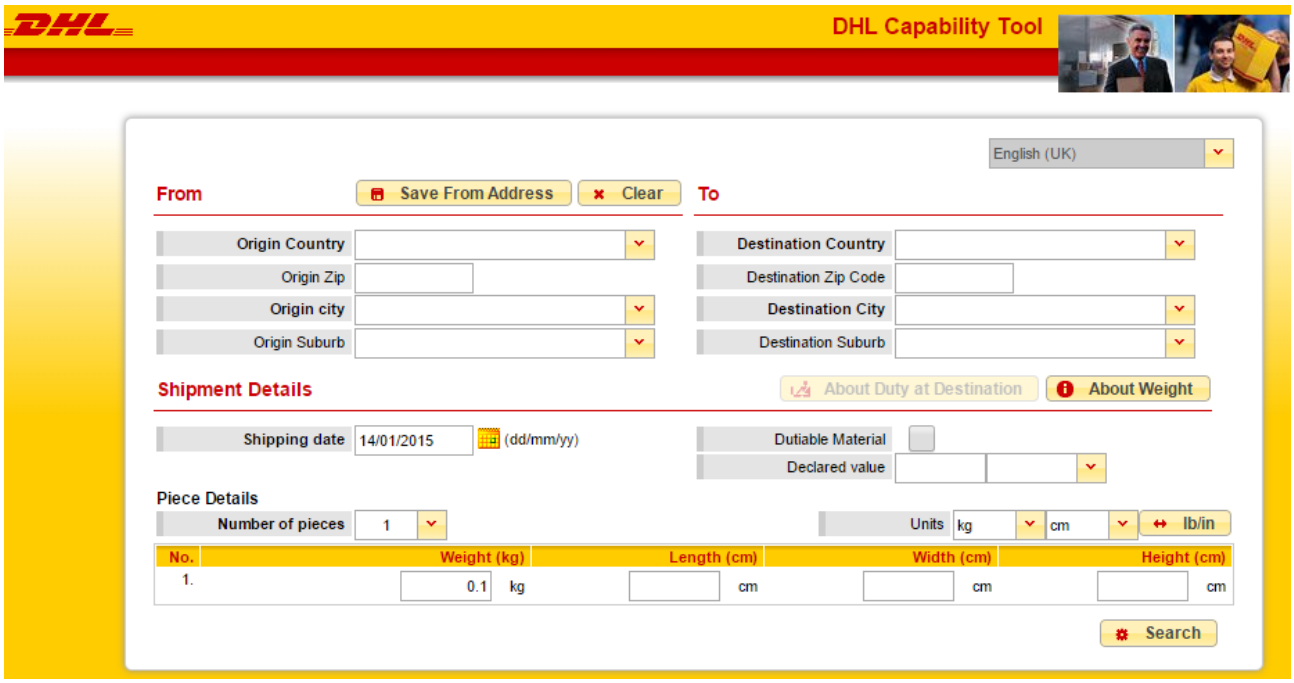
**2013 revenue adversely affected by a 17.6 percent drop in the yen against the dollar.*
Company revenues are primarily from non-asset third-party logistics.

Source: Company reports; SJ Consulting estimates

Prepared by SJ Consulting Group

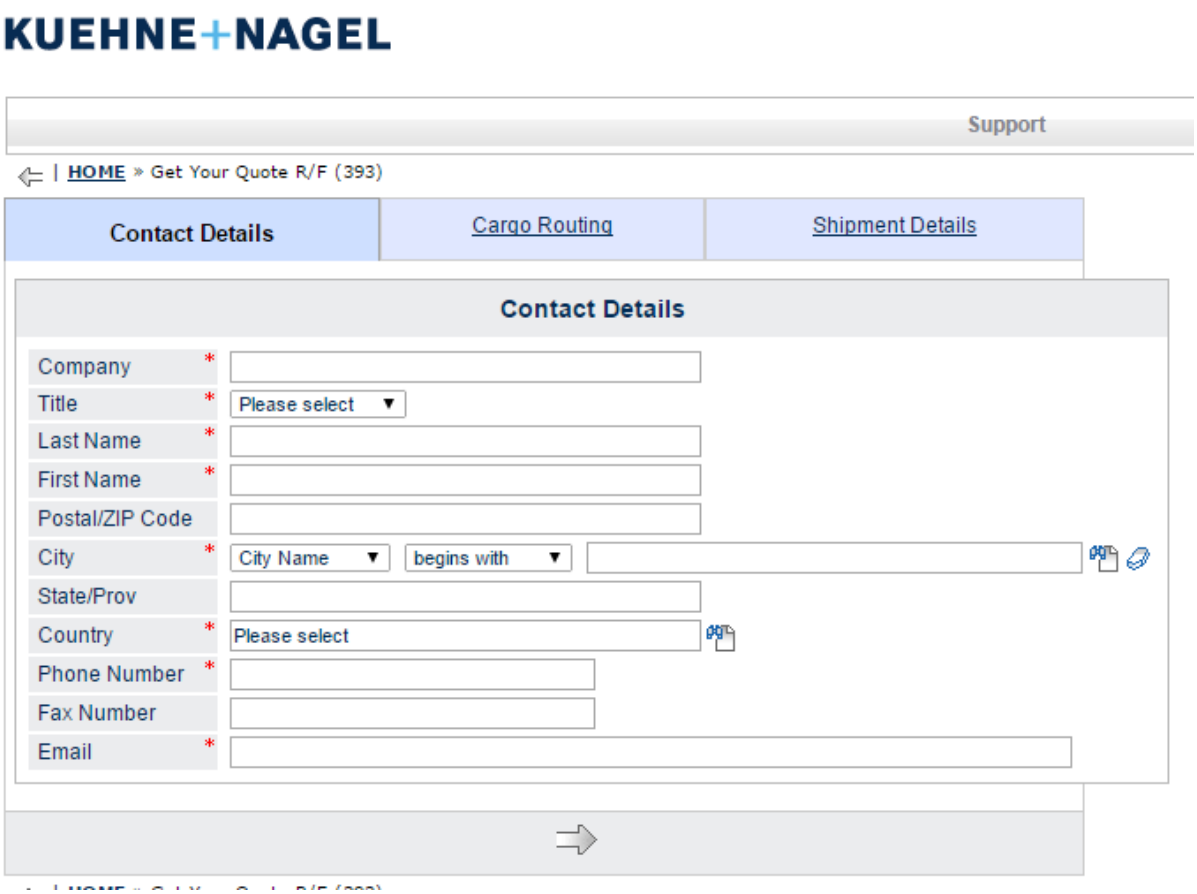
APPENDIX II: Registration forms

DHL LOGISTICS. Has an available quotation form for time and price, listed below in Figure 15 and it is not difficult to find. It has no possibility for comparing to other carriers, but it gives fast quotation with rough price.



DHL quotation form (http://www.dhl.com/en/logistics.html)

KUEGNE+NAGEL. Gives users more difficult quotation form, it starts from choosing transportation type, options: Air, Sea, Road. After selection it gives form to all shipment types to fill contact information.

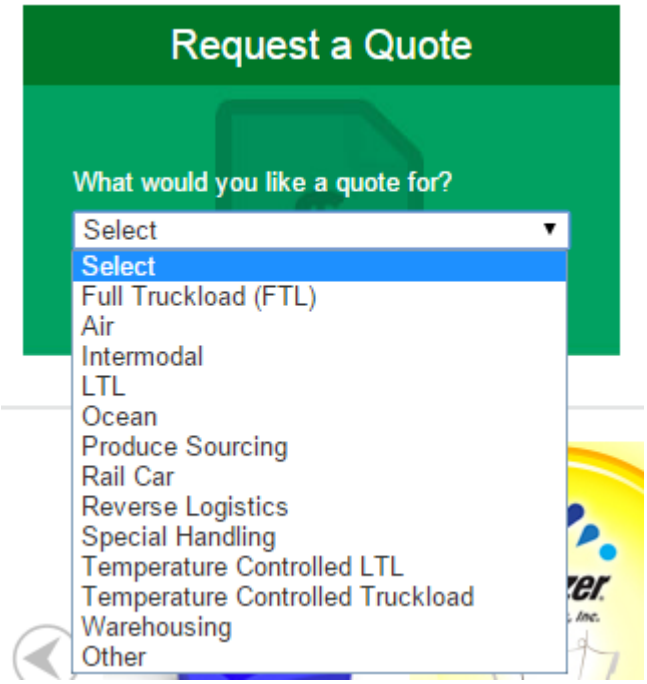


Quotation form (http://www.kn-portal.com/)

It shows there are required fields with red stars, so there are no option to get fast and anonymous quotation. After this form fulfillment next is Cargo Routing about location from where to where and Shipment details.

DB SCHENKER LOGISTICS. It has no available quotation form for non-registered users.

C.H. ROBINSON WORLDWIDE. Is a B2B shipper, in first place as shows Figure 17 the selection of quote, after selection it asks full detailed contact information and company information. It has no possibility to get anonymous or fast quotation.

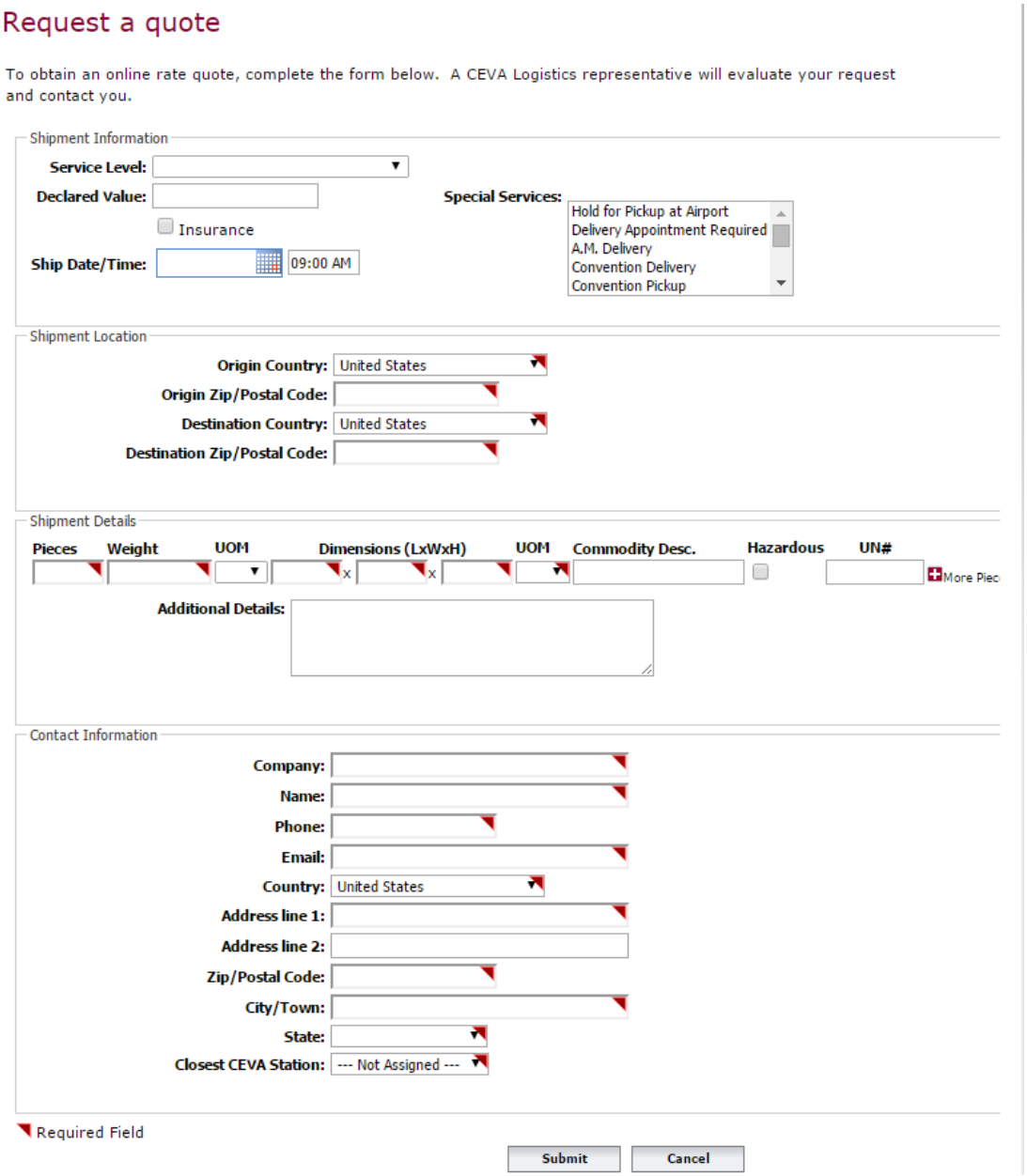


(http://www.chrobinson.com/en/us/Contact-Us/Request-a-Quote/)

CEVA LOGISTICS. Ceva Logistics is totally for B2B it has detail quote form There are no possibility for anonymous quotation.

Service levels (http://www.cevalogistics.com/en-US/Pages/default.aspx)

It shows available service levels. So it's possible after fulfillment of this Form get fast and precise quotation. For shipment location for United States in Form there is need to fill zip/postal code and for other countries instead of zip code, there is field for Origin city/ Town.



Quotation form (http://www.cevalogistics.com/en-US/Pages/default.aspx)

DSV. It has no available form for non-registered users/ companies.

PANALPINA. This company declares that it will give answer to quotation form within 24 hours, see quotation example. We can see from quotation form that this form is rough it is not automatized so it takes much more time answer for person. Carrier don't have anonymous quotation.

Get your transport quote

Pick-up date *

Please click in the text field to get the calendar view.

Commodity *

Mode of transport: Air, Ocean, Road, Don't know

Origin of goods *

Destination of shipment *

Total weight of goods *

Please select an incoterm *: CFR, CIF, CIP, CPT, DDP, DAP, DAT, EXW, FAS, FCA, FOB, Don't know

Remarks

Company Name *

Contact Name *

Company Domicile *

Postal address *

Telephone *

Telefax

Email address *

How would you like to be contacted? *: Telephone, Email, Telefax, Don't mind

Do you have a regular contact person at Panalpina? If yes, please enter the name here, so that your request can be forwarded accordingly.

Panalpina Contact

Where are you based? * Please select a country

Where will our transport invoice be paid? *

Panalpina quote form (http://www.panalpina.com/www/global/en/home.html)

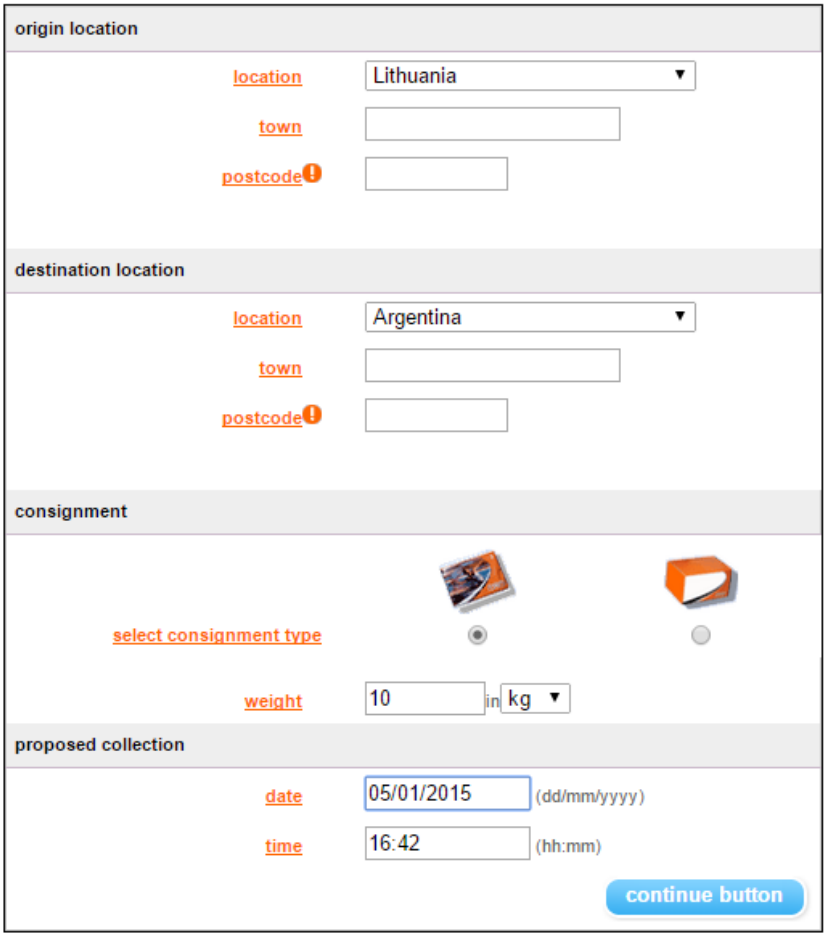
DACHSER. It has no available form for non-registered users/ companies.

EXPEDITORS INTERNATIONAL. It has no available form for non-registered users/ companies.

SNCF GEODIS. It has no available form for non-registered users/ companies.

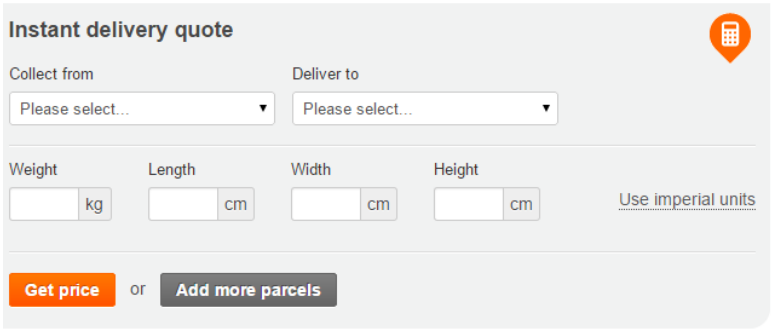
DPD. DPD Company doesn't have a quotation system but it has a transportation to countries and additional services price list, so after looking at rough price customers gives request to calculate precise price.

TNT. The TNT Company has an automated time quotation form to calculate shipping time. It uses three factors Country, town and post code as shown.



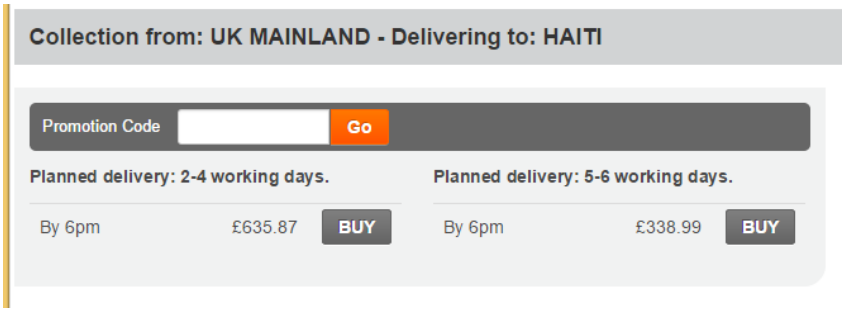
DPD time quotation form (http://www.dpd.com/)

Also it has option like instant delivery quote as shown above this type of quotation is not precise but fastest.



DPD instant delivery quote (http://www.dpd.com/)

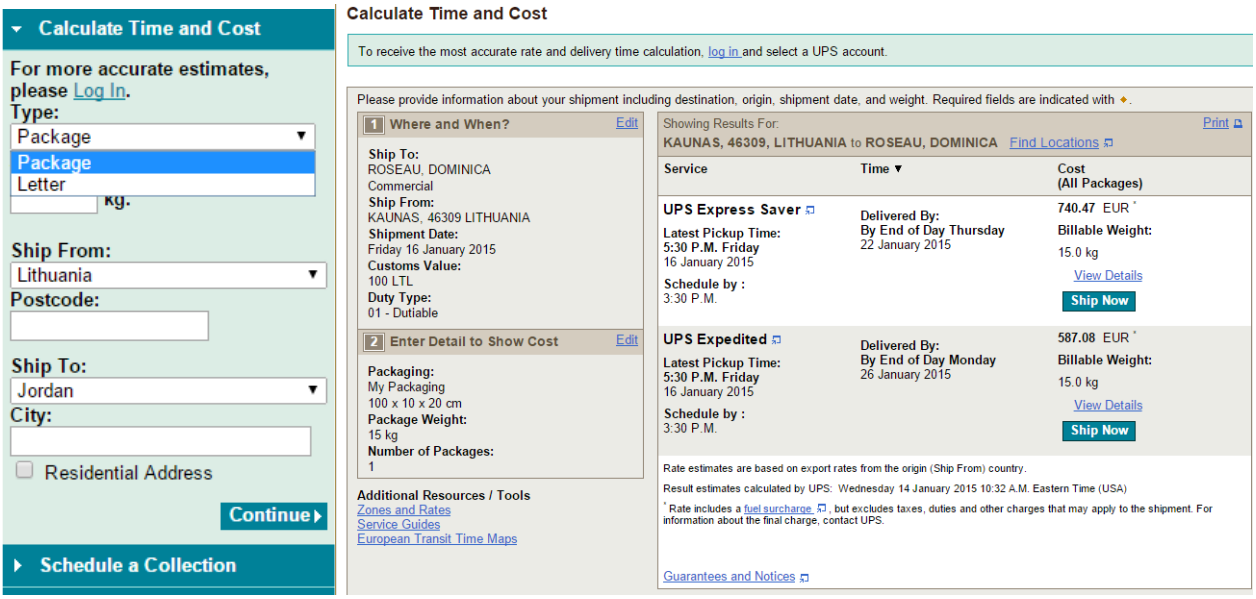
There is just one main criteria country for location and package parameters it gives answer right away after fulfillment of these fields. An example of answered quotation.



DPD example of instant delivery quote answer (http://www.dpd.com/)

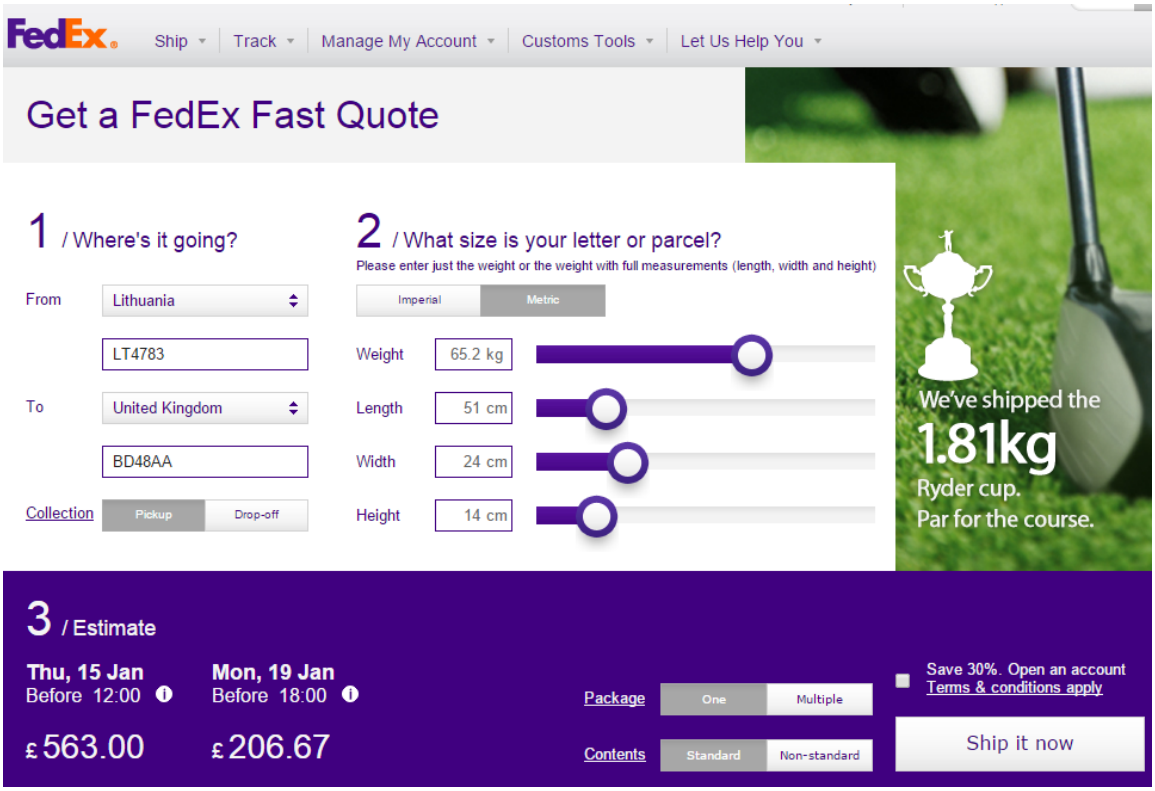
Both quotations time and instant delivery are accessible anonymous.

UPS. UPS has anonymous time and cost quotation as shown. It needs three criteria Country, postal code and sometimes city. The quotation is full automated it gives answer right away after fulfillment.



UPS calculation of time and price (http://www.ups.com/)

FEDEX. FedEx website has fast and anonymous quotation with two main criteria: country and post code. The price and time is given right away after fulfillment as shown.



FedEx fast quote (http://www.fedex.com/gb/shippingrates/index.html)

APPENDIX III: Analysis of logistics management software

Index	Software	Tracking (Barcode/RFID scanning)	Quoting	User friendly and easy to use	Global and local carrier selection	Accounting integration	Inventory management	Order management	Scheduling	Shipping management	Billing and Invoicing	Freight brokering	Based on cloud solution	SUM
1	3PL Warehouse Manager	1		1	1	1	1	1		1			1	8
2	3PLink	1		1	1	1	1	1	1	1	1	1	1	11
3	Parcelhub Shipping Software	1					1		1	1			1	5
4	Awery Airline Management Software	1		1	1	1	1	1	1	1	1	1	1	11
5	Pantonium	1		1		1		1	1				1	6
6	cargonet			1	1	1	1						1	5
7	SCP		1				1	1	1	1				5
8	Catapult QMS		1		1		1	1					1	5
9	CMS WorldLink		1		1	1		1		1			1	6
10	CSIRoad	1				1	1	1	1	1				6
11	BoxTop Technologies	1			1	1		1			1			5
12	ComFreight			1	1			1		1		1	1	6
13	ShipmentOnline (SOL)	1		1	1	1		1			1		1	7
14	Avaal Express	1	1		1	1		1		1	1	1		8
15	3PL Freight software	1	1		1	1		1			1	1	1	8
16	Air Track	1				1	1	1	1	1				6
17	Assist 4 Freight Management	1	1		1	1		1			1		1	7
18	CDM WinFrt	1			1			1			1		1	5
19	E TMS				1	1		1		1	1	1	1	7
20	Real Time Freight	1	1		1	1					1	1	1	7
	SUM	14	7	7	15	15	9	17	7	11	10	7	15	

Logistic management and freight forwarder analyzed software list:

1. http://3plcentral.com/
2. http://www.3plsoftware.com/
3. http://www.parcelhub.co.uk/
4. http://awery.aero/
5. http://www.pantonium.com/
6. http://www.gocargonet.com/
7. http://www.jadaman.com/
8. http://gocatapult.com/
9. http://www.cmsglobalsoft.com/cms-worldlink-overview/
10. http://www.csiroad.com/
11. http://www.boxtop.net/
12. https://www.comfreight.com/
13. http://shipmentonline.co/
14. http://avaal.com/avaal_express.php
15. https://3plfreightsoftware.com/
16. http://www.csasoftware.com/
17. http://www.aeb-international.co.uk/uk/index.php
18. http://www.cdmsoft.com/
19. http://180.179.110.57/etms/(S(1h2a5yiy1fx53q5505azxj55))/login.aspx
20. http://www.realtimefreight.com/

APPENDIX IV: “TransProto” prototype code

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN"
"http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">

<html xmlns="http://www.w3.org/1999/xhtml" xmlns:v = "urn:schemas-microsoft-
com:vml" xmlns:o="urn:schemas-microsoft-com:office:office">

  <head>

    <meta http-equiv="content-type" content="text/html; charset=utf-8" />

    <meta http-equiv="cache-control" content="private" />

    <meta http-equiv="x-ua-compatible" content="ie=edge" />

    <meta http-equiv="content-script-type" content="text/javascript" />

    <meta name="viewport" content="initial-scale=1.0, maximum-scale=1.0,
minimum-scale=1.0, user-scalable=0" />

    <meta name="apple-mobile-web-app-capable" content="yes" />

    <meta name="apple-mobile-web-app-title" content="TransProto4" />

    <meta name="apple-mobile-web-app-status-bar-style" content="black-
translucent" />

    <meta name="apple-itunes-app" content="app-id=891264087" />

    <meta name="author" content="Justinmind" />

    <meta name="description" content="Generated by Justinmind on Sun Jun 07
12:27:53 EEST 2015" />

    <title>TransProto4</title>

    <link rel="shortcut icon" type="image/x-icon"
href="./resources/_jim/images/common/favicon.ico" sizes="128x128" />

    <link type="text/css" rel="stylesheet" href="./review/includes/include-
1433669273646.css" />

    <!--[if IE]><link type="text/css" rel="stylesheet"
href="./review/includes/include-1433669273646-ie.css" /><![endif]-->

    <!--[if IE 8]><link type="text/css" rel="stylesheet"
href="./review/includes/include-1433669273646-ie8.css" /><![endif]-->

    <!--[if lt IE 9]>

      <script type="text/javascript"
src="./resources/_jim/javascript/PIE_IE678.js"></script>

    <![endif]-->

    <!--[if IE 9]>

      <script type="text/javascript"
src="./resources/_jim/javascript/PIE_IE9.js"></script>

    <![endif]-->

    <script type="text/javascript"
src="./resources/external_tools.js"></script>

  </head>

  <body class="review offline showComments" tabindex="0">

    <div id="sidepanel" class="close">
```

```
      <div id="user-info">
        <input id="user-id" class="hidden"/>
        <img id="user-image"
src="./resources/_jim/images/sidepanel/user_picture_mini_blk.png"/>
        <span id="user-name">Anonymous</span>
        <span id="user-email"></span>
        <span id="user-config" class="menu_edituser"></span>
      </div>
      <div class="screens section">
        <div id="navigation">
          <ul id="navigationtree">
            <li class="leaf" title="Home">
              <input class="hidden" value="s-d12245cc-1680-458d-89dd-
4f0d7fb22724"></input>
              <div class="top-border"></div>
              <ins class="icon"> </ins><a href="screens/d12245cc-1680-
458d-89dd-4f0d7fb22724" tabindex="-1">Home</a>
              <span class="menu_dotred"></span>
            </li>
            <li class="leaf" title="LogIn">
              <input class="hidden" value="s-873de407-d511-47ab-95d4-
57077b02257d"></input>
              <div class="top-border"></div>
              <ins class="icon"> </ins><a href="screens/873de407-d511-
47ab-95d4-57077b02257d" tabindex="-1">LogIn</a>
              <span class="menu_dotred"></span>
            </li>
            <li class="leaf" title="Registration">
              <input class="hidden" value="s-78eb6d44-05b2-48a0-a3ba-
b94c6da09265"></input>
              <div class="top-border"></div>
              <ins class="icon"> </ins><a href="screens/78eb6d44-05b2-
48a0-a3ba-b94c6da09265" tabindex="-1">Registration</a>
              <span class="menu_dotred"></span>
            </li>
            <li class="leaf" title="Unregistered resources">
              <input class="hidden" value="s-731c33f1-4f36-4b37-bea3-
0ad4f5fef90b"></input>
              <div class="top-border"></div>
              <ins class="icon"> </ins><a href="screens/731c33f1-4f36-
4b37-bea3-0ad4f5fef90b" tabindex="-1">Unregistered resources</a>
```

```
            <span class="menu_dotred"></span>

          </li>

          <li class="leaf" title="Unregistered warehouse recources">

            <input class="hidden" value="s-ab20c24d-d21d-4d03-9344-
a925acd52cc9"></input>

            <div class="top-border"></div>

            <ins class="icon"> </ins><a href="screens/ab20c24d-d21d-
4d03-9344-a925acd52cc9" tabindex="-1">Unregistered warehouse recources</a>

            <span class="menu_dotred"></span>

          </li>

          <li class="leaf" title="Unregistered Requests">

            <input class="hidden" value="s-27b1f399-8816-498b-8139-
a68e4c765914"></input>

            <div class="top-border"></div>

            <ins class="icon"> </ins><a href="screens/27b1f399-8816-
498b-8139-a68e4c765914" tabindex="-1">Unregistered Requests</a>

            <span class="menu_dotred"></span>

          </li>

          <li class="leaf" title="Unregistered warehouses requests">

            <input class="hidden" value="s-bbe196c8-477b-4dba-b444-
604552e9bf23"></input>

            <div class="top-border"></div>

            <ins class="icon"> </ins><a href="screens/bbe196c8-477b-
4dba-b444-604552e9bf23" tabindex="-1">Unregistered warehouses requests</a>

            <span class="menu_dotred"></span>

          </li>

          <li class="leaf" title="My activities">

            <input class="hidden" value="s-6d167455-216e-4008-b1f6-
183ee7778fb7"></input>

            <div class="top-border"></div>

            <ins class="icon"> </ins><a href="screens/6d167455-216e-
4008-b1f6-183ee7778fb7" tabindex="-1">My activities</a>

            <span class="menu_dotred"></span>

          </li>

          <li class="leaf" title="Quick request">

            <input class="hidden" value="s-d23e9267-8114-487f-a5f5-
d627bac310bb"></input>

            <div class="top-border"></div>

            <ins class="icon"> </ins><a href="screens/d23e9267-8114-
487f-a5f5-d627bac310bb" tabindex="-1">Quick request</a>

            <span class="menu_dotred"></span>
```

```
            </li>

            <li class="leaf" title="Resources">

              <input class="hidden" value="s-dfa44781-487c-4f60-8660-
f2d30140016b"></input>

              <div class="top-border"></div>

              <ins class="icon"> </ins><a href="screens/dfa44781-487c-
4f60-8660-f2d30140016b" tabindex="-1">Resources</a>

              <span class="menu_dotred"></span>

            </li>

            <li class="leaf" title="Warehouse recources">

              <input class="hidden" value="s-1c55fcb0-2dc6-4c2e-83c0-
7d522a52e145"></input>

              <div class="top-border"></div>

              <ins class="icon"> </ins><a href="screens/1c55fcb0-2dc6-
4c2e-83c0-7d522a52e145" tabindex="-1">Warehouse recources</a>

              <span class="menu_dotred"></span>

            </li>

            <li class="leaf" title="New transport">

              <input class="hidden" value="s-1eb7f659-17b5-470b-bd5c-
6dc70456135a"></input>

              <div class="top-border"></div>

              <ins class="icon"> </ins><a href="screens/1eb7f659-17b5-
470b-bd5c-6dc70456135a" tabindex="-1">New transport</a>

              <span class="menu_dotred"></span>

            </li>

            <li class="leaf" title="Routing">

              <input class="hidden" value="s-606228e7-596f-434e-a4ad-
387f02df0b2a"></input>

              <div class="top-border"></div>

              <ins class="icon"> </ins><a href="screens/606228e7-596f-
434e-a4ad-387f02df0b2a" tabindex="-1">Routing</a>

              <span class="menu_dotred"></span>

            </li>

            <li class="leaf" title="New warehouse">

              <input class="hidden" value="s-551ab5cc-e896-43d8-b9ff-
703ffec3f81c"></input>

              <div class="top-border"></div>

              <ins class="icon"> </ins><a href="screens/551ab5cc-e896-
43d8-b9ff-703ffec3f81c" tabindex="-1">New warehouse</a>

              <span class="menu_dotred"></span>

            </li>
```

```
            <li class="leaf" title="Warehouse pricing">

              <input class="hidden" value="s-e042a22e-ddd1-4d94-8019-
417744830ebb"></input>

              <div class="top-border"></div>

              <ins class="icon"> </ins><a href="screens/e042a22e-ddd1-
4d94-8019-417744830ebb" tabindex="-1">Warehouse pricing</a>

              <span class="menu_dotred"></span>

            </li>

            <li class="leaf" title="Requests">

              <input class="hidden" value="s-a8be40db-5a66-42bc-ae81-
6a9a39e63572"></input>

              <div class="top-border"></div>

              <ins class="icon"> </ins><a href="screens/a8be40db-5a66-
42bc-ae81-6a9a39e63572" tabindex="-1">Requests</a>

              <span class="menu_dotred"></span>

            </li>

            <li class="leaf" title="New transport request">

              <input class="hidden" value="s-480574d9-931a-44c0-859d-
37256dc30d4f"></input>

              <div class="top-border"></div>

              <ins class="icon"> </ins><a href="screens/480574d9-931a-
44c0-859d-37256dc30d4f" tabindex="-1">New transport request</a>

              <span class="menu_dotred"></span>

            </li>

            <li class="leaf" title="Warehouse requests">

              <input class="hidden" value="s-bc48a238-c4db-4ced-b578-
efcc9d7b4898"></input>

              <div class="top-border"></div>

              <ins class="icon"> </ins><a href="screens/bc48a238-c4db-
4ced-b578-efcc9d7b4898" tabindex="-1">Warehouse requests</a>

              <span class="menu_dotred"></span>

            </li>

            <li class="leaf last" title="New warehouse request">

              <input class="hidden" value="s-7443e301-d284-4b0e-83e3-
0865d3a33d70"></input>

              <div class="top-border"></div>

              <ins class="icon"> </ins><a href="screens/7443e301-d284-
4b0e-83e3-0865d3a33d70" tabindex="-1">New warehouse request</a>

              <span class="menu_dotred"></span>

            </li>

          </ul>
```

```
        </div>
      </div>
      <div id="comments" class="section">
        <div class="comment-all">
          <div id="comment-grid"></div>
        </div>
      </div>
    </div>
    <div id="jim-mainWindow">
        <div id="topInfo"class="open" onselectstart="return false;">
            <div id="infoContent">
                <div class="leftcontrols">
                    <div id="logo" class="section"><img
src="./resources/_jim/images/sidepanel/logo.png" alt="logo"/></div>
                    <div id="info" class="section info-text-label">
                        <span id="projectname"
title="TransProto4">TransProto4</span>
                        <span id="canvasname"></span>
                    </div>
                </div>
                <div class="rightcontrols">
                    <div class="highlight section">
                        <span class="button-icon light"></span>
                        <div id="highlight-select" class="highlight-select"
onchange="this.blur()">Highlight interactive areas
                          <ul id="highlight-menu">
                          <li value=".click, .toggle, .dblclick, .rightclick,
.mouseenter, .mouseleave, .mouseover, .drag, .change, .focusin, .focusout,
.swipeup, .swipedown, .swipeleft, .swiperight, .swipeleftup, .swipeleftdown,
.swiperightup, .swiperightdown, .taphold">All</li> <li value=".click,
.toggle">Click/Tap</li> <li value=".dblclick">Double Click</li> <li
value=".rightclick">Right Click</li> <li value=".mouseenter, .mouseleave,
.mouseover">Mouse Over</li> <li value=".change">Change</li> <li
value=".focusin, .focusout">Focus In/Out</li> <li value=".drag">Drag</li> <li
value=".taphold">Tap & Hold</li> <li value=".swipeup, .swipedown, .swipeleft,
.swiperight, .swipeleftup, .swipeleftdown, .swiperightup,
.swiperightdown">Swipe</li>
                          </ul>
                        </div>
                    </div>
                    <div class="comments-separator"></div>
                    <div id="commentscontrol" class="section">
```

```
                        <div id="comments-page-counter-img"
class="newcomments_notification_red">
                            <span id="comments-page-counter"></span>
                        </div>
                        <span>Comments Mode</span>
                        <div id="commentsSwitch">
                            <span id="comments-switch-img" class="off"></span>
                        </div>
                    </div>
                    <div class="comments-separator"></div>
                    <div id="toggle-panel-btn"><span
class="menu_off"></span></div>
                </div>
            </div>
        </div>
        <div id="topSeparationLine" class=""></div>
        <div id="toppanel" class="hidden" onselectstart="return false;">
          <div id="control-bar">
            <div id="rotateDevice" class="hidden">
                <span class="button-icon rotate"></span><span>Rotate</span>
            </div>
            <div class="hidden">
                <span class="button-icon gestures"></span>
                <select id="gestureTool" onchange="this.blur()">
                  <option value="0" selected="selected">One finger</option>
                  <option value="1">Two fingers (pinch)</option>
                  <option value="2">Two fingers (rotate)</option>
                </select>
            </div>
            <div class="hidden">
              <span class="button-icon zoom"></span>
              <div class="styled-select">
                <select id="zoomValue" onchange="this.blur()">
                  <option value="0">50%</option>
                  <option value="1">75%</option>
                  <option value="2" selected="selected">100%</option>
                  <option value="3">150%</option>
```

```
                </select>
              </div>
            </div>
          </div>
        </div>
        <div id="jim-body" class="full web" >
            <div id="simulation" class="firer"></div>
        </div>
        <div id="bottomSeparationLine" class=""></div>
        <div id="tutorial-ui">
            <div id="tutorial-grey-layer"></div>
            <div id="tutorial-img-wrap">
                <div id="tutorial-img"></div>
            </div>
        </div>
    </div>
    <div id="chromeTransfer" class="hidden"></div>
    <div id="blockui" class="hidden">
      <div id="dialog" class="hidden">
        <div id="content">
          <textarea class="annotation firer" rows="2" placeholder="Leave a
comment..."></textarea>
          <form class="attachment firer" enctype="multipart/form-data"
method="post">
            <span class="attachment-img"></span>
            <span class="filename"><a class="action">Attach
file</a></span><span class="firer delete_attach"></span>
            <input type="hidden" name="code" value="" />
            <input type="file" class="file" name="file" size="5" value=""
onchange="annotation.updateAttachmentFile(this);" tabindex="-1" />
          </form>
          <button id="dialog-save" class="button firer selected" tabindex="-
1">ADD</button>
          <button id="dialog-cancel" class="button firer" tabindex="-
1">Cancel</button>
          <div class="clear"></div>
        </div>
      </div>
      <div id="user-dialog" class="hidden">
```

```
        <span id="error-insertion"></span>
        <span id="close-button"></span>
        <div id="content">
          <span class="title">User Profile</span>
          <form class="user-profile firer" enctype="multipart/form-data"
method="post">
            <div id="user-img-wrapper">
                <img id="dialog-user-img"
src="./resources/_jim/images/sidepanel/nopicture_icon.png"/>
                <div id="change-img-clipping">
                    <div id="change-img-button"></div>
                    <span>UPLOAD PICTURE</span>
                </div>
                <input type="file" class="input-file" name="file" value=""
tabindex="-1" />
            </div>
            <span id="remove-button">Remove Image</span>
            <input id="dialog-user-name" type="text" class="input-text firer"
name="name" placeholder="Set your name"/>
            <input id="dialog-user-id" type="text" class="hidden"
name="userID"/>
          </form>
          <button id="dialog-save" class="button firer selected" tabindex="-
1">Save Settings</button>
          <div class="clear"></div>
        </div>
      </div>
    </div>
    <!-- START COMMENT TEMPLATES -->
    <script type="text/x-jquery-tmpl" id="root-template">
            <![CDATA[
            <div class="root {{? it.isRead === false}}unread{{?}} closed firer
rounded-border">
                <input type="hidden" id="parentCode" value="{{=it.code}}" />
                <input type="hidden" id="canvasID" value="{{=it.canvasID}}" />
                <input type="hidden" id="elementID" value="{{=it.elementID}}"
/>
                <input type="hidden" id="canvasURL" value="{{=it.canvasURL}}"
/>
                {{=annotation.render(it, "comment-template")}}
                <div class="replies"></div>
```

```
                <div class="replier">

                    <img class="user-comment-img" {{?
!annotation.hasPicture()}}src="./resources/_jim/images/sidepanel/user_picture_m
ini.png"{{??
true}}src="../../../../images/pictures/{{=annotation.getCurrentAuthorID()}}.png
"{{?}}/>

                    <textarea class="annotation firer">Leave a
comment...</textarea>

                    <div class="actions">

                        <form class="attachment firer" enctype="multipart/form-
data" method="post">

                            <span class="attachment-img"></span>

                            <span class="filename">Attach file</span><span
class="firer delete_attach"></span>

                            <input type="hidden" name="code" value="" />

                            <input type="file" class="file" name="file"
size="5" value="" onchange="annotation.updateAttachmentFile(this);" tabindex="-
1" />

                        </form>

                        <button id="dialog-save" class="action save button
firer selected">ADD</button>

                        <button id="dialog-cancel" class="cancel button
firer">Cancel</button>

                    </div>

                    <div class="clear"></div>

                </div>

                </div>

             </div>

             ]]>

        </script>

        <script type="text/x-jquery-tmpl" id="comment-template">

            <![CDATA[

            <div class="comment">

                <input type="hidden" id="userID" value="{{=it.authorID}}" />

                <input type="hidden" id="code" value="{{=it.code}}" />

                <input type="hidden" id="timestamp" value="{{=it.timestamp}}"
/>

                <div class="comment-content">

                    <img class="user-comment-img{{?
annotation.hasPermission(it.author)}} firer{{?}}" {{?
annotation.hasPermission(it.author) &&
!annotation.hasPicture()}}src="./resources/_jim/images/sidepanel/user_picture_m
ini.png"{{??
true}}src="../../../../images/pictures/{{=it.authorID}}.png"{{?}}/>
```

```
                    {{? annotation.hasPermission(it.author)}}<span class="user-
comment-img-add user_picture_more firer{{? annotation.hasPicture()}}
hidden{{?}}"></span>{{?}}

                    <div class="user-comment-content">

                        <span class="author"
title="{{=it.author}}">{{=it.author}}</span>{{?
annotation.hasPermission(it.author) }}<span class="edit edit_topic
firer"></span><span class="delete delete_topic firer"></span>{{?}}

                        <span class="date">{{=it.date}}</span>

                        <div class="viewmode">

                            <div
class="text">{{=annotation.toHTML(it.content)}}</div>

                            {{? it.fileName !== "" }}{{?
annotation.isImage(it.fileName)}}<img src="" class="attachment firer"
onclick="annotation.getAttachmentFile({{=it.code}}, '{{=it.fileName}}');"
title="{{=it.fileName}}"></img>{{?? true}}<div class="attachment-wrap"><span
class="attachment-img"></span><span class="attachment filename firer"
onclick="annotation.getAttachmentFile({{=it.code}}, '{{=it.fileName}}');"
title="{{=it.fileName}}">{{=it.fileName}}</span></div>{{?}}{{?}}

                            <div class="actions">

                                {{? it.parentCode === null || it.parentCode ===
0}}<div class="total-wrap"><span class="total-img comments"></span><span
class="total"></span></div>{{?}}

                                <div class="reply firer"><span class="reply-
img"></span><a class="action">Reply</a></div>

                            </div>

                            {{? it.parentCode === null || it.parentCode ===
0}}<div class="expand-btn firer"><span class="expand-btn-img
expand"></span><span class="expand-btn-text">Expand</span></div>{{?}}

                            <div class="clear"></div>

                        </div>

                        <div class="editormode">

                            <textarea class="annotation
firer">{{=it.content}}</textarea>

                            <div class="actions">

                                <form class="attachment firer"
enctype="multipart/form-data" method="post">

                                    <span class="attachment-img"></span>

                                    <span class="filename"><a
class="action">Attach file</a></span><span class="firer delete_attach"></span>

                                    <input type="file" class="file" name="file"
size="5" value="" onchange="annotation.updateAttachmentFile(this);" tabindex="-
1" />

                                </form>

                                <button id="dialog-save" class="action save
button firer selected">OK</button>

                                <button id="dialog-cancel" class="cancel button
firer">Cancel</button>
```

```
                            </div>
                            <div class="clear"></div>
                          </div>
                        </div>
                      </div>
                    </div>
                    ]]>
        </script>
        <script type="text/x-jquery-tmpl" id="message-template">
                    <![CDATA[
                    {{? it.type === "error" }}
                    <div class="message error">
                      <div class="container">
                        <span class="warning"></span>
                        <div class="notice">{{? it.title
}}<strong>{{=it.title}}</strong>{{?}}{{=it.text}}</div>
                        <strong class="close">x</strong>
                      </div>
                    </div>
                    {{?? it.type === "feedback"}}
                    <div class="message feedback">
                      <div class="container">
                        <span class="warning"></span>
                        <div class="notice">{{=it.text}}</div>
                        <button type="button" class="ok firer" tabindex="-
1">Yes</button>
                        <button type="button" class="cancel firer"
tabindex="-1">No</button>
                      </div>
                    </div>
                    {{?}}
                    ]]>
    </script>
    <!-- END COMMENT TEMPLATES -->
    <script type="text/javascript" src="./review/includes/include-
1433669273646.js"></script>
    <script type="text/javascript">(function(){jimMain.init("screens/d12245cc-
1680-458d-89dd-4f0d7fb22724");})();</script>
  </body>  </html>
```