TALLINN UNIVERSITY OF TECHNOLOGY
Estonian Maritime Academy
Centre for Maritime Studies
Unit for Maritime Transport

Maiko Arras

USER REQUIREMENTS FOR COAL RELATED LAYTIME CALCULATION SOFTWARE

Thesis

Supervisor: Prof. Olli-Pekka Hilmola
Co-Supervisor: Rauno Iin

Tallinn 2015

I declare I have written the thesis independently.
All works and major viewpoints of the other authors, data from other sources of literature and elsewhere used for writing this paper have been referenced.

Maiko Arras

……
(signature, date)
Student's code: 140839VDSR
Student's e-mail address: arrasmaiko@gmail.com

Supervisor professor Olli-Pekka Hilmola:
The thesis conforms to the requirements set for the theses.

……
(signature, date)

Co-Supervisor Rauno Iin:
The thesis conforms to the requirements set for the theses.

……
(signature, date)

Chairman of defence committee:
Permitted to defence.

……
(Title, name, signature, date)

TABLE OF CONTENTS

ABSTRACT

Laytime is one of the most important clauses in voyage charter parties since it is a basis for many disputes arising from voyage charter parties. Although laytime is mostly related to judicial aspects, laytime processes are also matters of operations and costs in running a shipping company – cost leadership is one way of how to succeed in competition and shipping is a ruthlessly competitive industry. Personal experience of the author indicated that laytime calculation processes could be improved and users' requirements have not been fulfilled with current software solutions. The objective of this work was to give an input for improving the laytime calculation software by finding out and prioritizing users' requirements for such software. To achieve the objective there are qualitative and quantitative research methods used in this work. Since the author has worked as a laytime analyst of coal trades, this work has been narrowed to coal related laytime calculation processes. The main conclusion of this work is that users' requirements are not fulfilled with current software solutions and users require laytime calculation software that allows coordinating within the same system. Requirements that users say as very important are mostly related to coordinating part of the laytime process.

Keywords: user requirements, laytime, coal, laytime calculation, voyage charter party

1. INTRODUCTION

In today's globalizing world it is common that raw materials are sourced in one part of the world, production is taking place in another part and goods are consumed in the third part of the world. The main reason for such a dynamic structure of the world's production and consumption is the need for the lowest cost of products and the desire of companies to maximize profits. Companies are looking for products overseas because of many different reasons but the most important are lower manufacturing costs, availability of different natural resources and temporary shortages or surpluses which affect the pricing process (Stopford 2009, 394). It all reflects the necessity of the international sea trade that is driven by economic activity which creates the demand for imports and the supply of exports (Stopford 2009, 393). International sea trade depends on prices and tariffs between countries in trade and the cost of freight (Stopford 2009, 394). The latter is where the shipping comes into the structure of the international sea trade.

Shipping, a very competitive industry (Stopford 2009, 48) with its roots going back 5000 years in time (Stopford 2009, 3), is a crucial part of the international sea trade by making the carriage of physical commodities from one location to another possible. In 2013 there was almost 9.6 billion tons of cargo loaded on vessels, shipped overseas and discharged at different ports all around the world. The world dry-cargo shipments reached 6.7 billion tons, a 5.5 per cent growth over 2012. Of this the five major bulk commodities (iron ore, coal, grain, bauxite and alumina, and phosphate rock) accounting for 44.2 per cent (2.92 billion tons) of the total volume of dry cargo and minor bulks (forest products and the like) making up 21.0 per cent (1.4 billion tons). In 2013, the total volume of coal shipments (thermal and coking) increased by 5.0 per cent to reach 1.18 billion tons. (UNCTAD 2014, 5)

If a buyer from one country wishes to buy product from a seller from overseas country, parties need to develop legal relationship by drafting and signing a sales contract. The sales contract is an agreement between seller and buyer where they stipulate all matters related to the trade, including the goods, the price, payment and transportation, the risk distribution between parties, the financing of the sale *et cetera*. (Gorton et al. 2004, 55). The

party who is responsible for arranging a sea transport shall enter into an agreement with a shipowner. Agreement between shipowner and charterer is known as a contract of affreightment which may take different forms – most common are the voyage charter party, the time charter party and the bill of lading (Wilson 2010, 3).

Of these contracts the author is addressing the issue of laytime which is one of the most important clauses in a voyage charter party (Wilson 2008, 49) but laytime clause is often incorporated in sales contracts as well. The idea behind laytime is that the charterer and the shipowner agree certain time that is allowed for loading or discharging a vessel without any extra costs to counterparties. Laytime is often basis for disputes that result from the voyage charter party or from the sales contract. Although matters regarding laytime calculations are mostly related to judicial aspects it is also important to pay attention to the whole picture of laytime calculation since it is a matter of cost and in turn of competition for companies which are dealing with it.

As mentioned before, shipping is a highly competitive industry which means shipping companies need to find different strategies of how to stand out and withstand in the competition. It is known that strong global businesses need to either differentiate in terms of quality, product, service, technology or have a cost leadership to succeed in the competition (Yang Liu 2013, 4). Although cost of bunkers is the biggest cost category of running a shipping company and trying to reduce bunker consumption by slow-steaming or by other means is crucial, it is also important to reduce all other possible costs of running the business including the ones that result from laytime calculations.

1.1 Research problem, research questions and the hypothesis

In this work it is researched for the solution to the problem of high operating costs in a shipping company by improving laytime calculation process.

Calculating laytimes is a part of a vessel operator's, cargo operator's, cargo trader's or laytime analyst's job while dealing with voyages based on a voyage charter party or with cargo trade fixtures that realize on loading or discharging a vessel. Laytime calculations are mainly carried out by using software like Microsoft's Excel or designated software applications like Veson's IMOS. Laytime calculations are coordinated between counterparties by exchange of calculation reports and comments by e-mail.

The author has worked as a laytime analyst of coal trades for the last 12 months in a Company X, therefore this work has been narrowed to coal related laytime processes. Company X is a full-service provider of shipping logistics and operations. From the personal experience of the author it could be said that currently used software application do not take into account all specific aspects of laytime calculation and also coordinating process. Accordingly, current laytime calculation software and laytime process could be potentially improved. By improving the software and the process, working hours of dealing with laytime calculations could be reduced which in turn reduces business running costs. For finding the solution the author has set the following research questions which need to be answered:

1. What sub-processes form the whole laytime process?
2. Who are the stakeholders in the laytime process?
3. What are the most important user requirements for the software solution for calculating laytimes of coal trades?

The hypothesis of the work is the following: users of laytime calculation software require the software to allow calculating and coordinating laytime calculations within the same application.

1.2 Research objectives and the structure of the work

The objective of the thesis is to work out user requirements for the laytime calculation software of coal trades. To achieve the objective the author has set the following research tasks:

1. Describing laytime as a process.
2. Analyzing laytime calculation and coordinating process
3. Analyzing the laytime calculation software application used by dry bulk department of Company X.
4. Carrying out focus group interview with stakeholders from Company X in order to elicit user requirements for the laytime calculation software application of coal trades.
5. Carrying out survey among laytime analysts in order to prioritize user requirements for the laytime calculation software of coal trades.

Research task 1 will be approached in the first part of the work *id est* theoretical part and research tasks from 2 to 5 will be approached in the second part of the work *id est* empirical part.

In the theoretical part of the work the author gives an overview of laytime. Laytime is a specific part of shipping and for the better understanding this author finds it important to give a reader a short description of laytime and its most important aspects. Theoretical part of the work relies on the following books and publications which will be used to give a reader a better understanding of laytime and to elaborate general and laytime related terms: Laytime Definitions for Charter Parties 2013 by BIMCO, John Schofield's "Laytime and demurrage", which was published in 2008, "Shipbroking and Chartering Practice" by Lars Gorton, Patrick Hillenius, Rolf Ihre and Arne Sandevärn, which was published in 2004, John F Wilson's "Carriage of Goods by Sea", which was published in 2008 and Martin Stopford's "Maritime Economics", which was published in 2009. Known to the author, laytime as a process and laytime calculation process have not been previously researched, therefore the description of laytime processes will be elaborated basis the personal experience of the author. General data has been collected from UNCTAD "Review of Maritime Transport 2014" which was published in November of 2014.

In the empirical part of the work the author will analyze the laytime calculation software used by Company X in order to give better insight of the software features and to prepare the structure of the focus group interview. The software will be analyzed by going through laytime calculation of one case voyage. After analyzing currently used software the author will carry out focus group interview among stakeholders from the Company X in order to compose a list of user requirements for the laytime calculation software. After that the author will carry out survey among laytime analysts from different companies in order to prioritize requirements. Collected quantitative and qualitative data will be analyzed and conclusions will be made.

Based on results of previously described research tasks the author will make a proposal for the user requirements which should be certainly included in the software application for calculating laytime calculations of coal trades.

1.3 Methodology

The objective of the work is to determine user requirements of the laytime calculation software in order to give input for improving the laytime calculation software and processes. One of the most important things regarding designing good services is to understand the needs of users (Holopainen, Helminen 2011, 1) and also focusing on user is an important aspect in a total quality management approach (Kaulio 1998, 1). Working together with users gives better insight into users needs and also creates creativity (Kaulio 1998, 1). „Well-founded user requirements are an essential basis for the development of products with good usability (Rexfelt, Rosenblad 2006, 1).“

There are various methods of how to include users into the process of designing new services and products. M. Kaulio studied the following seven methods in his work: 1) quality function deployment, 2) beta testing, 3) concept testing, 4) consumer idealized design, 5) lead user method, 6) user-oriented product development and 7) participatory ergonomics (1998, 1). From these, the author has chosen consumer idealized design as a research method. The main idea behind the method is to involve users in early phases of product or service design process and it deals with the conceptual design and requirement analysis phase of product developement (Kaulio 1998, 1). Consumer idealized design is described as "a process for involving consumers in the actual design of new manufactured goods or services" (Kaulio 1998, 5). The method is carried out by conducting focus group interview where the participants are selected stakeholders. During the focus group interview the idea is to get the users to forget existing products or services and ignore the feasibility of new designs.

The outcome of the interview should include the following (Kaulio 1998, 5):

1) a (new) design;
2) a list of articulated requirements;
3) a record of the underlying reasons for the design choices.

In this work the (new) design is not the ocjective but requirements give an overview of the desired design. During the focus group interview the participants are guided through their ideal in order to identify requirements and to find solutions to their problems and requirements (Kaulio 1998, 5).

For the focus group interview the author has chosen the main stakeholders related to laytime calculations from the Company X.

Before carrying out the focus group interview the author will analyze the software used by the Company X in order to prepare the structure of the focus group. The software will be analyzed by going through laytime calculation of one case voyage. After analyzing currently used software the author will carry out focus group among laytime analysts from the Company X in order to compose list of user requirements for the laytime calculation software. After that the author will carry out survey among laytime analysts from as many companies as possible in order to prioritize users' requirements. Collected quantitative and qualitative data will be analyzed and conclusions will be made.

Based on the results of previously described methods the author will make a proposal for user requirements for the laytime calculation software application of coal trades.

2. THEORETICAL APPROACH TO THE LAYTIME

Laytime is mainly an aspect of English maritime law relating to voyage charters and some of the basic principles of it were established in the first half of the nineteenth century. Laytime and cases resulting from that are mostly related to charter parties but the same law applies also to sales contracts. (Schofield 2005, 1) Disputes and cases that result from voyage charter parties are often related to laytime calculations and mostly come from indistinct wordings (Gorton et al. 2004, 235). "Lay-time concerns charterers and ship-owners, with both reliant on decisions by berth operators, beyond their control, that may generate congestion (Mokia, Dinwoodie 2002, 2)."

Although different organizations have tried several times to make the field more clear, problems resulting from legal aspects are still at place. Standardized laytime and demurrage clauses have been described in the following five documents: 1) the Charterparty Laytime Definitions 1980, 2) the Voyage Charterparty Laytime Interpretation Rules 1993, 3) the Baltic Code 2003, 4) the Baltic code 2007 Charterparty and Laytime Terminology and Abbreviations, and 5) the Laytime Definitions for Charter Parties 2013. Definitions of terms and clauses which are described in these documents apply only if they have been stipulated in the charter party or contract. (Schofield 2005, 1) Before describing the whole laytime process the author will give an introduction of what the voyage charter is and how laytime fits into it.

Voyage charter is a type of vessel employment where a charterer or the party who wants to use the vessel agrees with the shipowner to use the vessel for a certain voyage. The charterer obliges to pay the freight and parties need to make an agreement called voyage charter party. This type of charter is typical in tramp shipping where vessels sail without having certain routes and schedules. It is common that the charterer is not the owner of the cargo that is transported on the ship and there could be more than one charterer in the chain. The charterer, who is not the actual shipowner and not the final charterer in the chain, is described as "disponent owner". In practice the voyage charter is a charter where the registered owner or disponent owner promises to transport an agreed cargo from one port to another. The registered owner or the disponent owner who has chartered the vessel on time

charter or bare boat charter basis retains the operational control over the vessel and bears operating costs. Charterers' costs are usually related to the cargo but loading and discharging costs are settled between parties according to the agreement. The cost structure of different forms of charters is described in Table 1.

Table 1. The cost structure of different forms of charters

<table>
<tr><th></th><th>Voyage charter</th><th>Time charter</th><th>Bare boat charter</th></tr>
<tr><td>Master instructed by</td><td>Owner</td><td>Owner for ship and charterer for cargo</td><td>Charterer</td></tr>
<tr><td>Revenue depends on</td><td>Freight rate (rate per unit of cargo) and quantity of cargo</td><td>Hire rate, duration and off-hire time</td><td>Hire rate and duration</td></tr>
<tr><td rowspan="3">Allocation of costs</td><td>Paid by owner

1. Capital costs
Capital
Brokerage

2. Operating costs
Wages
Provisions
Maintenance
Repairs
Stores & supplies
Lube oil
Water
Insurance
Overheads

3. Port costs
Port charges
Stevedoring charges
Cleaning holds
Cargo claims

4. Bunkers et cetera.
Canal transit dues
Bunker fuel</td><td>Paid by owner

1. Capital costs
Capital
Brokerage

2. Operating costs
Wages
Provisions
Maintenance
Repairs
Stores & supplies
Lube oil
Water
Insurance
Overheads</td><td>Paid by owner

1. Capital costs
Capital
Brokerage</td></tr>
<tr><td>Paid by charterer

1. Usually costs and charges related to cargo</td><td>Paid by charterer

1. Port costs
Port charges
Stevedoring charges
Cleaning holds
Cargo claims

2. Bunkers et cetera.
Canal transit dues
Bunker fuel</td><td>Paid by charterer

1. Operating costs
Wages
Provisions
Maintenance
Repairs
Stores & supplies
Lube oil
Water
Insurance
Overheads

2. Port costs
Port charges
Stevedoring charges
Cleaning holds
Cargo claims

3. Bunkers et cetera.
Canal transit dues
Bunker fuel</td></tr>
<tr><td colspan="3">Contract of Affreightment (COA): profile same as voyage charter</td></tr>
</table>

Source: Martin Stopford (2009), Gorton et al. (2004)

If it is agreed that loading and discharging operations are carried out by the charterer then the shipowner and the charterer agree a certain period that is available for the charterer to load and discharge a vessel – that time is described as "laytime". Laytime reflects the basic concept of voyage charter that the shipowner is responsible for the delay in connection with the transit and the charterer usually is responsible for the delay related to loading and discharging. If the shipowner fails to arrive to the port within the agreed period of time then certain sanctions might apply and if the charterer fails to load or discharge the vessel within agreed laytime the charterer has to pay compensation for the time exceeded. The compensation which is paid by the charterer for the exceeded time for loading or discharging is described as "demurrage". (Gorton et al. 2004, 113) If charterer loads or discharges the vessel in less time than agreed laytime the owner has to pay compensation to the charterer which is described as "despatch".

The words "laytime", "demurrage" and "despatch" are defined in the following terms in the the Laytime Definitions for Charter Parties 2013:

1. "Laytime shall mean the period of time agreed between the parties during which the owner will make and keep the vessel available for loading and discharging without payment additional to the freight."
2. "Demurrage shall mean an agreed amount payable to the owner in respect of delay to the vessel beyond laytime, for which the owner is not responsible unless specifically stated in the Charter Party."
3. "Despatch money or dispatch shall mean an agreed amount payable by the owner if the vessel completes loading or discharging before the laytime has expired."

The voyage of the vessel under the voyage charter divides into the following stages (Schofield 2005, 2):

1. The voyage of the vessel from the place where she is at the beginning of the voyage, which might be the end of her previous voyage or the agreed time in charter party, to the place of loading.
2. Loading the cargo on the vessel at the place of loading.
3. The voyage of the vessel from the place of loading to the place of discharging.
4. Discharging the cargo from the vessel at the place of discharging for the consignee.

Each of these stages must be completed before the next can begin and these stages are consecutive. There could not be gaps between stages nor overlap. So the voyage charter means the charterer and the shipowner or the disponent owner have agreed that the vessel sails to the loading place, loads at the loading place, sails to the discharging place and discharges at the discharging place. The shipowner tries to complete all stages as economically as possible and charterer wants the transportation of the cargo to be as cheap as possible. Stages where the vessel is sailing to loading or discharging place are controlled by the shipowner or disponent owner and all the risk of delay during these stages lies with the shipowner or disponent owner. The time allowed for loading and discharging operations and the allocation of the risk of delay which occurs during loading and discharging stages is mutually agreed between parties. The freight payable covers the use of the ship for all of these stages and affects the allocation of risk which each party has to bear. (Schofield 2005, 3)

In terms of laytime provisions, voyage charters are divided into two principal types – customary laytime and fixed laytime. A customary laytime means there is no certain time agreed between parties and the time allowed for loading or discharging is stipulated by taking into account all matters occurring at the port during operations with certain vessel – customary laytime is basically described as a reasonable time. Since customary laytime is not agreed in advance it gives basis for disputes and as a result it is not very common to incorporate that type in agreements nowadays. Although sometimes "customary quick despatch" is agreed which means the loading or discharging should be carried out within the average period of time relevant to specific berth. The other type, fixed laytime, is the period of time for loading and discharging that is agreed in advance. It is usually agreed in days, hours or as a rate of loading or discharging. Fixed laytime is preferred since it avoids discussions about the allowed time afterwards and it is more flexible to determine the allocation of risk. Risk allocation is usually settled by agreeing which party is responsible for delays resulting from certain reasons – these are usually expressed as exceptions. (Ibid.)

In terms of location, where the loading or discharging takes place, there are different voyage charters – berth charters, dock charters and port charters. It is important for the parties to agree and understand the certain location where the laytime commences and the liability for certain delays pass to each party. Whether it would be berth, dock or port charter, to specify the exact location and the time of vessel's arrival at this location usually the master of the ship sends out message which is described as "notice of readiness" or "NOR". (Schofield 2005, 4)

Laytime commences usually after the valid notice of readiness has been tendered and the turntime is over. The notice of readiness has to be tendered within the agreed period of time when the ship has to arrive to the specified location. The agreed period is described as "laycan" for loading and "delivery window" for discharging. After tendering the notice of readiness the "turntime" starts to count which is additional time – the length of the turntime is based on the agreement between the shipowner and the charterer.

As important as determining the time of commencement of laytime is the determination of the time of completion of laytime. The laytime continues to count until loading or discharging has been completed or until it expires. (Schofield 2005, 5) The moment of completion of laytime is open to mutual agreement between shipowner and charterer.

There could be two principal methods of calculating laytime – a calculation for single period covering both loading and discharging, and separate calculation for each port. These methods are described as "average laytime" and "reversible laytime". (Ibid.)

The terms "average laytime" and "reversible laytime" are themselves defined in the following terms in the the Laytime Definitions for Charter Parties 2013:

1. "To average laytime shall mean that separate calculations are to be made for loading and discharging and that any time saved in one operation is to be set off against any excess time used in the other."
2. "Reversible laytime" shall mean an option given to the charterer to add together the time allowed for loading and discharging. Where the option is exercised the effect is the same as a total time being specified to cover both operations."

As mentioned before the compensation payable to the shipowner applies, if loading or discharging has not been completed within the agreed laytime. Such compensation was described as demurrage. Demurrage is a form of liquidated damages and is described in the charter as a daily rate which is usually the daily hire rate of the vessel. Demurrage might be agreed for certain period of time or for an unlimited period. There is also another type of compensation for the extra time which takes form of unliquidated damages and it is described as "detention". (Schofield 2005, 6)

Regarding demurrage there is a common phrase "once on demurrage, always on demurrage" which means if laytime is over and the demurrage time has commenced, exceptions related to laytime do not apply (Schofield 2005, 6).

In this chapter the author has shown that laytime is a topic coming from the voyage charter and it is related to legal aspects. Also laytime has specific terms, which were introduced, and they need to be understood to read further. In the next chapter the author is describing laytime as a process and its all phases from drafting the sales contract until the payment of demurrage or despatch.

2.1 Laytime as a process

In this chapter the author gives an overview of different phases and sub-processes of the laytime. As it was described before the laytime is related to overseas trade and to the loading and/or discharging of the cargo from vessel. Laytime is coming into the overall trade process at the time of fixing sales contract between seller and buyer and ends with demurrage or despatch payments. Between these two end-points there are different stages and processes which must be carried out in order to have a complete laytime process. Stages of laytime are described in the following sub-chapters.

2.1.1 Sales contract

The sales contract is the basic contract in the export transaction and as mentioned before it is an agreement between seller and buyer where they stipulate all matters related to the trade, including the goods, the price, payment and transportation, the risk distribution between parties, the financing of the sale *et cetera*. It is also the framework of different contracts – agreement of financing, insurance and transport. (Gorton et al. 2004, 55)

There are two types of sales contracts: 1) custom sales contracts which are drafted from scratch and agreed based on the vision and requirements of the seller and buyer; 2) standard sales contracts, where framework is usually composed by organizations which represent market players in general or of certain cargo category. Since this work is based on coal trades, the most relevant standard sales contract is called Standard Coal Trading Agreement which is composed and provided by an organization called Global Coal Limited.

Standard Coal Trading Agreement is internationally used contract for seaborne coal trades. It is a contract including a set of standard terms and conditions together with a range of coal quality specifications and delivery points for international coal sales and purchases. Standard Coal Trading Agreement is continuously refined and updated in close collaboration with the industry. (Global Coal, 2015)

Regardless of the type of the sales contract, the principal provisions of the sales contracts which affect the laytime process, are the following:

1. Delivery point where the cargo is being loaded or discharged from the vessel.
2. Lenght of the laytime period which results from the delivery point's terms and conditions.
3. Demurrage and despatch rate.
4. Laytime clause which stipulates all laytime calculation related matters (laycan, commencement of laytime, completion of laytime, laytime exemptions *et cetera*).
5. Delivery clause in which the parties agree the party responsible for the carriage and of the apportionment between themselves of the risks and expenses involved in the transporation of the goods. It is upon to seller and buyer to decide whether they agree custom terms or standard delivery terms of which the most widely used are International Commercial Terms or so-called Incoterms (Incoterms are elaborated in the end of this sub-chapter).

The Incoterms rules are an internationally recognized standard in sales contracts which have been developed by industry stakeholders together with International Chamber of Commerce. There are several publications of the Incoterms rules and the latest, Incoterms 2010, came into effect in the beginning of 2011. Since clauses in different versions of Incoterms do not match it is improtant to specify the exact version of Incoterms that apply for specific trade. Incoterms, by standardizing some of the most important aspects of the terms and conditions in sales contracts, gives unified understanding of which tasks, costs and rules lie within the buyer or the seller. Incoterms rules are recognized by United Nations Commission on International Trade Law as standard terms in international trade. (ICCWBO, 2015)

There are eleven Incoterms rules in Incoterms 2010 and additional four are described in Incoterms 2000 but most relevant to trades where maritime transport is the mode of transport are described as follows (ICCWBO, 2015):

1. „FAS Free Alongside Ship – means that the seller delivers when the goods are placed alongside the vessel (e.g., on a quay or a barge) nominated by the buyer at the named port of shipment. The risk of loss of or damage to the goods passes when the goods are alongside the ship, and the buyer bears all costs from that moment onwards."
2. "FOB Free On Board – means that the seller delivers the goods on board the vessel nominated by the buyer at the named port of shipment or procures the goods already so delivered. The risk of loss of or damage to the goods passes when the goods are on board the vessel, and the buyer bears all costs from that moment onwards."
3. "CFR Cost and Freight – means that the seller delivers the goods on board the vessel or procures the goods already so delivered. The risk of loss of or damage to the goods passes when the goods are on board the vessel. the seller must contract for and pay the costs and freight necessary to bring the goods to the named port of destination."
4. "CIF Cost, Insurance and Freight – means that the seller delivers the goods on board the vessel or procures the goods already so delivered. The risk of loss of or damage to the goods passes when the goods are on board the vessel. The seller must contract for and pay the costs and freight necessary to bring the goods to the named port of destination. The seller also contracts for insurance cover against the buyer's risk of loss of or damage to the goods during the carriage. The buyer should note that under CIF the seller is required to obtain insurance only on minimum cover. Should the buyer wish to have more insurance protection, it will need either to agree as much expressly with the seller or to make its own extra insurance arrangements."

2.1.2 Voyage charter party

After the sales contract has been agreed between the buyer and the seller, the party responsible for the carriage of goods – the shipper – should find a solution to transport the cargo from one port to another taking also into account all the laytime related clauses which were agreed in the sales contract.

Although the party responsible for the carriage of cargo may decide whether to charter a vessel basis voyage charter, time-charter, bareboat charter or use liner service, in this work it is elaborated voyage charter since its direct connection to laytime. To find a vessel from the open market, the shipper usually contacts shipbroker, places an order on the market and then awaits reactions from the tonnage that may be interested in the order (Gorton et al. 2004, 27). The voyage charter order consist the following items (Gorton et al. 2004, 157):

1) the charterers name,
2) loading and discharging ports,
3) cargo description and the quantity,
4) laycan,
5) loading and discharging rates and terms,
6) charter party form which the charterer wishes to base the terms and conditions,
7) requirements for the ship.

If there are interested shipowners on the market, negotiations over the freight rate and other terms between the charterer and shipowners begin. By calculating the freight rate shipowners have to count with the fact that freight rate is also affected by the period of time which the vessel has to stay at ports and also by terms related to loading and discharging. The shipowner calculates the period of time which the vessel has to spend at ports basis the loading and discharging rates and basis the information regarding actual rates gathered from the agents at ports. Loading and discharging terms determine who shall pay for the costs at loading and discharging ports. There are two main loading and discharging terms: 1) „FIO“ which means that all costs related to loading and discharging are for the charterers' account, and 2) „Liner terms“ which means all costs related to loading and discharging are for the owners' account. Sometimes these terms are combined – for example „LIFO“ which means liner in free out (shipowner is responsible for loading and charterer for discharging). (Gorton et al. 2004, 158) To start firm negotiations in terms of the voyage charter party the shipowner

has to make the firm offer which contains the following details (Gorton et al. 2004, 160): 1) the shipowners name; 2) the ship's name and particulars; 3) cargo quantity and description of the commodity; 4) loading and discharging ports and berths; 5) laydays/cancelling day: 6) loading and discharging rates and terms; 7) demurrage and despatch rates; 8) freight amount and conditions for payment of freight; 9) clauses covering time counting, Ice clause, War Risk clause, applicable law and place of arbitration, Bunker clause, clauses covering extra insurance premiums, taxes and dues *et cetera*, which the owner considers to be of prime importance; 10) charter party form; 11) commissions.

After the main terms have been fixed by the charterer and shipowner, negotiations over details, which are incorporated into the voyage charter party, begin. There are different forms of voyage charter parties: a standard form adopted or approved by BIMCO, some other well-known standard recognized by both parties or the charterers' or the owners' own *pro forma* charter party. During negotiations regarding details the voyage charter party is amended according to counterparties preferences and agreements. Finally the voyage charter party will be confirmed and fixed where all agreed terms and conditions including the ones which relate to laytime will be incorporated. (Ibid.)

2.1.3 Loading and discharging operations

If the charterer and shipowner have binding voyage charter party or recap, the shipowner shall give voyage instructions including all relevant information regarding the fixture to the master.

In terms of loading and discharging the first most important details of the fixture for the master are laycan (Alizadeh, Talley 2011, 1) and delivery window. These are periods of time during which the vessel has to arrive at the loading or discharging port and when the vessel has to be ready in all respects to load or discharge the cargo. When the vessel has arrived at the loading port, berth or dock the master gives a notice of readiness and if cargo and berth are available the vessel shall berth for loading operations. At discharging port the vessel shall berth if the notice of readiness is given and the consignee is ready to receive the cargo. After vessel's arrival to the loading or discharging port the master or the officer and the representative of the port start keeping logs of all activities related to the vessel's port stay and loading or discharging operations. After the completion of the loading or dishcarging, the master, the representative of the terminal and the agent check if logs match and sign the

Statement of Facts or „SOF“ for each port – a base document that determines all times and facts about vessel's port stay and loading or discharging operations.

The most common facts with times on the statement of facts are the following: 1) vessel's arrival, 2) time of anchoring, 3) tendering the notice of readiness, 4) accepting the notice of readiness, 5) anchor aweigh, 6) pilot on board, 7) first line ashore, 8) vessel all fast, 9) gangway secured, 10) initial draft survey commenced, 11) initial draft survey completed, 12) commenced loading or discharging, 13) completed loading or discharging, 14) final draft survey commenced, 15) final draft survey completed and 16) vessel sailed.

If there are stoppages during the operations, then these are also stated in the SOF. After the completion of loading there is usually carried out a draft survey to determine the quantity loaded and it could be the same for determining the discharged quantity if any of the parties request that. The quantity is also stated in the bill of lading or „BL“ – a document from where the figure of cargo quantity is usually taken for calculating laytimes.

2.1.4 Calculating laytime calculations

If the sales contract and the voyage charter party has been agreed and the vessel has completed loading or discharging operations, laytime calculations should be carried out. Laytime calculations are settled between the following counterparties:

1. Seller and buyer at loading port (if there are more sellers and buyers in the chain, then all parties have to settle between themselves).
2. Voyage charterer and shipowner at loading port (if there are more voyage charterers and shipowners in the chain, then all parties have to settle between themselves).
3. Seller and buyer at discharging port (if there are more sellers and buyers in the chain, then all parties have to settle between themselves).
4. Voyage charterer and shipowner at discharging port (if there are more voyage charterers and shipowners in the chain, then all parties have to settle between themselves).

Laytime calculations are usually carried out by using designated software applications like Veson's IMOS. Sometimes Microsoft's Excel is also used for the same purposes.

Drafting a laytime calculation is a step-by-step process which relies on outcomes of previously described stages – sales contract, voyage charter party, notice of readiness, statement of facts and determined cargo quantity. Laytime calculation steps are the following:

1. Determining main details from the sales contract or the voyage charter party (laycan, demurrage and despatch rates, loading or discharging rates and terms, turntimes, type of laytime *et cetera*).
2. Determining relevant port activities and cargo quantity from the statement of facts, notice of readiness and bill of lading.
3. Determining the time of commencement of laytime.
4. Determining the time which to be count as laytime or demurrage and the time which to be deducted. It is made by following the agreed details in the sales contract or the voyage charter party.
5. Determining the time of completion of laytime or demurrage.
6. After determining all necessary details the balance between used time (countable time) and allowed time should be calculated.
7. Payable demurrage, detention or despatch should be calculated basis the balance time between allowed and used time which should be multiplied with the agreed demurrage, detention or despatch rate.

2.1.5 Coordinating laytime calculations

After calculating laytimes the calculation report has to be sent to another counterparty which is usually made by e-mail. The counterparty who receives the calculation either replies with confirmation or proposes to revise the calculation. If the counterparty replies with the confirmation the calculation is settled but it is more common that proposals to revise the calculation are made.

The main reason behind proposals to revise the laytime calculation is that counterparties interpret clauses from the sales contract and the voyage charter party and facts from the statement of facts in their own interest. Occasionally while dispute arises lawyers get involved in this stage of laytime process. Rarely disputes are too complicated and need to be settled in arbitration or court.

If there are several counterparties in the chain, the coordination process could take longer time. Often it is necessary to remind the other counterparty to reply on sent laytime

calculation report. This stage ends when the counterparties confirm final laytime calculations and the amount of demurrage or despatch.

After confirming the laytime calculation the counterparty who has the right to claim for demurrage, despatch or detention sends out the invoice. Between charterer and shipowner the amount payable is often incorporated in the final freight invoice.

Finally the counterparty responsible for the payment shall pay the amount within the agreed period.

In this chapter the author has shown that there are different stages which form the overall laytime process. Laytime begins with the negotiations over the cargo trade and sales contract which form the initial basis of the laytime. Details of the sales contract, including the ones related to laytime, are input for the next – the chartering – stage. In the chartering stage the party responsible for arranging the transport of the cargo shall put an order through the shipbroker on the market and agree the terms and details of the voyage charter with the shipowner. If the voyage charter party has been agreed the vessel should go to the loading port, give notice of readiness and load the cargo on board. After loading the vessel should head to the discharging port, give notice of readiness and discharge the cargo. After having loaded or discharged, seller and buyer should calculate laytimes basis the sales contract and statement of facts. Same applies for the charterer and shipowner but the basis is the voyage charter party and statement of facts. Calculation reports and proposals to revise calculations will be exchanged by e-mail until the calculation is confirmed by both counterparties. Finally the counterparty who has the right to claim for demurrage, despatch or detention sends the invoice and the other party shall arrange the payment within the agreed period of time.

It has come out that the stakeholders related to laytime are the following: the seller, the buyer, the charterer, the shipbroker, the shipowner, the representative of the port, the agent, the person who drafts laytime calculations (the vessel operator, the cargo operator, the cargo trader or the laytime analyst) and legal personal (lawyers, arbitrators *et cetera*) if the dispute regarding laytime calculation is complex.

3. DETERMINING USER REQUIREMENTS FOR THE LAYTIME CALCULATION SOFTWARE

In this part of the work – the empirical part – the author will examine processes of calculating and coordinating laytime in order to improve the software used for these purposes. The author has worked as a laytime analyst of coal trades for the Company X for the last 12 months, hence the author will concentrate on the improvement of laytime calculation software by going through laytime processes related to Company X and its coal trades.

Since the objective of the thesis is to improve the laytime calculation software, the author has chosen consumer idealized design as a method for reaching the objective which was described in chapter 1.3.

Before carrying out the focus group by the guidelines of consumer idealized design the author will describe the background of the Company X, current laytime related processes and currently used laytime calculation software. Currently used laytime calculation software will be described in order to to give overview of features and to prepare for the focus group interview. The software will be described by going through laytime calculation of the case voyage.

After analyzing previously described aspects the author will carry out focus group with vessel operators and laytime analysts from Company X who are dealing with laytime calculations. That will be done in order to collect the qualitative information regarding laytime calculations and to make a list of user requirements for the laytime calculation software. Based on the list of user requirements the author will send survey to wider audience to prioritize these requirements.

In the end of this chapter the author will make conclusions and also proposal for the requirements that should be included in the laytime calculation software application that fits into Company X's laytime related processes and its coal trades context.

3.1 Company X and its dry bulk operations department

Company X is a subsidiary of the commodity trading company Trading Company X. Company X is a full-service provider of shipping logistics and operations, with additional specialists who cover accounting, compliance and IT functions for international commodities trading. Company X is a service provider for physical trading houses.

Company X is offering its services to Trading Company X which is trading crude oil, oil products, industrial metals, precious metals, thermal coal, coking coal, iron ore and other energy commodities like LNG, power and emissions.

Company X is working as an agent for Shipping Company X, which is also a subsidiary of Trading Company X. Shipping Company X is a shipping company within the group which main activity is vessel chartering. Shipping Company X charters vessels in voyage charter and time charter basis to carry out voyages for Trading Company X's own traded cargoes but also for third party cargoes.

There are six different departments for cargo and vessel operations at Company X: 1) dry bulk, 2) crude and oil products, 3) LPG, 4) biofuels, 5) natural gas and LNG and 6) energy. Within dry bulk operations department there are four shipping operators who are operating dry bulk vessels. The author has worked in dry bulk department as a laytime analyst of coal trades.

Dry bulk department's overall activity is described as follows. Dry bulk freight traders from Shipping Company X fix vessels (chartering in time charter and voyage charter) and voyages which dry bulk operators have to operate. These voyages could be based either on Trading Company X's own cargo trades or on third party fixtures. If the trade and the voyage are fixed, the shipping operator carries out all necessary activities throughout the voyage. Laytime calculations are drafted and coordinated with counterparties by laytime analyst. In addition to laytime calculations which are made for voyages operated by dry bulk operators, the laytime analyst has to calculate laytimes which result from the cargo trade fixtures where the cargo is sold or bought on loading or discharging a vessel – including all laytime calculations related to coal trades fixed by Trading Company X traders.

3.2 Analysis of laytime calculation and cooordinating process

At dry bulk department of Company X laytime calculations are mostly drafted and coordinated by laytime analyst. Very complex laytime calculations which are subject to *force majeure* event or potentially could end up in arbitration are coordinated and calculated by vessel operators responsible for certain voyage in close cooperation with lawyers.

Laytime calculations are usually drafted after the completion of the voyage. Laytime calculation reports are sent to the shipbroker who in turn forwards the report to counterparty for their confirmation or feedback. If there is a need to carry out laytime calculation basis Trading Company X's sales contracts, then calculations are usually drafted as soon as possible after the loading or discharging has been completed and reports will be sent to cargo trader who in turn sends the calculation report to the buyer or seller.

Laytime calculations for coal trade fixtures are settled between different counterparties depending on the fixture. As it is seen in Table 2, the laytime analyst should draft six different laytime calculations for one voyage if for the voyage there is a vessel chartered in basis voyage charter and chartered out basis voyage charter to Trading Company X for carrying own cargo (there could be even more laytime calculations for such fixture if there are several sellers and buyers related to the trade with Trading Company X).

Table 2. Laytime calculation counterparties depending on the fixture at Company X

Fixture type	Laytime calculations between the following counterparties	
	At loading port	At discharging port
Time charter in or out	No laytime calculations	No laytime calculations
Voyage charter in	Shipping Company X and shipowner	Shipping Company X and shipowner
Voyage charter out (third party cargo)	Shipping Company X and charterer	Shipping Company X and charterer
Voyage charter out (own cargo)	Shipping Company X and Trading Company X	Shipping Company X and Trading Company X
Sales contract	Trading Company X and seller or buyer	Trading Company X and seller or buyer

Source: Drafted by the author (2015)

3.2.1 Laytime calculation analysis of the case voyage

In this sub-chapter the author analyses how does laytime analyst at Company X process laytime calculation and coordinates it with counterparty by elaborating one case voyage step-by-step.

The case voyage was a fixture where Trading Company X bought coal in three parcels at loading port and sold the cargo in four parcels at discharging port. For the voyage, Shipping Company X chartered vessel basis the voyage charter who in turn chartered the vessel out to Trading Company X basis the voyage charter. The process of calculating and coordinating laytime calculations of the case voyage last for 5 months (started after discharging in August 2014 and completed in December 2014). The process itself is described as follows:

1. After the completion of discharging, the laytime analyst searches from e-mails (e-mail application) for the recaps and voyage charter parties between the shipowner and Shipping Company X and between Shipping Company X and Trading Company X, loading port NOR, SOF and BL, discharging port NOR and SOF and copies these documents into the cloud based voyage folder (cloud based document management application) in order to find these documents more easily if it should be necessary in the future.
2. The laytime analyst sends an e-mail request to the trader at Trading Company X in order to get suppliers' and receivers' details (names of suppliers and receivers, relevant cargo quantitites, relevant laycans, demurrage rates, contracts applied between Trading Company X and suppliers and receivers).
3. The laytime analyst inserts details of loading and disharging port activities from NOR, SOF and BL in IMOS port activities window and cargo quantities in the IMOS main view.
4. The laytime analyst creates fixture details spreadsheet in Microsoft Excel where the most important information about the fixture is saved from the recaps, voyage charter parties (name of the counterparty, date of the voyage charter party, laycan, demurrage rate, despatch rate, loading rate and terms, discharging rate and terms, type of laytime, turntime for loading and discharging) and from the supplier and receiver details. The purpose of this activity is to avoid searching this information

from contracts or e-mails in the future if necessary – searching for the information from contracts and e-mails is time consuming.

5. The laytime analyst opens New Laytime Calculation Setup in IMOS which is shown in Figure 1. Then selects the counterparty (owner, charterer, supplier or receiver), the relevant port and if the laytime is reversible, the laytime analyst checks the necessary box. If the counterparty is not entered into the system, the laytime analyst has to send request by e-mail to support to get the counterparty inserted into the system. If all is in order the laytime analyst clicks OK button to start drafting the laytime calculation.
6. The laytime analyst drafts the laytime calculation in the Laytime Calculation view in IMOS. At first the laytime analyst checks if main details are correct (cargo quantity, loading or discharging rate, loading or discharging terms, demurrage and despatch rates). Then the laytime analyst imports previously entered port activities. Then the laytime analyst checks boxes that specify if the laytime expires and if the rule „once on demurrage, always of demurrage“ applies. After that the laytime analyst specifies the time of commencement of laytime as per contract or the voyage charter party. Then all times of deductions will be entered into the calculation basis the contract or the voyage charter party and NOR and SOF (these documents can be usually opened with Microsoft Word or Adobe Reader). Finally the time of completion of laytime will be specified.
7. After drafting the laytime calculation the laytime analyst saves the laytime calculation report (PDF converter) on the hard drive.
8. The laytime analyst sends the laytime calculation report to the trader of Trading Company X or to the broker between the Shipping Company X and shipowner.
9. The laytime analyst sends weekly e-mail reminders to trader or broker to get feedback or confirmation to the laytime calculation.
10. If feedback is given with proposals to revise the laytime calculation, the laytime analyst opens counter calculation with e-mail where are the comments and checks if proposed amendments are in accordance with SOF and contract or the voyage charter party.
11. Comments and revised laytime calculation reports are exchanged between counterparties until laytime calculations are finally confirmed.

As it is seen there are seven different software applications which laytime analyst currently uses to calculate and coordinate laytime calculations – IMOS, cloud based document management system, Microsoft Excel, Microsoft Word, Microsoft Outlook, Adobe Reader and PDF converter. Laytime analyst uses two monitors which helps to divide different opened applications on separate screens.

3.3 Analysis of the current laytime calculation software application

In this sub-chapter the author will analyze features of the currently used laytime calculation software at Company X.

At Company X, laytime calculations are drafted with the software called IMOS which is developed by Veson and it is used for all chartered voyages within dry bulk department. Laytime calculations are coordinated with counterparties by exchange of e-mails and comments between Company X and the counterparty.

Features of IMOS New Laytime Calculation Setup view which is shown in Figure 1, are the following:

1. User can add voyages only for the voyage which has been entered into the system previously.
2. User can choose only previously into the system entered counterparty (owner, charterer, supplier and receiver) for whom the calculation will be made.
3. User can choose between „time counting“ and „deduction“ method for calculating laytime.
4. User can select previously entered port for the laytime calculation.
5. User can add additional ports not related to loading or discharging into the laytime calculation.
6. User can choose if the laytime calculation is reversible between ports, if the laytime expires and if the principle „once on demurrage, always on demurrage applies“.

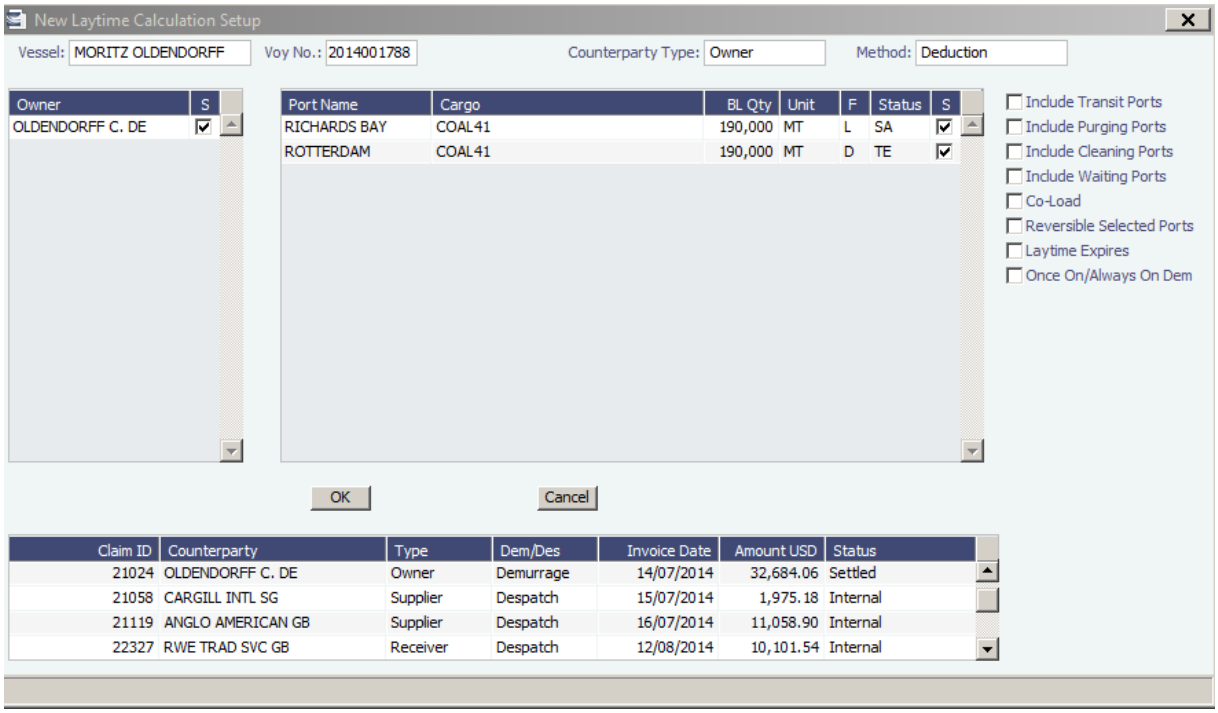

Figure 1. IMOS New Laytime Calculation Setup view

Source: (Company X 2015)

Features of IMOS Laytime Calculation view which is shown in Figure 2, are the following:

1. User can set the status of the laytime calculation.
2. User can amend the cargo quantity, loading or discharging rate, loading or discharging terms, demurrage and dispatch rate.
3. User can see how much time is allowed, used, deducted and the balance.
4. User can import port activities from voyage data or from previous laytime calculation.
5. User can edit port activities.
6. User can choose if the laytime expires, if the laytime is continuous, if the principle "once on demurrage, always on demurrage" applies, if the time rounds up and which is the time format.
7. User can choose whether the result of laytime calculation will be included in P&L and if it is possible to rebill the sum from owners.
8. User can insert times of deductions and set the allocation percent of certain deduction.

9. User can set the time of commencement of laytime. Software has set the default commencement of laytime six hours after tendering notice of readiness.
10. User can set the time of completion of laytime.
11. User can choose allocation percent to apply allocation percent to rate.
12. User can set overall allocation percent.
13. User can set minimum allowed time.
14. User can set grace time.
15. User can choose currency for laytime calculation.
16. User can insert agreed amount of laytime calculation if the sum differs from the actual result of laytime calculation.
17. User can make notes regarding difference reason.
18. User can make remarks for the laytime calculation which will be shown on the laytime calculation report.
19. User can save calculation report.
20. User can save laytime invoice.

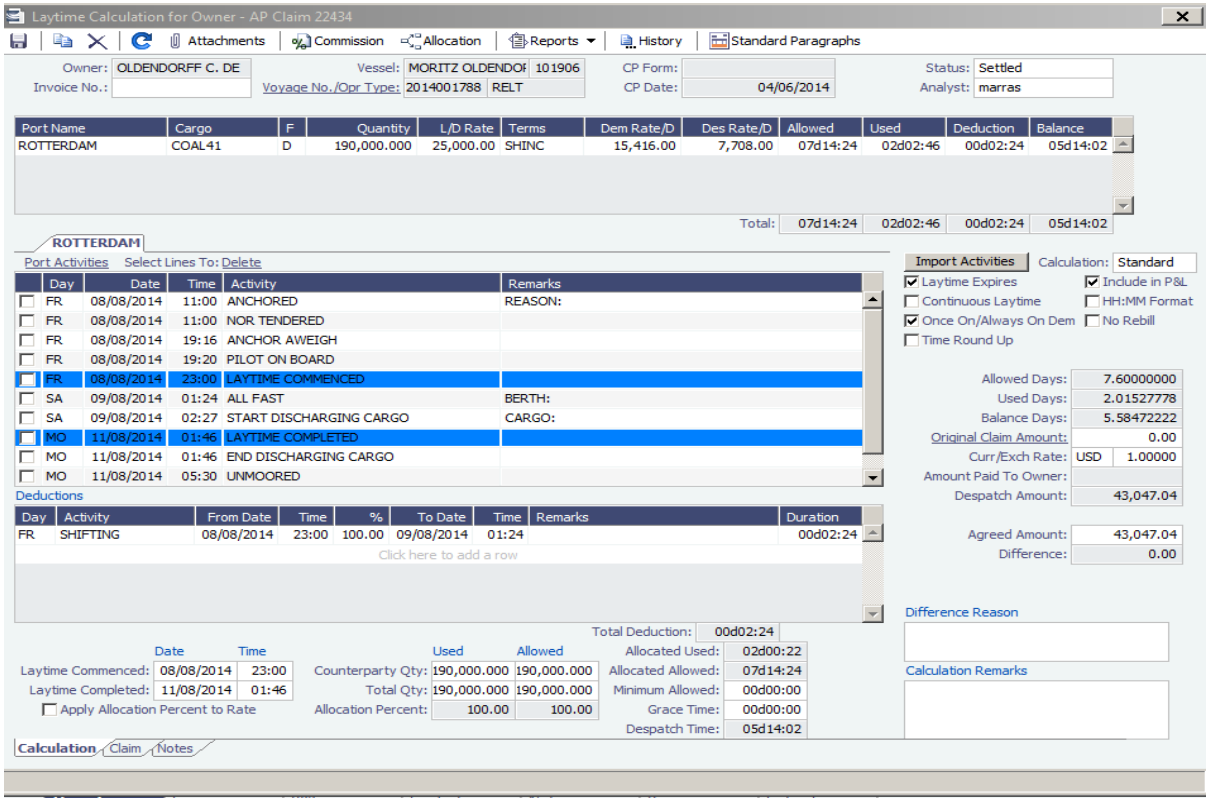

Figure 2. IMOS Laytime Calculation view

Source: (Company X 2015)

3.4 Eliciting user requirements

In this sub-chapter the author will describe results of the focus group interview which was carried out as per consumer idealized design guideleines (consumer idealized design method was introduced in the chapter 1.3). The focus group interview was carried out among vessel operators and laytime analysts from Company X. There were four people plus the author. The focus group interview was carried out on the 29th of April 2015 from 14:00 o'clock until 17:00 o'clock.

It came out that main goals for the laytime calculation software should be:

1. To allow laytime analyst to draft laytime calculations.
2. To allow laytime analyst to coordinate laytime calculations.

It came out that in addition to calculating laytimes the laytime calculation software should be able to give the laytime analyst the opportunity to manage and coordinate laytime calculations with other counterparty within the same system. Focus group members thought such system would make their working processes faster and would save their working time.

The focus group came up with the following requirements that should be included in the laytime calculation software:

1. Document management system that gives an opportunity to keep laytime calculation related documents in the same system so the laytime analyst could find these documents more easily. The reason for such feature was that it is confusing to go to other applications to find relevant documents.
2. Integration with external systems (access to SOF, NOR, BL, sales contracts, voyage charter parties). Such system would give an opportunity to get access to other systems that have important information for certain laytime calculation. The reason for such feature is that it is time consuming to ask information by e-mails.
3. Laytime calculations should be easily shared in the system. Simple sharing between other laytime analysts or anyone else in order to let them to have access to the laytime calculation. The reason for such feature is that there is a need to share the laytime calculation with other stakeholders.
4. Counterparty should have access to the laytime calculation and binding documents. It is important that counterparties who have access to laytime calculation can see

documents and content relevant to them. The reason for that is that the time of sending documents related to certain laytime calculation could take extra time and can be lost in e-mails.

5. Counterparty should have an option to amend laytime calculation in the same system. Shared system should allow counterparties to exchange laytime calculations between themselves in the same system. The reason is that tracking amendments are time consuming if counterparties exchange laytime calculation reports by e-mail.
6. Integration with company shipping program. Integration with company shipping programs should be made for amendments and data exchange. The reason is that companies have their own shipping programs which they would need to use for laytime calculation purposes.
7. Parallel system. Laytime calculation software should allow in addition to shared system to upload laytime calculation reports from their own programs to the system. The reason for that is that shipping companies have their own laytime calculation software and they could prefer to use their own system at the same time.
8. Track changes in laytime calculation. If amendments are made to laytime calculations by counterparties, then all changes should be traceable. The reason is that it is time consuming to find amendments from counterparty's calculation report if it has been sent by e-mail.
9. Comment amendment in laytime calculation. Commenting specific amendment should be possible to support amendment with explanation. The reason is that looking for comments in e-mail and tracing amendment in separated system is time consuming.
10. Link clause to amendment from the voyage charter party or sales contract. Clause which is related to amendment in the laytime calculation should be linked with relevant clause from the voyage charter party or sales contract. The reason for that is that finding relevant clause to amendments from external and separated systems is time consuming.
11. Highlight clause relevant to deduction. Clause which is related to amendment from the voyage charter party or contract should be possible to highlight. The reason for that is that finding relevant clause to amendments from external and separated systems is time consuming.

12. Chat with counterparty. The laytime calculation software should allow counterparties to chat with each other in the same system. The reason for that is there is too much waiting for counterparty's response by e-mail.
13. Highlight SOF. Clause which is related to amendment from the voyage charter party or contract should be possible to highlight. The reason for that is that finding relevant clause to amendments from external and separated systems is time consuming.
14. Flexible port activities and deductions entering. The laytime calculation software should allow to enter custom port activities and deductions and should also have option to save port activities and deductions which could be loaded later. The reason for that is the need for entering custom port activities.
15. Laytime terms to count automatically in new laytime calculation (e.g ScoTA 7, ScoTA 8 *et cetera*.). The laytime calculation should have option to enter certain laytime terms from the voyage charter party or sales contract into the system and these terms sohuld be incorporated into new calculation after choosing certain terms. The reason for that is that finding laytime from contracts is time consuming.
16. Send counter calculation in .pfd format if not interested to use laytime calculation software. The laytime calculation software should allow the laytime analyst to draft laytime calculation in another system and upload the document into the laytime calculation software. The reason for that is because some laytime analysts find it easier to use company's laytime calculation software.
17. Automatic reminders. The laytime calculation software should send automatic reminders to counterparty who has to give feedback or confirm sent laytime calculation. The reason for that is the problem where laytime analysts have to spend time on checking if the counterparty has replied to sent laytime calculation and also on sending reminder e-mails weekly.
18. Activity notification. The laytime calculation software should send notification to laytime analyst if counterparty has replied to the sent laytime calculation. The reason is that the laytime analyst should know immediately if laytime calculation has been confirmed by other counterparty in order to react as fast as possible.
19. Laytime calculation status update. The laytime calculation software should show the laytime analyst status of the laytime calculation and update it accordingly. The laytime

calculation software should allow filter and sort laytime calculations acoording to their status. The reason is that laytime calculations are hard to manage.

20. Access for lawyers. The laytime calculation software should have an option to give access to certain laytime calculation and all information related to the laytime calculation for lawyers. The reason for that is the occasional need for lawyers participation in dispute solving and to give over all materials related to the dispute by e-mail is time consuming and confusing.
21. Small dispute arbitration. The laytime calculation software should solve the small dispute problem where counterparties are arguing long time over one clause which they interpret differently. The reason is that often there are disputes over small amount of money and counterparties could not find common language for a long time.

3.5 Prioritizing requirements for the laytime calculation software

The author conducted survey (Appendix 1.) among laytime analysts from partner companies of Company X. The author sent the survey to five companies that are transporting or trading coal and got answers from 13 people who had direct connection to laytime calculations. From respondents it was asked to accept or not with the goal – if the laytime calculation software should also be for coordinating process. Also respondents had to decide whether the requirements which were pointed out during the focus group interview would need to be fulfilled or not.

The most valuable information that came out was that 9 out of 13 respondents thought that laytime calculation software should also work for coordinating processes. It means more than half of the directly to laytime calculations connected people would prefer to have software that works as a laytime calculation and coordinating software. Currently used system does not support such approach which means the current system is not meeting the requirements of its users.

The aim of the survey was also to get answer for the question which user requirements were desirable and which were not. Such information allows the author to prioritize requirements which are the input for the design of the laytime calculation software.

The author has divided results of the survey into three parts:

1. Requirements of which answers' median score resulted 5 were considered as „User requirements that must be included in the laytime calculation software". These user requirements are shown in the Table 3.
2. Requirements of which answers' median score resulted between 5 and 3 were considered as „User requirements that are desirable in the laytime calculation software". These user requirements are shown in the Table 4.
3. Requirements of which answers' median score resulted between 3 and 0 were considered as „User requirements that are not desirable in the laytime calculation software". These user requirements are shown in the Table 5.

Table 3. User requirements that must be included in the laytime calculation software

Requirement	Score	
	average	median
Flexible port activities and deductions entering.	5	5
Automatic reminders. System reminds counterparty regularly to respond.	5	5
Activity notification. If counterparty has changed anything, the system informs me.	5	5
Laytime calculation status update. I can manage and check laytime calculations' statuses in the system.	5	5
Integration with company's shipping program.	4.78	5
Parallel system (it should be possible to upload laytime calculation from company's shipping software to the system in addition to calculating laytimes in the system itself).	4.78	5
Integration with external systems (accounting, agents *et cetera*.).	4.67	5
Laytime calculations should be easily shared in the system.	4.56	5

Source: Drafted by the author (2015)

Table 4. User requirements that are desirable in the laytime calculation software

Requirement	Score	
	average	median
Document management system that gives an opportunity to keep laytime calculation related documents in the same system so I could find these documents more easily.	4.33	4
Counterparty should have access to the laytime calculation and binding documents.	4.33	4
Highlight SOF relevant to deduction.	4.22	4
Laytime terms to count automatically in new laytime calculation. If I choose SCoTA then the laytime calculation counts all laytime related terms from SCoTA.	4.11	4
Option to send counter calculation in .pdf file format.	4.11	4
Counterparty should have an option to amend laytime calculation in the same system.	4.00	4
Option to comment amendment in laytime calculation.	4.00	4
Option to highlight clause relevant to deduction.	4.00	4
Track changes in laytime calculation.	3.89	4
Option to link clause to amendment from the voyage charter party or sales contract.	3.33	3
Access for lawyers. I can send all materials and progress to lawyer if necessary.	3.33	3

Source: Drafted by the author (2015)

Table 5. User requirements that are not desirable in the laytime calculation software

Requirement	Score	
	average	median
Small dispute arbitration. I can ask counterparty to settle the dispute in small arbitration provided by the system.	2.33	2
Chat with counterparty.	2.11	2

Source: Drafted by the author (2015)

3.6 Conclusions and proposals

The thesis was set out to find for the solution to the problem of high operating costs in a shipping company by improving laytime calculation processes. The author has described the whole laytime process and has identified several aspects related to laytime calculation software which need to be changed according to users' requirements. In this work the author also set out research questions that got answered. The research questions and answers to them are described below.

What sub-processes form the whole laytime process? The whole laytime process includes the following stages: 1) Laytime begins with the negotiations about the cargo trade and sales contract which form the initial basis of the laytime. Details of the sales contract, including the ones related to laytime, are input for the next – the chartering – stage; 2) In the chartering stage the party responsible for arranging the transport of the cargo shall put an order through the shipbroker on the market and agree the terms and details of the voyage charter with the shipowner; 3) If the voyage charter party has been agreed the vessel should go to the loading port, give notice of readiness and load the cargo on board. After loading the vessel should head to the discharging port, give notice of readiness and discharge the cargo; 4) After having loaded or discharged, seller and buyer should calculate laytimes basis the sales contract and statement of facts. Same applies for the charterer and shipowner but the basis is the voyage charter party and statement of facts; 5) Calculation reports and proposals to revise calculations will be exchanged by e-mail until the calculation is confirmed by both counterparties. Finally the counterparty who has the right to claim for demurrage, despatch or detention sends the invoice and the other party shall arrange the payment within the agreed period of time.

Who are stakeholders in the laytime process? It has come out that the stakeholders related to laytime are the following: the seller, the buyer, the charterer, the shipbroker, the shipowner, the representative of the port, the agent, the person who drafts laytime calculations (the vessel operator, the cargo operator, the cargo trader or the laytime analyst) and legal personal (lawyers, arbitrators *et cetera*).

What are the most important user requirements for the software solution for calculating laytimes of coal trades? The most important user requirements for the laytime calculation software are the following: 1) flexible port activities and deductions entering; 2)

automatic reminders (system reminds counterparty regularly to respond); 3) activity notification (if one counterparty has changed anything, the system informs the other counterparty); 4) laytime calculation status update (the counterparty can manage and check laytime calculations' statuses in the system); 5) integration with company's shipping program; 6) parallel system (it should be possible to upload laytime calculation from company's shipping software to the system in addition to calculating laytimes in the system itself); 7) integration with external systems (accounting, agents *et cetera*.); 8) laytime calculations should be easily shared within the system.

In addition the author found that laytime analyst from Company X uses currently seven different software applications in order to conduct laytime calculations – IMOS, cloud based document management system, Microsoft Excel, Microsoft Word, Microsoft Outlook, Adobe Reader and PDF converter.

The hypothesis of the work, users of laytime calculation software require the software to allow calculating and coordinating laytime calculations within the same application, has turned out to be true.

Accordingly, the main conclusion of this work is that users' requirements for the laytime calculation software of coal trades are not fulfilled with current solutions. The main difference between the current and the desired software application is that laytime calculation and coordination processes do not take place within the same system at the moment. Also currently used laytime calculation software at Company X does not meet any of the most important user requirements.

The proposal of the author is the following: Company X or any interested person should consider developing cloud based web application of coal trades for calculating and coordinating laytime calculations that allows calculating and coordinating laytime calculations within the same system. The software should also include the most important user requirements that came out in this work. Such laytime calculation and coordination application could be developed to meet company's own needs but should be accepted by competitors as well. Before developing the application, the developer should conduct a feasibility study and a market survey in order to get feedback if other companies accept the solution.

SUMMARY

In this work the author is addressing the issue of laytime which is one of the most important clauses in a voyage charter party. The idea behind laytime is that the charterer and the shipowner agree certain time that is allowed for loading or discharging a vessel without any extra costs to counterparties. Laytime is often basis for disputes that result from the voyage charter party or from the sales contract. Although matters regarding laytime calculations are mostly related to judicial aspects, the author found, from the personal experience, it important to pay attention to the whole picture of laytime and especially to the part where the calculation and coordinating takes place. Since calculating and coordinating laytimes is a matter of cost and in turn of competition for companies which are dealing with it, the author set the objective to give an input for improving the laytime calculation software by finding out and prioritizing user's requirements for such software.

In this work it is researched for the solution to the problem of high operating costs in a shipping company by improving laytime calculation process. To find the solution to the problem by improving one part of running the shipping company came from the personal experience of the author. The author has worked as a laytime analyst of coal trades at Company X for the last 12 months therefore this work has also been narrowed to coal related laytime processes. Company X is a full-service provider of shipping logistics and operations and is a subsidiary of commodity trading company Trading Company X. From the personal experience of the author it could be said that currently used software application do not take into account all specific aspects of laytime calculation and also coordinating process. Resulting from previous, the hypothesis of this work is the following: users of laytime calculation software require the software to allow calculating and coordinating laytime calculations within the same application.

To achieve the objective of this work and to prove or disprove the hypothesis, the author set three research questions and five research tasks. The work is structured into three principal chapters. The first chapter introduces the background of the research problem, the structure and methodology of the work. The second chapter is a theoretical part where the

author describes the concept of laytime, elaborates laytime related terms and describes laytime as a process by going through all sub-processes that form the whole laytime process. The third part of the work is an empirical part where the author analyzes laytime calculation and coordination process by going through one laytime calculation. Also currently used laytime calculation software is analyzed and most important users' requirements for the laytime calculation software are determined.

The objective of this work was achieved by using qualitative and quantitative research methods. At first the author used consumer idealized design as a qualitative research method. After that the author distributed a survey in order to collect quantitative data. In practice the consumer idealized design was a focus group interview with stakeholders from Company X. During the focus group interview the group brainstormed ideas and a list of users' requirements for the laytime calculation software were determined. After that the author sent the survey including the list of users' requirements to five companies in order to get feedback if the laytime calculation software should also work as coordinating software. Respondents were also asked to answer the importance of each user requirement.

Hypothesis of this work was proved – users of laytime calculation software require the software to allow calculating and coordinating laytime calculations within the same application. All members of the focus group and the majority of survey respondents agreed with that position.

The most important user requirements that survey respondents pointed out were the following: 1) flexible port activities and deductions entering; 2) automatic reminders (system reminds counterparty regularly to respond); 3) activity notification (if one counterparty has changed anything, the system informs the other counterparty); 4) laytime calculation status update (the counterparty can manage and check laytime calculations' statuses in the system); 5) integration with company's shipping program; 6) parallel system (it should be possible to upload laytime calculation from company's shipping software to the system in addition to calculating laytimes in the system itself); 7) integration with external systems (accounting, agents *et cetera*.); 8) laytime calculations should be easily shared within the system.

Conclusions of this work are the following:

1. Users' requirements for the laytime calculation software of coal trades are not fulfilled with current solutions.
2. The main difference between the current and the desired software application is that laytime calculation and coordination processes do not take place within the same system at the moment.
3. Currently used laytime calculation software at Company X does not meet any of the most important user requirements.

Proposals of the author are the following:

1. Company X or anyone interested should consider developing cloud based web application for calculating and coordinating laytime calculations of coal trades that allows calculating and coordinating laytime calculations within the same system.
2. The developed software should also include the most important user requirements that came out in this work.

Recommendations of the author are the following:

1. Before developing the new software application, the author recommends to conduct due diligence.
2. Before developing the new software application, the author recommends to conduct a market survey in order to get feedback if managements of companies accept the new solution desired by users.

REFERENCES

About Global Coal. Global Coal. https://www.globalcoal.com/Brochureware/aboutglobalCOAL/ (29.03.2015)

Alizadeh, A. H. Talley, W. K. Vessel and voyage determinants of tanker freight rates and contract times. Norfolk: Elsevier

Gorton, L. Hillenius, P. Ihre, R. Sandevärn, A. (2004). Shipbroking and Chartering Practice. Sixth edition. London: Informa

Holopainen, M. Helminen, P. (2011). User-based service innovation including a futures perspective: a case study with four methods. Cheltenham: Edward Elgar Publishing Ltd.

Kaulio, M.A (1998). Customer, consumer and user involvement in product development: A framework and a review of selected methods. Sweden: Carfax

Mokia, Z. Dinwoodie, J. (2002). Spatial aspects of tanker lay-times. Plymouth: Pergamon

Overview of International Commercial Terms. International Chamber of Commerce. http://www.iccwbo.org/products-and-services/trade-facilitation/incoterms-2010/ (21.03.2015)

Rexfelt, O. Rosenblad, E. (2006). The progress of user requirements through a software development project. Gothenburg: Elsevier

Schofield, J. (2011). Laytime and Demurrage. 6th edition. New York: Informa

Stopford, M. (2009). Maritime Economics. 3rd edition. Oxon: Routledge

UNCTAD/RMT. (2014). UNCTAD. The Review of Maritime Transport 2014. Geneva: United Nations

Wilson, J. (2008). Carriage of Goods by Sea. 6th edition. Essex: Pearson Education Limited

Wilson, J. (2010). Carriage of Goods by Sea. 7th edition. Essex: Pearson Education Limited

RESÜMEE

KASUTAJANÕUDED SÖEGA SEOTUD KAIPÄEVADE ARVESTAMISE TARKVARALE

Maiko Arras

Käesolevas lõputöös käsitleb autor kaipäevadega seonduvat, mis on üks olulisim osa reisitšarterist. Kaipäevade põhikontseptsioon seisneb selles, et prahtija ja laevaomanik lepivad kokku aja, mille täpsel kasutamisel, laadimis- ja/või lossimistöödeks, ei teki osapooltel teineteise ees täiendavaid kohustusi. Kaipäevad on tihti reisitšarterist, kuid ka kauba ostu-müügi lepingust tulenevate vaidluste aluseks. Kuigi probleemid seoses kaipäevadega tulenevad peamiselt juriidilistest aspektidest lähtuvalt, näeb töö autor isiklikule kogemusele tuginedes, et tähelepanu tuleks pöörata kaipäevadega seonduvale üldisemalt – eriti sellele osale, mis puudutab kaipäevade arvutamist ja arvutuste kooskõlastamist ning selleks ettenähtud tarkvara. Kaipäevade arvutamine ja kooskõlastamine on kaipäevade arvutamisega kokkupuutuvatele ettevõtetele kuluallikaks ning sellest tulenevalt seotud ka konkurentsiga – madalad kulud on üheks võimaluseks konkurentsieelise saavutamisel. Käesoleva töö autor seadis eesmärgiks anda sisend kaipäevade arvutamiseks ettenähtud tarkvara parendamiseks, mis peaks omakorda looma võimalused kulude kokkuhoiuks. Autoripoolseks eesmärgiks oli leida ja prioritiseerida kasutajate nõuded sellisele tarkvarale.

Autor on töötanud söetehingutega seotud kaipäevade analüütikuna viimased 12 kuud Ettevõttes X, mistõttu on antud töö sisuline osa kitsendatud söega seotud kaipäevade protsessidele. Ettevõte X osutab logistikateenuseid ja tugiteenuseid Laevandusettevõttele X ning enda emaettevõttele Kaubandusettevõte X. Isiklikust kogemusest lähtuvalt võib töö autor öelda, et Ettevõttes X hetkel kasutusel olev tarkvaralahendus ei võta arvesse kõiki spetsiifilisi kaipäevade arvutamisega, kuid ka kooskõlastamisega seotud aspekte. Tulenevalt eelnevast püstitas töö autor järgneva hüpoteesi: kaipäevade arvutamise tarkvara kasutajad vajavad, et tarkvara võimaldaks kaipäevade arvutamist ja kooskõlastamist ühes tarkvararakenduses.

Töö eesmärgi saavutamiseks ja hüpoteesi kinnitamiseks või ümberlükkamiseks seadis töö autor kolm uurimisküsimust ja viis uurimisülesannet. Töö struktuur koosneb kolmest põhimõttelisest peatükist. Esimene osa tutvustab uurimisprobleemi tausta, töö struktuuri ja uurimismeetodeid. Teine peatükk käsitleb kaipäevasid teoreetilisest küljest ja tutvustab kaipäevadega seotud olulisemaid termineid. Lisaks on töö autor võtnud teises peatükis kaipäevade protsessi osadeks ning tutvustanud alamprotsesse, mis moodustavad kogu kaipäevade protsessi. Kolmas osa tööst on empiiriline osa, kus analüüsitakse kaipäevade arvutamise ja kooskõlastamise protsessi läbi ühe konkreetse kaipäevade arvutuse. Empiirilises osas analüüsitakse ka Ettevõttes X hetkel kasutatavat kaipäevade arvutamise tarkvara ning otsitakse kõige olulisemaid kasutajate nõudeid kaipäevade arvutamise tarkvarale. Lisaks otsitakse kolmandas osas vastust töös püstitatud hüpoteesile.

Töö eesmärk saavutati kasutades kvalitatiivset ja kvantitatiivset uurimismeetodit. Esmalt kasutas töö autor meetodit "tarbija ehk kasutaja idealiseeritud kujundus" ning seejärel viis autor läbi küsitluse, et koguda kvantitatiivseid andmeid. Praktikas oli "tarbija idealiseeritud kujundus" fookusgrupi intervjuu kaipäevade arvutamisega seotud isikutega Ettevõttest X. Fookusgrupi intervjuu jooksul viis grupp läbi ajurünnakuid ideede leidmiseks ning kaipäevade arvutamiseks ettenähtud tarkvarale kasutajanõuete määratlemiseks. Fookusgrupi intervjuu järgselt edastas autor küsitluse viiele ettevõttele, et saada tagasisidet selle kohta, kas kaipäevade tarkvara peaks endas sisaldama ka kooskõlastamise funktsiooni. Küsitletavad pidid samuti määratlema, millised fookusgrupi intervjuu ajal välja tulnud kasutajanõuded olid nende jaoks olulised ja millised mitte.

Töö hüpotees sai kinnitatud – kaipäevade arvutamise tarkvara kasutajad vajavad, et tarkvara võimaldaks kaipäevade arvutamist ja kooskõlastamist ühes tarkvararakenduses. Antud positsiooniga nõustusid kõik fookusgrupi intervjuu osalised ning enamus küsitlusele vastanutest.

Põhilised järeldused antud tööst on, et kasutajanõuded söetehingutega seotud kaipäevade arvutamise tarkvarale ei ole praeguste tarkvaralahendustega täidetud. Peamine erinevus praeguse ja soovitud tarkvararakenduse vahel on, et kaipäevade arvutamine ja kooskõlastamine ei toimu hetkel samas süsteemis. Ettevõttes X hetkel kasutatav kaipäevade arvutamise tarkvara ei vasta ühelegi kõige olulisemale kasutajanõudele.

APPENDICES

Appendix 1. Survey

Please fill in the following survey and please revert filled document to the following e-mail address: maiko.arras@...

1. Should the laytime calculation software also be for coordinating process? (YES/NO)

If you answered YES, please write down the level of desirability to the following requirements/features (5 – must be included; 4 – very desirable; 3 – desirable; 2 – could be included; 1 – not desirable; 0 – I do not need such requirement to be fulfilled at all)

2. Document management system that gives an opportunity to keep laytime calculation related documents in the same system so I could find these documents more easily.
   Answer ( )
3. Integration with external systems (accounting, agents *et cetera*.).
   Answer ( )
4. Laytime calculations should be easily shared in the system.
   Answer ( )
5. Counterparty should have access to the laytime calculation and binding documents.
   Answer ( )
6. Counterparty should have an option to amend laytime calculation in the same system.
   Answer ( )
7. Integration with the company's shipping program.
   Answer ( )
8. Parallel system (it should be possible to upload laytime calculation from company's shipping software to the system in addition to calculating laytimes in the system itself).
   Answer ( )
9. Track changes in laytime calculation.
   Answer ( )
10. Option to comment amendment in laytime calculation.
    Answer ( )

Appendix 1 continuation. Survey

11. Option to link clause to amendment from the voyage charter party or sales contract.
    Answer ( )
12. Option to highlight clause relevant to deduction.
    Answer ( )
13. Chat with counterparty.
    Answer ( )
14. Highlight SOF relevant to deduction.
    Answer ( )
15. Flexible port activities and deductions entering.
    Answer ( )
16. Laytime terms to count automatically in new laytime calculation. If I choose ScoTA then the laytime calculation counts all laytime related terms from ScoTA.
    Answer ( )
17. Option to send counter calculation in .pdf file format.
    Answer ( )
18. Automatic reminders. System reminds counterparty regularly to respond.
    Answer ( )
19. Activity notification. If counterparty has changed anything, the system informs me.
    Answer ( )
20. Laytime calculation status update. I can manage and check laytime calculations' statuses in the system.
    Answer ( )
21. Access for lawyers. I can send all materials and progress to lawyer if necessary.
    Answer ( )
22. Small dispute arbitration. I can ask counterparty to settle the dispute in small arbitration provided by the system.
    Answer ( )