



FInest – Future Internet enabled optimisation of transport and logistics networks



D8.2

Conceptual Design of Logistics Contract Manager

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Abstract

This document is associated with the E-Contracting Module (ECM) and is submitted as specified in the Finest Description of Work (DoW) as deliverable D8.2 – “Conceptual design of logistics contract manager” – associated with Work Package 8 (WP8). The role of this module within Finest is to provide online and semi-automatic contract establishment and management. The Finest core modules using the services offered by ECM are TPM (Transport Planning Module – associated with WP7) and BCM (Business Collaboration Module – associated with WP5).

The objectives of WP8 are: Conduct a detailed analysis of the state-of-the-art techniques and solutions to select the technology baseline to build upon (task T8.1); Provide a conceptual design and detailed specification for the E-Contracting Module and its integration within the overall envisioned technical solution (task T8.2); Identify Generic Enablers required from the Core Platform to realize the E-Contracting Logistics Module, and clearly define the additional components (“domain-specific enablers”) that need to be realized on top of this (task T.8.3); Develop a conceptual prototype for demonstrating the planned features (task T8.4); Define a detailed Implementation Plan for the follow-up project in Phase 2 (task T8.5).

In this document, we present the work conducted to achieve the following objectives associated with deliverable D8.2:

- a) refinement of requirements for the Logistics Contract Manager (task T8.1);*
- b) refinement of conceptual design (task T8.2);*
- c) initial assessment of the technical specification (task T8.2);*
- d) initial specification of relationships with overall envisioned solution for Finest (task T8.2);*

In addition, we anticipated the activities related to task T8.4 (prototypically implementation). We implemented and describe in this document the initial demonstrator of ECM capabilities which supported the process of refining the requirements for the ECM.

This document does not describe additional work done in this deliverable associated with the refinement of generic enablers, which is part of task 8.3 “Technological Alignment with FI PPP Core Platform”. The actual results of this work are provided in D9.2.

Document History

Version	Date	Comments
V1.0	30-01-2012	First draft of the structure
V1.1	19-03-2012	Consolidation of inputs from partners
V1.2	23-03-2012	Reorganizing content
V1.3	26-03-2012	Completed version
V1.4	28-03-2012	Incorporating reviews
V1.5	30-03-2012	Incorporating reviews
V1.6	02-04-2012	Final version

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Acronyms

Acronym	Explanation
BCM	Business Collaboration Module
ECM	E-Contracting Module
FI PPP	Future Internet Public Private Partnership
GE	Generic Enablers
ICT	Information and Communication Technology
NCL	North-sea Container Line
QoS	Quality of Service
SLA	Service Level Agreement
SLO	Service Level Object
SME	Small Medium Enterprise
T&L	Transport & Logistics
TPM	Transport Planning Module
TSD	Transport Service Description
USDL	Unified Service Description Language
WP	Work Package

1 Introduction

The E-Contracting Module (ECM) is a core module from Finest platform. The role of this module in this platform is to support the online and real-time establishment and management of T&L contracts. In the previous deliverable (D8.1 – “*Requirements analysis and selection of technology baseline for logistics contract manager*”), we identified the problems in T&L domain associated with the execution of T&L services without having the online and real access to the information of the contracts. Now, in this deliverable we advanced on the refinement of the domain requirements related to e-contracting capabilities, on the conceptual design of the ECM solution, and on the technical specification that needs to be defined to support the identified domain requirements.

The capabilities of the ECM, indeed, were refined and extended. The process to achieve this refinement was based on the tight collaboration between ICT and domain partners of Finest project. The list of ECM refined capabilities is presented below:

- Able to represent in an electronic and online form the attributes of T&L contracts that are most relevant for the execution of T&L services;
- Able to detect and signal near-real-time deviations on agreed terms from the contracts related to amount of cargo, time-window, location (source/destination);
- Able to manage the life-cycle of contracts (e.g., new online representation, expired, near to expire, etc);
- Able to signal the need to re-evaluate long term contracts due to many deviations (changes on the agreed terms of the contract);
- Capability to connect to marketplaces outside Finest platform;
- Capability to look for service providers and consumers in Marketplaces;
- Capacity to do match-makings between offers (service provider announcements) and demands (service client’s announcements).

In this document, we describe in detail the methodology, processes and work done in order to reach this extended list of capabilities and also to advance in the refinement of the ECM design.

1

In this document, we present the work conducted to achieve the following objectives associated with deliverable D8.2:

- a) refinement of requirements for the Logistics Contract Manager (task T8.1);
- b) refinement of conceptual design (task T8.2);
- c) initial assessment of the technical specification (task T8.2).

In addition, we anticipated the activities related to task T8.4 (demonstration of the ECM capabilities) and we also describe the initial demonstrator implementation of ECM capabilities which supported the process of refining the requirements for the ECM.

This document does not describe additional work done in this deliverable associated with the refinement of generic enablers, which is part of task 8.3 “Technological Alignment with FI PPP Core Platform”. The actual results of this work are provided in D9.2.

2

This deliverable is organized as follows.

Section 2 describes the methodology used during the development of the work reported in this document. The strong collaboration between ICT and domain partners is one great asset in Finest project. The employment of proper methodologies is vital to facilitate the information exchange.

The development of demonstrators was one of the methods used to improve this exchange of information. Based on the challenges identified in WP2 (more details in Deliverable D2.3), a list of possible demonstrators was defined during the Early Prototype Meeting¹ (more details in Deliverable D3.2). The demonstrators help to better identify domain requirements for each one of the Finest modules. In fact, each core technical WP was assigned to develop one of the demonstrators. In the case of WP8, we developed and described in Section 3 of this document the demonstrator related to the “Late Booking Cancellation” challenge.

Based on the information gathered from the experience with the demonstrators and the interaction with the domain partners, we introduce in Section 4 the refinement of the technical requirements associated with the ECM.

Section 5 presents the refinement of the conceptual design. The improvements of the high level architecture are described as well as the refinements in terms of alignment and interactions among ECM and the other modules of Finest platform.

Section 6 describes initial assessments related to the technical specification of the ECM. We discuss how we can use results from the eFreight project as a base line for the information model to be used by WP8. In addition, we also describe the work done towards understanding how USDL can be used to represent the online contract information.

Finally, Section 7 comprises the conclusions and roadmap to be followed by WP8 to progress on its objectives.

¹ Amsterdam at AFKL Facilities in January, 2012.

3

WP1 (‘Domain Characterization and Requirements Analysis’) is concerned with the identification of business requirements in the Transport & logistics domain. Those requirements contribute to the overall design goals and rationale of the E-Contracting Module in WP8.

WP2 (‘Use Case Specification’) provides use case scenarios for Finest project. Those scenarios serve as basis for the refinement of the business requirements identified in WP1, and serve for the demonstration, test, and evaluation prototypes associated with the technical WPs, such as WP8. These scenarios are built on main challenges, thus closely related to the demonstrators and technical specifications developed in cooperation with the work done in the technical WPs.

WP3 (‘Solution Design and Technical Architecture’) provides the overall design and architecture of the Finest platform. This means that the core technical modules, i.e., design of the solutions in WP5 – WP8, must follow the definitions of WP3 in order to be integrated in the Finest platform.

WP4 (‘Experimentation Environment’) is concerned with providing the experimental infrastructure for demonstrating the use cases scenarios described in WP2. During the demonstration process the elements required by the WP8 module will also need to be considered by the experimental infrastructure.

The technical WPs (WP5, WP6, and WP7; respectively, ‘Business Network Collaboration’, ‘Proactive Event Driven Monitoring’, ‘Transport Planning and Replanning’) are not isolated entities in the overall Finest platform. In this sense, WP8 is mainly associated with WP5 and WP7, because information about contracts must flow specially among the e-contracting, business collaboration and planning modules.

WP9 (‘FI PPP Alignment’) is responsible for the alignment of the Finest project with the FI PPP Program. WP8 is related with WP9 in the sense that it helps on the identification of GEs associated with e-contracting aspects and also in possible technical specification alignments to better support the use of the GE within WP8.

2 Methodology

The work developed in WP8 uses information from both WP1 (Domain Characterization and Requirements Analysis) and WP2 (Use Case Specification). The former provides information related to the business requirements and the latter provides insights of challenges and demanded ICT support for conducting T&L services.

The combination of information from these two WPs is extremely important to help on developing the specific requirements and technical design associated with the ECM to be developed within WP8 scope. Currently, WP1 identified four categories of business requirements (more details in D1.3) and WP2 identified 21 use case general requirements (more details in D2.3) which are related to the business requirements. The complete list of use case requirements with their mapping to the Finest modules is provided in D3.2. For the purpose of this report we highlight in Table 1 the use case requirements directly associated with the ECM.

Table 1 - Use Case Requirements associated with ECM

UCR ID_WP8	UCR ID According to WP2	List of use case requirements related to ECM in WP8 extracted from D3.2
1	1 and 2	Enable search on the Spot Market to find alternatives
2	5	Provide information about contract usage
3	9 and 13	Provide matchmaking of transport offers and demands
4	1 and 13	Provide search mechanisms for finding transport services matching a transport demand within established contract and potential new partners
5	1	Provide facilities to get contract information
6	7 and 16	Providing consistency checks of the contract attributes
7	13	Support the creation of T&L Service Descriptions

The use case requirements listed in the Table 1 help to support the initial technical requirements listed in D8.1 and also introduce the need for defining new technical requirements able to support the ones coming from the use cases.

In addition of using the use case requirements for the refinements of ECM, we also developed and used demonstrators as a method to improve the exchange of information between ICT and domain partners in Finest project.

Based on the challenges identified in WP2, a list of possible demonstrators was defined. These demonstrators help to better identify domain requirements for each one of the Finest modules. In fact, those challenges and demonstrators were discussed during the Early Prototype Meeting of Finest project. The result of these discussions was the assignment of the development one demonstrator for each core technical WP. In the case of WP8, we identified the “Late Booking Cancellation” challenge as a demonstrator (also called Demonstrator 1) which requires many of the capabilities offered by the ECM. It is important to notice that one demonstrator may require more than one core module from Finest. Nevertheless, we focused only on the development of the Demonstrator 1 and we contributed to the discussions of other demonstrators.

For the development of the Demonstrator 1, we conducted many rounds of interactions with the domain partners in order to gather the feedback necessary to refine the demonstrator, understand what are the functionalities needed by the domain, and express in a visual way how the ICT solutions can contribute with innovations in the T&L domain. The main details of the demonstrator developed in WP8 are described in the next section.

3 Demonstrator 1: Addressing Late Booking Cancellation Challenge

The “Late Booking Cancellation” challenge is related to finding solutions to remediate the cancellation of booked capacity in very short time windows. This means that the cancellations happens or become visible only few hours before the cut-off time for loading or accepting the goods.

This is a problem that affects both large players and SME in T&L. Nevertheless, late cancellation of booking capacity under long term agreements tends to be susceptible to penalties agreed in the contract. This is not true for parties operating in Spot Markets.

Because of the absence of long term agreements and established relationship with other partners, parties operating in the Spot Market model tend to suffer great losses with late booking cancellations. Current ICT systems are not able or are very limited to assist on the identification of alternatives to cover the cancelled capacity and avoid the execution of transport with empty containers, for example.

Both large players and SMEs can be affected by late booking cancellations. Nevertheless, SMEs are the typical type of parties that operate mainly in a Spot Market model. Therefore, alternatives to handle late booking cancellations can bring benefits to all types of parties and especially it can largely impact SMEs.

The Demonstrator 1 is associated with the use case of fish export from Norway to Brazil (details in D2.3). In this case, NCL (the shipping operator, offering container feeder services) operates in a spot market model. It receives booking orders that are not associated with contracts (thus, not enforcing penalties in case of cancellation) and they are susceptible to cancellation of booked capacity right before the vessel starts to be loaded. Below we describe the details of the demonstrator developed to deal with this challenge.

<i>General Information</i>	
<i>Element</i>	<i>Description</i>
Title	Demonstrator 1
As-is scenario	<p>Use case 1 describes the shipment of dried/frozen fish from Norway to Brazil. This process involves two different stakeholders: the fish producer² and the shipping line. The fish producer books space on a shipping line’s vessel in order to get his/her fish transported from Norway to Brazi³l. From now on both stakeholders will only be called using their role names which are shipper for the fish producer and carrier for shipping line.</p> <p>In the as-is scenario the major issue is the fact that bookings on a vessel made by a shipper are not binding legal contracts which means that they are not binding to the shipper. In sea transport contracts are represented by waybills which are transported directly with the cargo. As a result, there exist no long term contract between shipper and carrier as long as the cargo does not reach the port terminal, and more precisely as long as the cargo is not uploaded onto the vessel. That means that shippers are not punished or charged if the bookings are canceled last minute or even if the cargo never shows up at the port.</p> <p>Because shippers encounter a major lack of planning reliability (for fish producers it is not possible to predict how much fish will be caught, how much will be sent and when) they regularly book more space than needed. In addition, to be absolute sure that they can ship all the cargo, they are booking not only space at one carrier but on several. Those bookings without a real need of shipment are called dummy bookings⁴. Because there are no contract penalties for shippers (as described above) they are not interested in cancelling unneeded space early or they just forget to cancel it. That generates major issues for the carriers – last-minute cancellations and no show of cargo. Because of those carriers encounter a major lack of planning reliability and solutions that find out alternatives for late booking cancellations. In case of shipping lines this</p>

² We refer to costumers as “fish producer”. More details about the stakeholders of this use case can be found in D2.3.

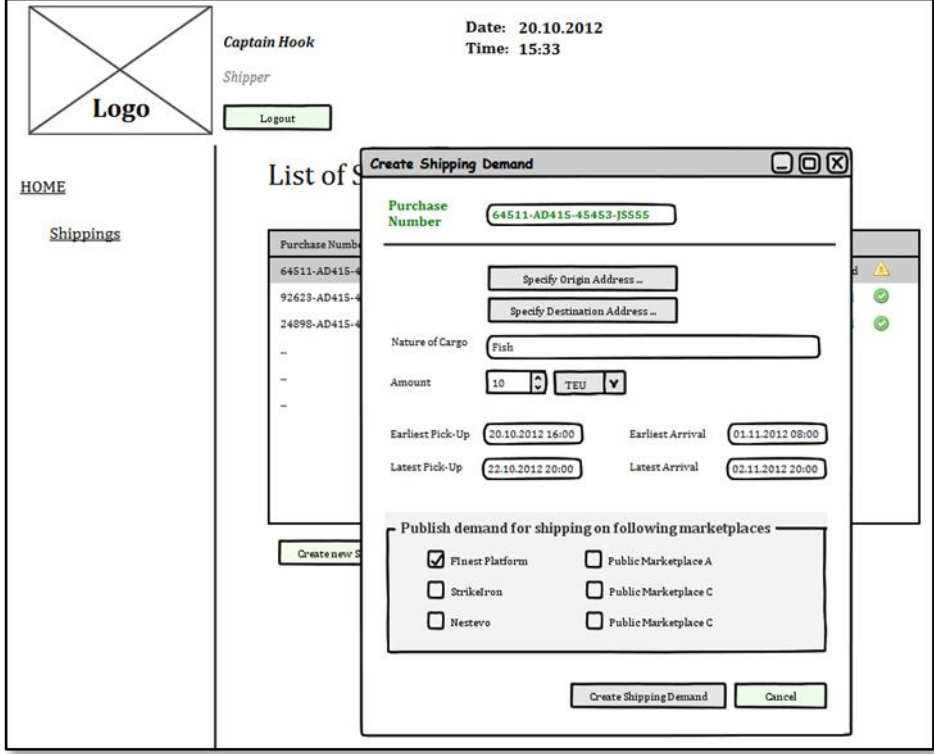
³ It is important to notice that NCL covers the feeder part of the voyage, not the complete voyage. This demonstrator, from the point of view of NCL, is actually focusing on booking of container shipping services from Norway to Rotterdam, but the same principle is valid for booking of transport from Norway to Brazil.

⁴ It is important to notice that it is not possible to prove the existence of “dummy bookings”, but the existence of late booking cancelations sometimes is perceived as such type of situation

<p>results regularly in vessels driving empty.</p>	
<p>Addressed main challenge</p>	<ul style="list-style-type: none"> • Dummy bookings, • Last-minute cancellations • No show of cargo
<p>To-be scenario</p>	<p>In the to-be scenario it is envisioned that shippers use the Finest platform to create shipping demands on Finest and/or public marketplaces. They get shipping offers from carriers and can reserve the offered vessel capacity either by prepaying or by simply reserving spaces. Prepaying will result in confirmed capacity reservations while a normal reservation will only putting the cargo on a waiting list which will be used if not enough prepaid reservations have been made for the vessel. Additionally, shippers get the ability to directly change the amount of a made reservation, if needed, and carriers get the possibility to cancel normal reservations.</p> <p>In Advance, the carriers shall get the possibility to directly find replacements for canceled shipments using the shipping demands published to the Finest platform or other public logistics marketplaces. They can react on the cancellations either by finding replacements for single cancellations or use a screen to find enough shipments to fill the entire free space of a vessel. The first possibility includes also the possibility to find shipping demands which include locations nearby the ports instead of just taking into account shipping demands where origin and destination are ports on the vessels tour. In case of locations next to the ports the carrier can directly contact a freight forwarder out of the Finest platform who will be responsible for organizing the additional transportation route(s). Additionally, the carrier will get an aggregated view where he/she can see how much cargo has been reserved but has not arrived so he/she can take actions if it is expected that too much cargo will not arrive in time.</p>
<p>Demonstrator approach</p>	<p>Envisioned in the demonstrator is that carriers can react faster on last-minute cancellations in order to be still able to get their vehicles (vessels) filled with cargo. They should be enabled to directly react on cancellations and fill the cancelled space with shipping demands published on the Finest platform or other public logistics marketplaces.</p> <p>Additionally, demonstrator 1 envisions a two-level reservation process to reduce the high risk of dummy bookings:</p>


	<ul style="list-style-type: none"> Normal Reservations A normal reservation represents a booking as it is today, but the <u>carrier</u> does only confirm under reserve and has also the opportunity to cancel the reservation. Additionally, the carrier can request from the shipper a confirmation for a normal reservation some days before shipment. If the shipper confirms it is mandatory that he/she pays in advance which turns the reservation into a prepaid reservation. Prepaid Reservations (confirmed) If a shipper prepays for a reservation he can be sure that space on the vessel will be available for his/her cargo. Incentives (like reduction in the price) could be offered to the shippers to encourage the use of the prepaid reservation and thus reduce the risk of late booking cancellations. <p>If shippers have incoming offers from carrier they can choose from the beginning if they want to accept them using a normal reservation or a prepaid reservation. Of course a shipper can also reject an offer.</p> <p>Publishing shipping demands onto the Finest platform and other public marketplaces makes it additionally possible for carriers to find cargo to fill their vehicles. Publishing demands onto the Finest platform has the advantage that services and demands will be described using USDL (Unified Service Description Language) that makes them comparable. Additionally, shipping demands are described using a unique purchase number which makes it possible to identify demands published on several marketplaces as the same.</p>
Involved modules	ECM, EPM, TPM
Lead	Stephan Heyne (SAP), Clarissa Marquezan (UDE), Oyvind Olsen (NCL)
Involved partners	SAP, UDE, NCL, MRTK, KN, KOC, AFKL

<i>Detailed Information</i>	
<i>Element</i>	<i>Description</i>
<i>Demonstrator</i>	Demonstrator 1

<i>title</i>	
<i>Screen name</i>	Creation of shipping demand
<i>Screenshot</i>	
<i>Screen purpose</i>	<p>Screen for role shipper. Shows a list of all shipping demands from the carrier (in the background) and a pop-up for creating a new shipping demand. Enables the shipper to publish a new demand directly on one of the public logistic marketplaces and/or on the Finest platform.</p>
<i>Detailed description</i>	<ul style="list-style-type: none"> • The pop-up will be shown by clicking on the button “Create new shipping demand” underneath the list of shipments (in the background) of the shipper. • The shipper needs to add important information regarding the shipping demand like: <ul style="list-style-type: none"> ○ Origin & destination address ○ Time frame for pick-up and time of arrival ○ Nature of cargo ○ Amount and unit • Below the information in the gray box the shipper can select to which marketplaces and platforms the demand will be published • Important is that all demands will be published using a unique purchase number so that one shipping demand published on several marketplaces

can be identified as the same demand instead being considered as several different demands.

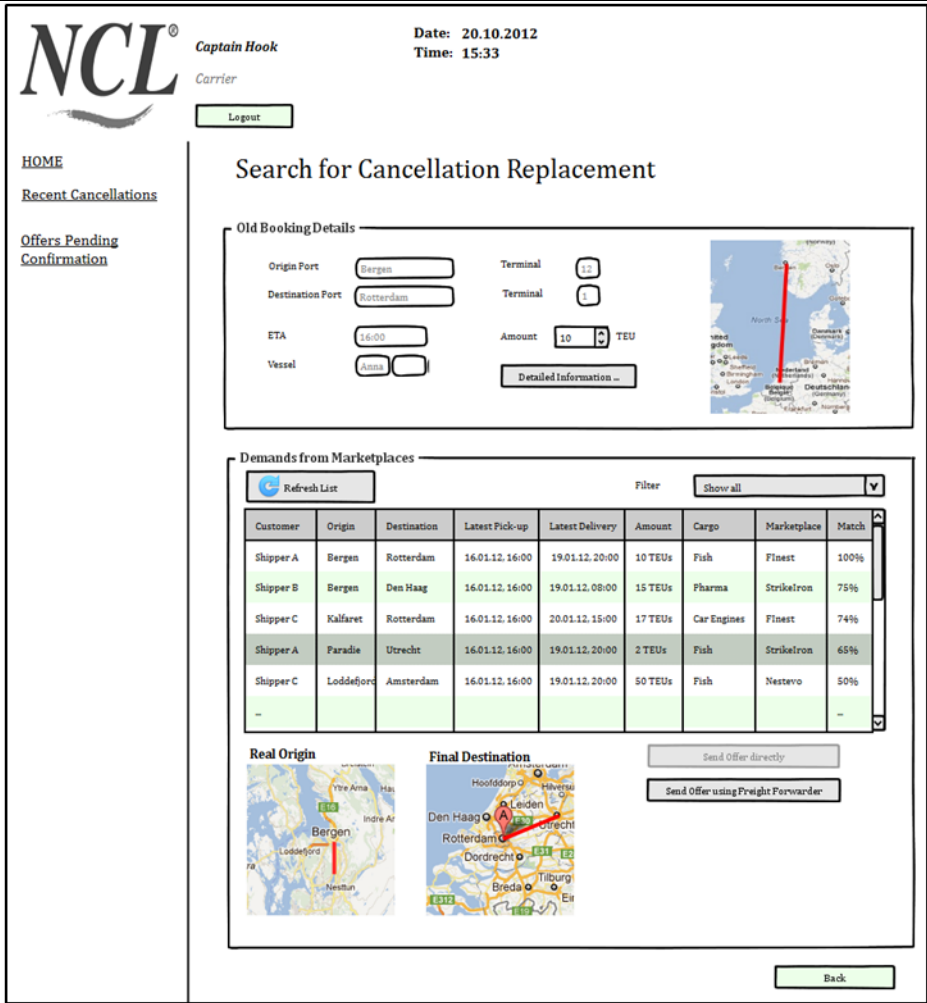
Detailed Information

Element	Description
Demonstrator title	Demonstrator 1
Screen name	Overview of reservations and offers for one concrete voyage (demand)
Screenshot	 <p>The screenshot displays a web interface for managing shipping reservations. It includes a header with the shipper 'Captain Hook', a date of 20.10.2012, and a time of 15:33. The main content is divided into three sections: 'List of Pre-Paid Shipments', 'List of Reserved Shipments', and 'Received Offers'. Each section contains a table with columns for Carrier, Origin Port, Destination Port, Latest Turn-up, Amount, Price, and Status. The 'List of Reserved Shipments' table shows four entries with various statuses like 'please confirm', 'reserved', and 'Canceled by Carrier'. The 'Received Offers' table shows four offers with prices ranging from 1900€ to 3000€.</p>

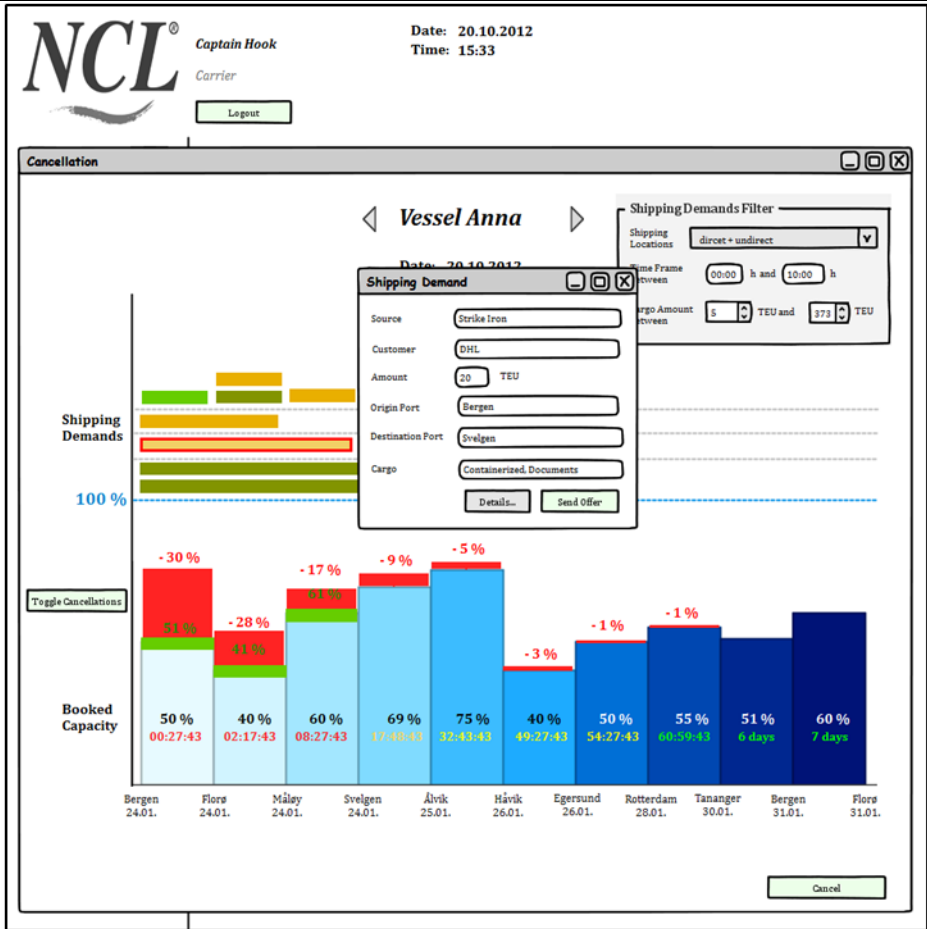
<i>Screen purpose</i>	Screen for role shipper. Gives the shipper an overview over incoming offers as well as made reservation and prepaid reservations for a specific shipment. This screen contains all relevant interactions between shipper and carrier regarding reservations (e.g. requests for confirmation). Here shippers can decide how they want to react on offers - reject, normal reserve or reserve by prepaying.
<i>Detailed description</i>	<p>The screen is divided into four areas:</p> <ol style="list-style-type: none"> 1. On top of the page general information about the shipping (demand) are visible like purchase number, amount, origin and destination 2. Below the shipping details the list of prepaid reservations is displayed. Using the buttons below the table prepaid shippings can be: <ul style="list-style-type: none"> • Canceled and • Updated with a different amount 3. The third area is the list of reserved shipments. Most important is for each reservation is its status which is displayed in the last column and additionally visualized by an icon. So, the shipper can for example see if the carrier has requested a confirmation for a reservation or if the carrier even has canceled a reservation. Below the table tree buttons are available to: <ul style="list-style-type: none"> • Confirm a reservation (than it will disappear from the list of reserved shipments and will appear in the list of pre-paid shipments), • Cancel a reservation and • Update the amount of a reservation 4. The last area of this screen is the list of received offers. This is an inbox for incoming replies from carriers to the shipping demand and gives the shipper the possibility to react on them. The table shows that carriers can offer different prices for prepaid reservations and normal reservations. For each column an icon indicates what the offer with the lowest price is. Using the buttons below the table the shipper can react on the offers. He/she can: <ul style="list-style-type: none"> • Reject offers, • Accept offers as a prepaid reservation using the prepaid price or • Accept offers as a normal reservation using the normal price (that price will still be valid later when the shipper confirms the reservation and turns it into a prepaid reservation).

Detailed Information																																																																																																					
Element	Description																																																																																																				
Demonstrator title	Demonstrator 1																																																																																																				
Screen name	Capacity and cancellation overview																																																																																																				
Screenshot	<p>The screenshot displays the NCL Captain Hook interface. At the top, it shows the date 20.10.2012 and time 15:33. A 'Logout' button is visible. The main section is titled 'Recent Cancellations' and contains a table with the following data:</p> <table border="1"> <thead> <tr> <th>Vessel</th> <th>Lastest Gate Closing Time</th> <th>Time to Fix</th> <th>Total Vessel Capacity</th> <th>Total Amount Booked</th> <th>Cargo Arrived at Port</th> <th>Cargo not Arrived at port</th> <th>Cargo Canceled</th> <th>Currently free Capacity</th> </tr> </thead> <tbody> <tr> <td>Anna</td> <td>Today, 16:15</td> <td>42 min</td> <td>373 TEU</td> <td>100% 373 TEU</td> <td>50% 187 TEU</td> <td>20% 75 TEU</td> <td>30% 112 TEU</td> <td>30% 112 TEU</td> </tr> <tr> <td>Carina</td> <td>Today, 22:00</td> <td>06:27 h</td> <td>323 TEU</td> <td>90% 297 TEU</td> <td>42% 136 TEU</td> <td>30% 97 TEU</td> <td>20% 65 TEU</td> <td>30% 91 TEU</td> </tr> <tr> <td>Emma</td> <td>Today, 23:30</td> <td>07:57 h</td> <td>323 TEU</td> <td>100% 323 TEU</td> <td>40% 130 TEU</td> <td>45% 146 TEU</td> <td>15% 49 TEU</td> <td>15% 49 TEU</td> </tr> <tr> <td>Tina</td> <td>Tomorrow, 07:30</td> <td>15:57 h</td> <td>458 TEU</td> <td>95% 435 TEU</td> <td>33% 152 TEU</td> <td>47% 216 TEU</td> <td>15% 69 TEU</td> <td>20% 92 TEU</td> </tr> <tr> <td>Lady Clarissa</td> <td>Tomorrow, 10:30</td> <td>18:57 h</td> <td>323 TEU</td> <td>100% 323 TEU</td> <td>30% 97 TEU</td> <td>50% 162 TEU</td> <td>20% 65 TEU</td> <td>20% 65 TEU</td> </tr> <tr> <td>Celina</td> <td>Tomorrow, 18:00</td> <td>1 day, 02:27 h</td> <td>677 TEU</td> <td>100% 677 TEU</td> <td>20% 136 TEU</td> <td>72% 488 TEU</td> <td>8% 54 TEU</td> <td>8% 54 TEU</td> </tr> <tr> <td>North Express</td> <td>22.10.2012, 18:30</td> <td>2 days, 02:57 h</td> <td>592 TEU</td> <td>100% 592 TEU</td> <td>10% 59 TEU</td> <td>90% 533 TEU</td> <td>0%</td> <td>0%</td> </tr> </tbody> </table> <p>Below this table is a section for 'Cancellations Anna' with a table showing specific cancellation events:</p> <table border="1"> <thead> <tr> <th>Cancellation Time</th> <th>Customer</th> <th>Origin Port</th> <th>Destination Port</th> <th>Gate Closing Time</th> <th>Time to Fix</th> <th>Amount</th> </tr> </thead> <tbody> <tr> <td>Yesterday 20:30</td> <td>Shipper A</td> <td>Bergen</td> <td>Ålvik</td> <td>Today, 16:00</td> <td>27 min</td> <td>10 TEUs</td> </tr> <tr> <td>Today 10:14</td> <td>Shipper B</td> <td>Bergen</td> <td>Ålvik</td> <td>Today, 16:15</td> <td>42 min</td> <td>15 TEUs</td> </tr> <tr> <td>Yesterday 09:04</td> <td>Shipper C</td> <td>Ålvik</td> <td>Haugesund</td> <td>Today, 16:30</td> <td>57 min</td> <td>50 TEUs</td> </tr> </tbody> </table> <p>At the bottom of the screenshot, there are buttons for 'Search for Alternative', 'New Offer', and 'Check Contract', along with a note: '* The Gate Closing Time can differ for the same vessel because a vessel can be served by more than one gate.'</p>	Vessel	Lastest Gate Closing Time	Time to Fix	Total Vessel Capacity	Total Amount Booked	Cargo Arrived at Port	Cargo not Arrived at port	Cargo Canceled	Currently free Capacity	Anna	Today, 16:15	42 min	373 TEU	100% 373 TEU	50% 187 TEU	20% 75 TEU	30% 112 TEU	30% 112 TEU	Carina	Today, 22:00	06:27 h	323 TEU	90% 297 TEU	42% 136 TEU	30% 97 TEU	20% 65 TEU	30% 91 TEU	Emma	Today, 23:30	07:57 h	323 TEU	100% 323 TEU	40% 130 TEU	45% 146 TEU	15% 49 TEU	15% 49 TEU	Tina	Tomorrow, 07:30	15:57 h	458 TEU	95% 435 TEU	33% 152 TEU	47% 216 TEU	15% 69 TEU	20% 92 TEU	Lady Clarissa	Tomorrow, 10:30	18:57 h	323 TEU	100% 323 TEU	30% 97 TEU	50% 162 TEU	20% 65 TEU	20% 65 TEU	Celina	Tomorrow, 18:00	1 day, 02:27 h	677 TEU	100% 677 TEU	20% 136 TEU	72% 488 TEU	8% 54 TEU	8% 54 TEU	North Express	22.10.2012, 18:30	2 days, 02:57 h	592 TEU	100% 592 TEU	10% 59 TEU	90% 533 TEU	0%	0%	Cancellation Time	Customer	Origin Port	Destination Port	Gate Closing Time	Time to Fix	Amount	Yesterday 20:30	Shipper A	Bergen	Ålvik	Today, 16:00	27 min	10 TEUs	Today 10:14	Shipper B	Bergen	Ålvik	Today, 16:15	42 min	15 TEUs	Yesterday 09:04	Shipper C	Ålvik	Haugesund	Today, 16:30	57 min	50 TEUs
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Screen purpose	Screen for role carrier. Gives on one hand an overview of the booked capacity and arrived cargo for each vessel in order to give carriers a better overview of their vehicles and on the other hand a list of cancellations for one selected vessel.																																																																																																				

<p><i>Detailed description</i></p>	<p>This screen contains two areas:</p> <ol style="list-style-type: none"> 1. In the upper area of the screen an overview of the capacities of all vessels is shown but only for the next transportation leg of their tours. Among other for each vessel the following information is displayed: <ul style="list-style-type: none"> • Total vessel capacity, • Cargo arrived at port, • Cargo not arrived at port so far (can be used to guess how many bookings may be dummy bookings), • Cargo canceled by shipper, • Total cargo amount booked (represents the sum of the cargo arrived at port, the cargo not arrived and the canceled reservations) and • Currently free capacity (represents the sum of the currently canceled capacity together with the capacity not booked at all). <p>The button below the table shows screen “Capacity based search for shipping demands per vessel” which will be described later.</p> 2. If a vessel in the first table has been selected then the table below will be displayed showing all cancellations received for the selected vessel. One column of the table shows the “time to fix” of the current cancellation. This value is calculated based on the close-time, or cut-off time, or booking-stop-time (different names are used depending on T&L provider type, e.g., sea or air, etc.). In the case of this sea transport and specifically in this demonstrator, one vessel can be served by several port gates. Thus the time to fix can differ even by cancellations for the same vessel. <p>Buttons below the second table are used to:</p> <ul style="list-style-type: none"> • Show contact details regarding the cancellation (e.g. cancellation restrictions from terms and conditions of the carrier), • Sending the shipper a new offer (discount, suggestion for different amount, suggestion for later shipment) and • Searching for cancellation replacements from Finest platform and public marketplaces. This button will show screen “Search for single cancellation replacements” which will be described later.
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<i>Detailed Information</i>																																																							
<i>Element</i>	<i>Description</i>																																																						
<i>Demonstrator title</i>	Demonstrator 1																																																						
<i>Screen name</i>	Search for single cancellation replacements																																																						
<i>Screenshot</i>	 <p>Old Booking Details</p> <p>Origin Port: <input type="text" value="Bergen"/> Terminal: <input type="text" value="10"/> Destination Port: <input type="text" value="Rotterdam"/> Terminal: <input type="text" value="1"/> ETA: <input type="text" value="16:00"/> Amount: <input type="text" value="10"/> TEU Vessel: <input type="text" value="Anna"/> <input type="button" value="Detailed Information ..."/></p> <p>Demands from Marketplaces</p> <table border="1"> <thead> <tr> <th>Customer</th> <th>Origin</th> <th>Destination</th> <th>Latest Pick-up</th> <th>Latest Delivery</th> <th>Amount</th> <th>Cargo</th> <th>Marketplace</th> <th>Match</th> </tr> </thead> <tbody> <tr> <td>Shipper A</td> <td>Bergen</td> <td>Rotterdam</td> <td>16.01.12. 16:00</td> <td>19.01.12. 20:00</td> <td>10 TEUs</td> <td>Fish</td> <td>Finest</td> <td>100%</td> </tr> <tr> <td>Shipper B</td> <td>Bergen</td> <td>Den Haag</td> <td>16.01.12. 16:00</td> <td>19.01.12. 08:00</td> <td>15 TEUs</td> <td>Pharma</td> <td>Strikelron</td> <td>75%</td> </tr> <tr> <td>Shipper C</td> <td>Kalfaret</td> <td>Rotterdam</td> <td>16.01.12. 16:00</td> <td>20.01.12. 15:00</td> <td>17 TEUs</td> <td>Car Engines</td> <td>Finest</td> <td>74%</td> </tr> <tr> <td>Shipper A</td> <td>Paradie</td> <td>Utrecht</td> <td>16.01.12. 16:00</td> <td>19.01.12. 20:00</td> <td>2 TEUs</td> <td>Fish</td> <td>Strikelron</td> <td>65%</td> </tr> <tr> <td>Shipper C</td> <td>Loddefjord</td> <td>Amsterdam</td> <td>16.01.12. 16:00</td> <td>19.01.12. 20:00</td> <td>50 TEUs</td> <td>Fish</td> <td>Nestevo</td> <td>50%</td> </tr> </tbody> </table> <p>Real Origin Final Destination</p> <p><input type="button" value="Send Offer directly"/> <input type="button" value="Send Offer using Freight Forwarder"/></p> <p><input type="button" value="Back"/></p>	Customer	Origin	Destination	Latest Pick-up	Latest Delivery	Amount	Cargo	Marketplace	Match	Shipper A	Bergen	Rotterdam	16.01.12. 16:00	19.01.12. 20:00	10 TEUs	Fish	Finest	100%	Shipper B	Bergen	Den Haag	16.01.12. 16:00	19.01.12. 08:00	15 TEUs	Pharma	Strikelron	75%	Shipper C	Kalfaret	Rotterdam	16.01.12. 16:00	20.01.12. 15:00	17 TEUs	Car Engines	Finest	74%	Shipper A	Paradie	Utrecht	16.01.12. 16:00	19.01.12. 20:00	2 TEUs	Fish	Strikelron	65%	Shipper C	Loddefjord	Amsterdam	16.01.12. 16:00	19.01.12. 20:00	50 TEUs	Fish	Nestevo	50%
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<i>Screen purpose</i>	Screen for role carrier. This screen is used to find replacements for single cancellations. The aim is to find the “100% match” for a cancelled reservation, which means from the same port to the same port and with the exact same amount, if possible. This screen will be mainly used if the vessel is totally filled with prepaid reservations and only single reservations are canceled. Additionally, also shipping demands are displayed where vessel would only be one sub-leg instead of being the only transportation leg.																																																						

<p><i>Detailed description</i></p>	<ul style="list-style-type: none"> • The top area of the screen contains information of the original reservation which has been cancelled and for which a replacement is searched for. • Additionally on top is a map which displays from which to which port the reservation has been made • In the lower area shipping demands from different public marketplaces and the Finest platform are displayed including information like: <ul style="list-style-type: none"> ○ Origin & destination ○ Latest pick-up & delivery ○ Amount ○ Nature of cargo • Below the table two maps are displayed. One displays the real origin of the cargo and one the real destination of it. That shows for example if the cargo comes from a city or town next to the city where the port is located. • Shipping demands can be selected in the table and in case of a direct shipping from port to port an offer can directly be sent to the shipper by using the “send offers directly” button. In case of indirect shipping (where the cargo at first needs to be transported to the port) a freight forwarder needs to be contacted to handle the additional routes. In that case the “send offer using freight forwarder” button needs to be used.
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<i>Detailed Information</i>	
<i>Element</i>	<i>Description</i>
<i>Demonstrator title</i>	Demonstrator 1
<i>Screen name</i>	Capacity based search for shipping demands per vessel
<i>Screenshot</i>	 <p>The screenshot shows the NCL Captain Hook interface. At the top, it displays the carrier name 'NCL Captain Hook' and the date '20.10.2012' at '15:33'. A 'Logout' button is present. The main window is titled 'Cancellation' and shows details for 'Vessel Anna' on '20.10.2012'. It features a 'Shipping Demands Filter' with options for 'Shipping Locations' (direct + indirect), 'Time Frame between' (00:00 h and 10:00 h), 'Cargo Amount between' (5 TEU and 373 TEU), and a 'Toggle Cancellations' button. The central chart shows 'Booked Capacity' and 'Shipping Demands' for various ports: Bergen 24.01., Flore 24.01., Malay 24.01., Sveigen 24.01., Alvik 25.01., Havik 26.01., Egersund 26.01., Rotterdam 28.01., Tananger 30.01., Bergen 31.01., and Flore 31.01. The chart includes a 100% capacity line and shows percentage changes for each segment.</p>
<i>Screen purpose</i>	Screen for role carrier. Displays the capacities of a vessel between the single ports on the tour and the cancellation rate for each part of the tour. Displays single shipping demands on top of the chart and shows how the capacity would change on selection of a demand. Displays details to each demand and enables sending offers for selected demands.
<i>Detailed description</i>	<ul style="list-style-type: none"> The chart represents the capacity of one vessels between the stops on the vessel's tour incl.: <ul style="list-style-type: none"> Currently reserved capacity (graduated blue colors bar),

	<ul style="list-style-type: none">○ Canceled capacity (red bar; shall show the problem of late booking cancellations) and○ A count-down timer per transportation leg which shows the left “time to fix” cancellations and the short time to react● On top of the chart single shipping demands from Finest platform and public marketplaces are displayed as rectangles. Clicking on one will show:<ul style="list-style-type: none">○ A popup with details regarding the shipment like capacity, nature of cargo, destination port and origin port○ How the currently reserved capacity will be affected if the demand’s cargo would be shipped (green bars on top of blue bars).● Additionally the screen contains a filter area in the upper right which makes it possible to filter e.g. by direct shipping (directly from port to port) or by amount
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4 Refinement of Technical Requirements

Based on the use case requirements, the experience of developing and discussing the demonstrators we introduce a refined set of technical requirements that complement and sum up to the initial technical requirements listed in D8.1. Below in Table 2, we present the refined list of technical requirements associated with the ECM. The total list of use case requirements and their association to the Finest core modules can be found in Section 3.2 in D3.2. The use case requirements ID not mentioned in this table were already covered by the initial requirements provided in D8.1.

Table 2 - List of technical requirement refinements for E-Contracting Module

Tec. Req. ID	Name	Description	Rationale	Related to UCRID_WP8
TR11	Online Contract lifecycle Management	There must be mechanisms for managing the lifecycle of contracts. This includes, creation, update.	There are solutions for online contracts but these solutions are isolated from the actual execution of the T&L contracts. Thus, it is necessary to provide to integrate and provide this lifecycle management.	5
TR12	Notification of contract expiration	There must be mechanisms to automatically inform the humans about expiration of contracts	Avoid human intervention for this type of simple action.	2
TR13	Contract Usage Update	There must be mechanisms to keep the information updated about the usage of some attributes of the contract (e.g., for capacity-based or blanket contracts).	Currently there is no online and automatic mechanism to keep track of this type of usage information. For example, the total capacity agreed in the blanket contract	2
TR14	Online and real time consistency check of booked SLOs against contracted SLOs	There must be mechanisms to guarantee, in the case of booking associated with long term, that the booked SLOs is consistency with the values agreed in the contract	Today there are no mechanisms to check in an online and real-time manner the information of booked T&L services against contract information. This is currently done manually and in between large intervals of time (e.g., 6 months).	6
TR15	Online consistency check of executed T&L service versus booked SLOs	There must be mechanisms to execute the online check whether the execution of a booked service is compliant with the booked SLOs.	Today there are no online and automated mechanisms to identify discrepancies on the SLOs of executed T&L services versus the contracted and booked SLOs.	6

Tec. Req. ID	Name	Description	Rationale	Related to UCRID_WP8
TR16	Creation of T&L Service Descriptions	There must be an automated mechanism to support the creation and announcement of T&L service description in marketplaces.	Today there is limited support for automatic creation of offers and demands in marketplaces.	7
TR17	Matchmaking support	There must be automated mechanisms to find service descriptions (offers and demands) that match according to established criteria.	The goal is to support to provide matchmaking in both ways, i.e., starting from the demands matching offers, and also offers matching demands.	3

5 Refinement of Conceptual Design

An initial high level architecture was defined and reported in D8.1. In this document we refine such architecture taking into account the refinements on the technical requirements. Figure 1 illustrates the refined high level architecture.

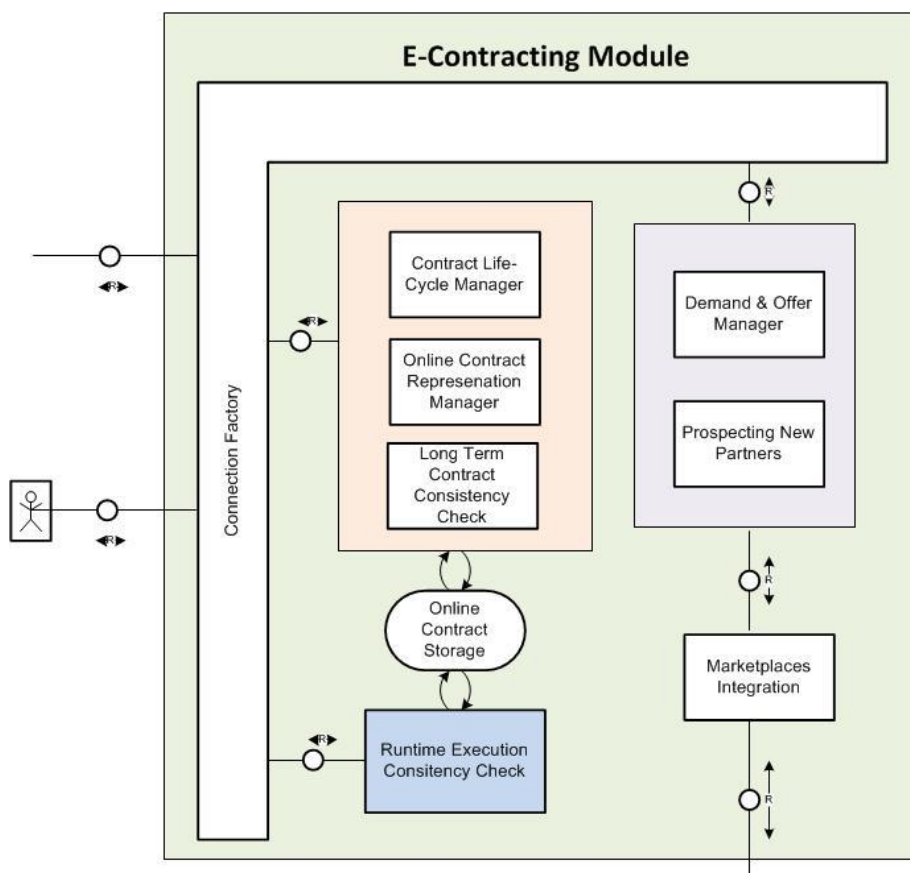


Figure 1 – Refinement of High Level Architecture of E-Contracting Module

The key architecture elements supporting the capabilities of ECM include:

- **Connection factory** – This is a module responsible to provide interface to the services provided by the ECM module. The interfaces can be accessed directly via users or by other systems using the functionalities of ECM.
- **Contract Lifecycle Manager** – This module is responsible to manage the creation, update and deletion of contracts. It is also responsible for monitoring and notifying expiration dates of contracts and needs for changing SLOs of contracts due to deviations
- **Online Contract Representation Manager** – It is responsible for providing search facilities among the established contracts as well as extraction of information of such contracts, for example to be used in a transportation planning process.
- **Long Term Contract Consistency Check** – This module is devoted to check whether a request for booking capacity associated with a long term contract is actually consistent with the term of the contract in that moment. This checking process should be done before actual execution of the T&L service. For example, the blanket contract associated with a booking “a” allows 2 days of transit time, nevertheless the negotiated booking (done during the planning process) states a transit time of 3 days. This is inconsistent with the long term contract and should be notified. The same logic is applied for total amount of transported goods, types of goods, etc.
- **Online Contract Storage** – Data repository for all established transport and logistics contracts. The information stored here is the one important to support the execution and checks of T&L services in an online and real-time fashion.
- **Runtime Execution Consistency Check** – This module is responsible for checking the actual SLOs of T&L service that are finished in order to check if these SLOs are consistent with the booked SLOs, which in their turn are consistent with the SLOs in contract. For example, the blanket contract associated with a booking “a” allows 2 days of transit time, the negotiated booking (done during the planning process) states a transit time of 2 days, nevertheless the actual transit time for this service was 3 days. This value is inconsistent with the agreed terms and should be automatically notified.
- **Demand and Offer Manager** – This module is defined in order to support the creation of demands and offers; the search for transport service descriptions; and execute the requested matchmaking process between offers and demands.
- **Prospecting New Partners** – This module is defined in order to support the discovery of new potential partners either for establishing long term contracts or finding partners in the Spot Markets.
- **Marketplaces Integration** – This module is designed to support the integration of information from marketplaces (inside and / or outside Finest and FI-WARE platforms).

In addition to the refining the high level architecture of the ECM module we also refined the information offered and required by the ECM.

- Offered information
 - Information about online attributes of T&L contracts/bookings most relevant for the execution of T&L services. Example: amount of goods to be transported, time-windows (e.g., pickup/dropoff time, transit time), source/destination, type of T&L service involved (e.g., sea, road, air)
 - Information about service provider (e.g., type of T&L service, routes, capacity of transport, supported type of cargo, time-windows)
 - Information about service consumer (e.g., source and destination, amount of cargo, type of cargo, time-windows)
- Required information
 - Information about changes on the booked T&L service before the execution of the transportation plan. Example: amount of goods to be transported, pickup/dropoff time, transit time
 - Information about the real amount of transported goods.
 - Information about the actual time-windows of the execution of a T&L service. Examples: time that vessel arrives and leaves the port; transit time actually used for the transportation in one leg (or door-to-door); actual pickup and dropoff time.

The details about the required and offered capabilities and interfaces of ECM in relationship to the other modules from Finest platform are described in the deliverable D3.2.

6 Initial Assessments on Technical Specification

The section describes some initial activities in order to support the detailed technical specification. To achieve such detailed specification it is necessary to have an understanding of the data model we can use in ECM. This section describes the assessment of using the information model from eFreight [1] related to the description of T&L services and the technological aspects of modelling contracts using USDL.

6

One of the capabilities of the ECM is to be able to handle offers and demands. For doing this, it is necessary to understand how such demands and offers will be described. Instead of starting the work of modelling such information from scratch we identified the potential of using the results of the eFreight Project [1] as a baseline for modelling the T&L offers and demands within ECM.

The overall picture of how the results from eFreight can be used in Finest is provided in deliverable D3.2 in Section 4.1.2. In the case of the ECM, we focused our analysis on the potentialities of the Transport Service Description (TSD) model defined by eFreight. More details about the TSD can be found in D7.2. This model is very complete and is able to represent the vital information for enabling the development of matchmaking process between

offers and demands. In addition, this model can also be used as a baseline that needs to be extended in order to support the representation of SLOs agreed in the contracts among parties.

2

In D8.1 we identified that for WP8 we will focus on the description of T&L services using the Unified Service Description Language (USDL). This decision has mainly been made because FI-WARE will provide special tool and technology support for USDL. Therefore, we can better exploit the tools and software produced in FI-WARE for the purposes of WP8. This section describes the initial work done in WP8 in order to identify the technical aspects of USDL that need to be considered in our work.

6.2.1 Usage of Linked USDL

One of the first changes we have to face was changing from the original version of USDL to Linked-USDL [2]. Between M6 and M12 FI-WARE decided to use Linked-USDL instead of the original version of USDL. Linked-USDL is a different version of USDL pushed by FI-WARE project team and based on RDF/linked Data. That means that data is described in triples instead of hierarchical XML structure like in the original version of USDL which is based on a Meta model. The new approach has been simplified compared to original USDL and has the advantage of simple integration of already existing RDF vocabularies. Therefore, also Finest will be built on top of the linked-USDL version from now on.

6.2.2 Existing USDL Tool and Technology Support

In order to examine the existing and planned tools and technologies provided by FI-WARE direct contact has been established to the responsible research team. So far only tool prototypes are available. Those are:

- For original version of USDL:
 - On one hand an enhanced editor exists based on the Eclipse integrated development environment (IDE) and
 - On the other hand, a light web editor based on HTML5 exists.
- For the linked-USDL version:
 - Only the light editor is available so far (see Figure 2).

As expected while testing the light editor for linked-USDL the Finest project team experienced that the editor is not ready to use because it encounters on one hand a lack of functionality needed to use it in a productive environment. On the other hand, it is expected that the existing editors (all of them) are too generic to be used by domain experts, especially because they require perfect knowledge of (linked) USDL. Additionally, usage of those editors would require a fixed set of terms to be used throughout the entire T&L domain if services shall be described in a comparable way.

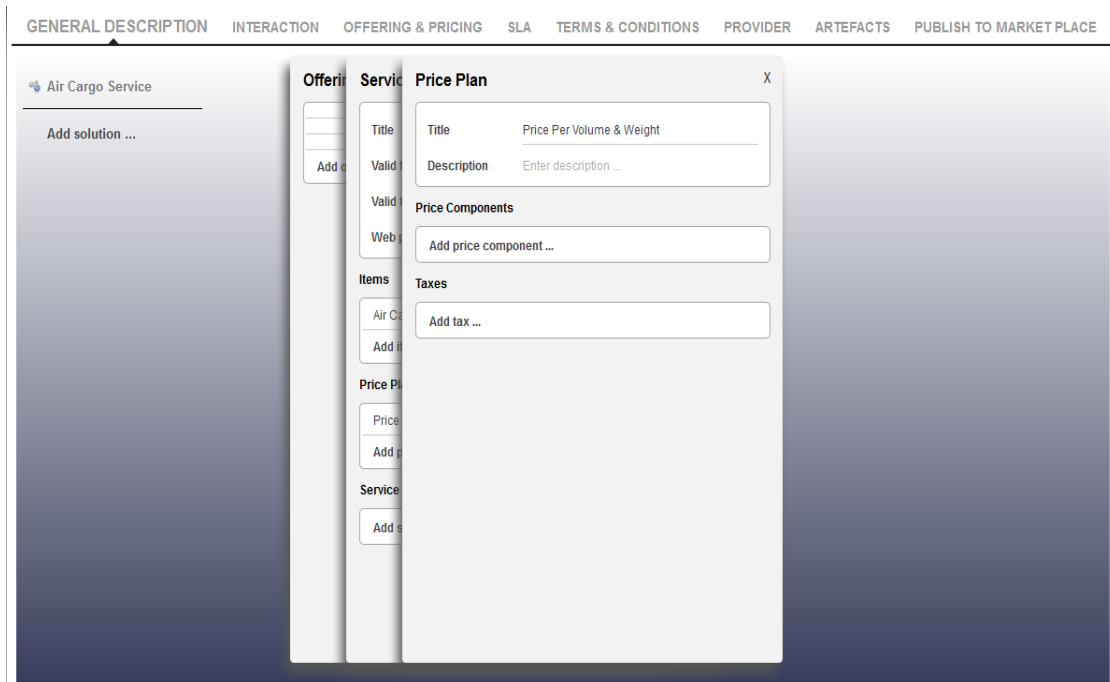


Figure 2 - Linked-USDL Editor provided by FI-WARE

6.2.3 Summary of T&L Service Modelling

During the period of this report, several attempts have been made to model T&L services in Linked USDL; as a result, it has been discovered that linked-USDL can be used to model T&L services without further (at least major) extensions. That means that the initial investigations are positive. Used for those attempts has been the light editor for linked-USDL.

The next steps are associated with the definition of the concrete modelling T&L services also taking into account the Transport Service Description (TSD) model from eFreight project. Additionally, the planned FI-WARE tool and technologies shall be used to develop a prototype and be integrated into the ECM architecture (if suitable).

7 Conclusions and Roadmap

This document describes the refinements in the technical requirements and the high-level architecture of the ECM. It is also presented in details one of the drivers for the refinements proposed to the ECM: the demonstrator of the late booking cancellation challenge. Such demonstrator in addition to the user case requirements and the discussions about the other demonstrators developed in the Finest project enabled a better understanding of the capabilities and functionalities to be designed and supported by the ECM.

We also provided an overview of some technical issues related that will support the detailed technical specification of the ECM. One of these technical issues was analysed in more details, i.e., the use of Linked-USDL, in order to enable a better alignment of the activities in WP8 and FI-WARE.

Based on the aforementioned, we are able to assure the accomplishment of the objectives of the deliverable D8.2, which were: (i) refinement of requirements for the Logistics Contract Manager (task T8.1); refinement of conceptual design (task T8.2); and initial assessment of the technical specification (task T8.2). In addition we also anticipated the activities related to task T8.4 (demonstration of ECM capabilities) with the implementation the Demonstrator 1.

The roadmap for the next achievements in the development of the ECM in WP8 includes:

- Detailed specification of the technical solution presented in the high level architecture;
- Define differentiation between SLA attributes of T&L contracts and QoS attributes that should be part of the offers and bids (e.g., during the execution of auctions);
- Model the SLA attributes using USDL model;
- Model the offers and bids using as baseline the TSD model;
- Identify which kind attributes in each contract type are negotiable or not;
- Verify the need of further possible GE requests.

8 References

- [1] eFreight Project . Accessed March 2012. Available at: <http://www.efreightproject.eu/default.aspx?articleID=18749&heading=The%20Project>
- [2] Linked-USDL. Accessed March 2012. Available at: <http://linked-usdl.org/>