FInest – **F**uture **In**ternet **e**nabled optimi**s**ation of **t**ransport and logistics networks

D2.5

FINAL USE CASE SPECIFICATION AND PHASE 2 EXPERIMENTATION PLAN

Project Acronym	FInest	
Project Title	Future Internet enabled optimisation of transport and logistics networks	
Project Number	285598	
Workpackage	WP2 USE CASE SPECIFICATION	
Lead Beneficiary	MARINTEK	
Editors	Agathe Rialland	Marintek
Contributors	Åsmund Tjora	Marintek
	Hande Koç	Arçelik
	Evert-Jan van Harten	Air France-KLM Cargo
	Øyvind Olsen	NCL
	Tor Knutsen	Port of Ålesund
	Michael Zahlmann	Kuehne+Nagel
	Jan Arve Hoseth	Tyrholm & Farstad
Reviewers	Fabiana Fournier	IBM
	Cyril Alias	Univ. Duisburg-Essen
Dissemination Level	PU	
Contractual Delivery Date	31.03.2012	
Actual Delivery Date	26/03/2012	
Version	V1.0	

The research leading to these results has received funding from the European Community's Seventh Framework Programme [FP7/2007-2013] under grant agreement no. 285598

Abstract

The present deliverable D2.5 concludes the two-year work conducted by the WP2 in the FInest project. This work started with a description of distinct use cases and related challenges in order to identify specific domain requirements and then translating these requirements into concrete to-be scenarios illustrating how future internet technology (incl. services provided by the FInest solution) can be used to improve collaboration and integration in the Transport and Logistics sector.

In phase II of the FI PPP program, the purpose is to use scenario experimentation as a basis for testing the FInest solution and evaluating its contribution to enhanced collaboration and integration among business actors in the transport and logistics domain.

The focus of D2.5 is therefore on the post-FInest phase, providing a final use case specification and phase II experimentation plan. This detailed plan for conducting early trials includes experimentation specifications and evaluation methodologies for each of the selected use case scenarios (along with possibilities for extending the set of scenarios with ones from other FI PPP use cases). This experimentation will be conducted by the project cSpace, a continuation of two FI PPP phase I projects: FInest and Smart-Agrifood.

Three of the scenarios described in FInest will be experimented as early trials in cSpace: Late cancellations, e-planning, and automated shipment tracking.

Using the Experimentation Environment designed in WP4, and to be developed in cSpace, the scenarios will be experimented in a way that enables the assessment of the FInest/cSpace Collaboration Platform.

Each scenario provides a test protocol (a test scenario described from a business user perspective) consisting of a step-wise description of an entire business activity to be supported by the collaboration platform.

This protocol is used by a tester who then recreates the scenario and generates a report including the execution log and performance assessment based on measurements criteria defined by the business user. This report serves as basis for evaluation of the solution on two levels: does the system work? Does the system help in conducting operations more effectively and efficiently?

In addition, it is suggested to conduct a benefit analysis to assess the potential business value generated by the FInest/cSpace solution. Keeping in mind that the FInest/cSpace technology is the means to improve business, not the goal in itself, a benefit analysis will be necessary to measure how much one can gain from using the Collaboration Platform.

Document History

Version	Date	Comments
V0.1	29/01/2013	First draft
V0.2	08/02/2013	Second draft: Ch. 1, 3, 4, 5 completed; Ch. 6 semi-completed
V0.3	8/03/2013	Final draft sent to internal review: scenario 1, 4, 5 updated; Ch. 2 completed; chap 5 updated
V0.4	14/03/2013	Internal review completed.
V1.0	26/03/2012	Deliverable submitted.

Table of Contents

List of Figures

List of Tables

Acronyms

Acronym	Explanation
EE	Experimentation Environment
FI	Future Internet
FI PPP	Future Internet Public Private Partnership
KPI	Key Performance Indicator
SME	Small- and Medium-sized Enterprise
T&L	Transport and Logistics
WP	Work Package

1. Introduction

The FInest project is one of the eight use case projects of the FI PPP Programme. WP2 is responsible for the specification of the use case scenarios from the transport and logistics domain adequate for experimenting FInest platform and future Internet technologies.

The Phase I of the FI PPP Program focuses on the description of the use cases and preparation for experimentation, while the Phase II serves to actually test FI capabilities (through early use case trials) and verify to what extent FInest addresses the challenges and needs of the domain. The experimentation of the scenarios defined in WP2 will enable the assessment of the FInest solution and of the potential improvement in supply chain performance and collaboration enabled by FInest and supporting Future Internet technologies.

The Phase II early trials will be run by FInest follow up project cSpace. Eight trials, 2 from FInest and 6 from SmartAgrifood, will be coordinated in the cSpace WP400, which will receive direct input from FInest WP2 (via D2.5). In Phase II, FInest becomes cSpace, and the "use case scenarios" defined in FInest become part of the "use case Trials". These scenarios have already been revised in light of the capabilities envisioned in cSpace. In the present report, the collaboration platform will still be referred to as FInest collaboration platform, to remain consistent with the past 24-month work (although technically, it becomes "cSpace").

The objective of WP2 during the period M13-M24 was to prepare for this Phase II assessment. Ultimately, the business users of FInest shall be able to make the following statements:

- "The FInest solution helps me to run my business better and more efficiently".
- "The FInest solution allows me to access new markets and approach new partners"
- "The FInest solution helps me handling events more efficiently and support integrated planning and real-time collaboration among actors.

The use case work conducted in FInest has resulted in a large amount information and data used as foundation of scenarios illustrating how business could be run, and performance could be improved by using F.I. technologies. There are three main uses for these scenarios, as shown in the figure below. D2.5 focuses on *experimentation* and *evaluation*, but the scenarios can also be used for dissemination and *illustration* of the collaboration platform concept in a given context.

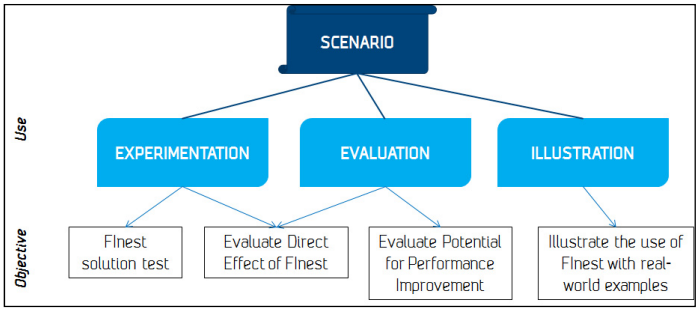


Figure 1: Uses of the FInest scenarios

Deliverable D2.5 documents the final outcome of Tasks T2.3, T2.4 and T2.5.

- *T2.3: "Experimentation Specification of Use Case Scenarios"*, i.e. a description of the 5 scenarios (summarized in Table 2 on page 11) to be tested in the experimentation environment defined in FInest WP4.
- *T2.4: "Evaluation Methodologies for Selected Use Case Scenarios", i.e.* a methodology for assessing FInest and its potential contribution to business-relevant improvement.
- *T2.5: "Detailed plan for large-scale trial in phase 2 of the FI PPP program"* along with possibilities for extending the set of scenarios (from other FI PPP projects).

The work builds on the results from M18[1] (experimentation specification and evaluation methodologies) and the vision and experimentation plan as described in cSpace proposal.

This document is organized as follows. First, we bring a brief review of the work conducted in WP2 during the 2-year project, and a presentation of the use cases that served as ground for identifying the test scenarios. Thereafter, a general description of the experimentation envisioned in the Phase II of the FI PPP (in accordance with the Experimentation Environment under design in WP4) and the suggested methodology to evaluate the solution and its potential contribution to performance improvement is made. Finally in chapter 6, each of the five scenario presents its own experimentation plan for large scale trials, together with the planned usage of FInest solution (illustrated through the test scenario), test protocols, data, and criteria to be used for evaluation.

2. Recap of WP2's activities during the two-year project period

The aim of the FInest use cases was to define relevant and realistic scenarios illustrating how transport business operations could be conducted and facilitated through the help of a FI-based collaboration platform (FInest / cSpace). The WP2 team has worked on designing scenarios that take into account current business and technical challenges and show improvements in business operations compared to current practice. This resulted in five scenarios illustrating the interplay between IT support and business practice, and how collaboration and integration can be achieved only if both IT infrastructure and business models are revised.

Based on a use case methodology defined at the beginning in D2.1, and fine-tuned periodically with concrete procedures and templates, the three use case groups have worked independently but systematically, and ensuring constant experience sharing. The 2-year working process, going from high level use case description to detailed description of use-case scenarios and experimentation plan, is summarised in Table 1. The table consists of a series of steps, together with respecting templates.

Figure 2, borrowed from D2.1, consolidates the working methodology followed in WP2 (green boxes) and the interaction with the other FInest WPs (orange boxes).

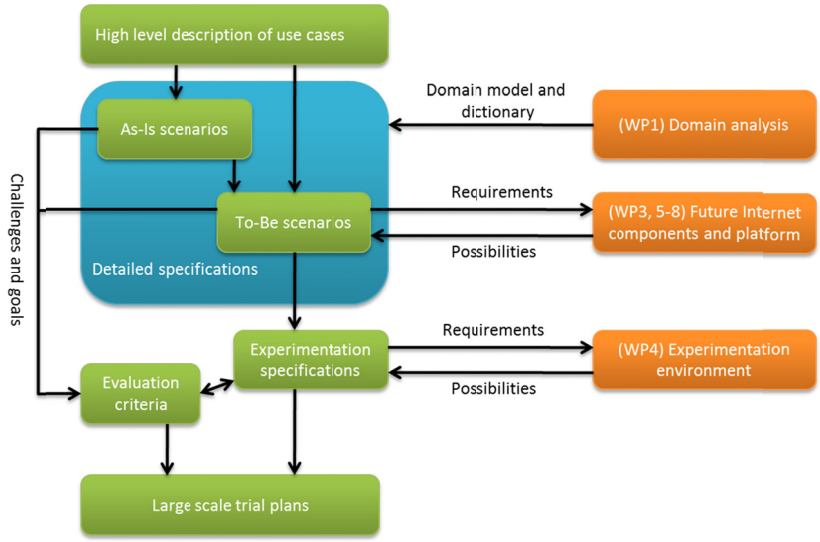
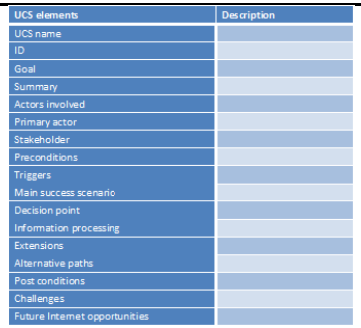
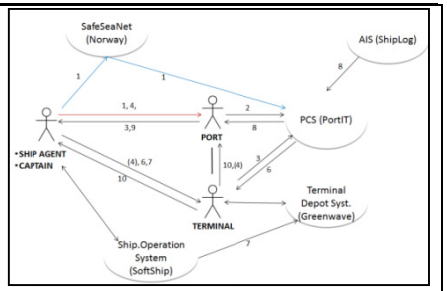
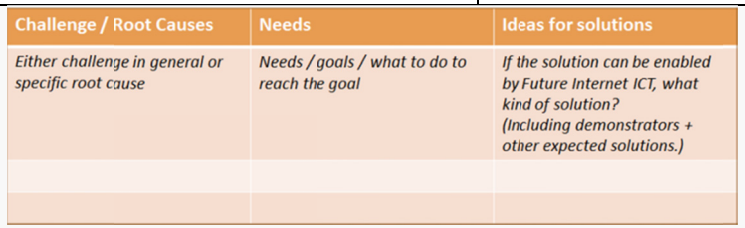
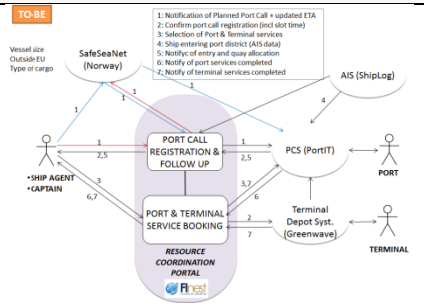


Figure 2: WP2 use case methodology

[1] Deliverable D2.4: https://project.sintef.no/eRoom/Marintek3/FutureInternetPPP/0_1f4ce

Table 1: Use Case working process: from high level description to specific scenarios description and experimentation plans

STEP	DESCRIPTION OF ACTIVITY	MAIN TEMPLATES
HIGH LEVEL USE CASE DESCRIPTION	Describe the domain, business and actors. Systematic description of business processes and information exchange (as-is) Identification of main challenges and potential for Future Internet technologies for improving collaboration and integration.	*Use case description* *Process description – diagram* *Process description - tabular*
MAIN CHALLENGES	Detailed description of main challenges related to collaboration and integration, experienced by the use case actors.	*Challenge description* *Connecting challenges to specific business processes*
ROOT-CAUSES	Analysis of the business challenges, the main problems encountered and their causes (human, technical, organizational, etc.). This in order to identify targeted areas of improvement and potential for FInest capabilities.	*Root-cause diagram*

AS-IS SCENARIOS	Describing in a concrete and real scenario how the challenge is experimented. The as-is scenarios are description of business operations featuring typical events (critical to operations), and describing how these are handled with today's practice and technologies.	 *UC Scenario description (adapted from SiSas)*	 *Use case diagram*
SEARCH FOR SOLUTION	For each challenge and main root-cause, a specific "need for improvement" is identified, together with a suggestion for IT-enabled solution. This results in a list of concrete domain requirements for the technical team developing FInest IT capabilities.	 *Needs for improvement and requirements for IT capabilities*	
TO-BE SCENARIOS	This exercise is conducted in parallel with the search for solutions. Based on the as-is scenarios described, the use case team, together with the technical team (responsible for designing FInest capabilities), draw a scenario in a form of a storyboard illustrating how actors interact and do business through the FInest Collaboration Platform. This way of projecting business users into a virtual world is useful to make sure the system under development is adapted to business practices and tackles the main challenges and needs for improvements expressed by the domain experts.	 *Mock-ups (designed by WP5-8)*	 *Use "story" + case diagram*

<table>
<tr>
<td>EXPERIMENTATION SPECIFICATION</td>
<td>Used for testing the technical capabilities of the FInest collaboration platform, test scenarios or protocols are defined as a step-wise description of actions conducted by business actors using the platform. The test aims at verifying whether FInest works as promised and provides the expected support to operations.</td>
<td>
<table>
<tr><th>STEP</th><th>ACTOR</th><th>PROCESS DESCRIPTION</th><th>EXPECTED RESULT</th><th>TEST DATA</th></tr>
<tr><td colspan="5"><u>Create shipping demand</u>
Fish exporters NG uses the FInest platform to publish demand for container shipping onmarketplaces</td></tr>
<tr><td>1</td><td>NG</td><td>Logs in and open the section "My transport plans"</td><td>A list of current transport plans is displayed</td><td>See (proptotype WP7)</td></tr>
<tr><td>2</td><td>NG</td><td>NG logs in and open the field "Shippings"</td><td>a list of current open reservations and confirmed/prepaid reservations is displayed</td><td>See appendix I</td></tr>
<tr><td>3</td><td>NG</td><td>Click on the icon "create a new shipping demand".</td><td>A window "create shipping demand" appears, containing a purchasenumber generated automatically by FInest</td><td>Purchase number "64511-AD415-45453-JS555"</td></tr>
<tr><td>4</td><td>NG</td><td>Fill up the fields "specify origin / destination address" for each leg of the transport plan, and register the information about the shipment.</td><td></td><td>See appendix II + prototype WP7</td></tr>
<tr><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td></tr>
</table>
Test scenario (stepwise description)
</td>
</tr>
<tr>
<td>FINEST / CSPACE CAPABILITIES & EVALUATION CRITERIA</td>
<td>The being used to test FInest, each scenario features a set of capabilities put in use to support operations. For each capability, a measurement criterion is defined for enabling the assessment of the utility of the platform and its components.</td>
<td>
<table>
<tr><th>FInest capabilities used in the scenario</th><th>Effect of Capabilities (expected)</th><th>Measure / KPI</th><th>AS-IS performance</th><th>Test results</th></tr>
<tr><td>BCM</td><td></td><td></td><td></td><td></td></tr>
<tr><td>EPM</td><td></td><td></td><td></td><td></td></tr>
<tr><td>TPM</td><td></td><td></td><td></td><td></td></tr>
<tr><td>ECM</td><td></td><td></td><td></td><td></td></tr>
</table>
Effect of capabilities and measurement criteria
</td>
</tr>
<tr>
<td>DATA FOR BENEFIT ANALYSIS</td>
<td>To calculate the potential benefit achievable by using FInest, the scenarios, so far very delimited and completely orchestrated, are expended to a set of events (forming the core of the scenario and enabling the design of scenarios variants). These events, together with data on frequency, handling efficiency, related performance, and envisioned improvements, will serve to quantitatively calculate how much improvement can be theoretically achieved.</td>
<td>
<table>
<tr><th></th><th></th><th colspan="4">as-is</th><th colspan="3">to-be</th></tr>
<tr><th>EVENTS</th><th>Scope</th><th>Frequency</th><th>Time of notification</th><th>Handling efficiency</th><th>Performance</th><th>Time of notification (earliest possible)</th><th>Handling efficiency</th><th>Potential performance improvement</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
ESTIMATES

Dataset for benefit analysis
</td>
</tr>
</table>

3. Use cases and to-be scenarios

The three use cases used as test ground in FInest are summarized in Figure 3 below. They correspond to three distinct logistics chains in which the FInest Domain Partners are central actors.

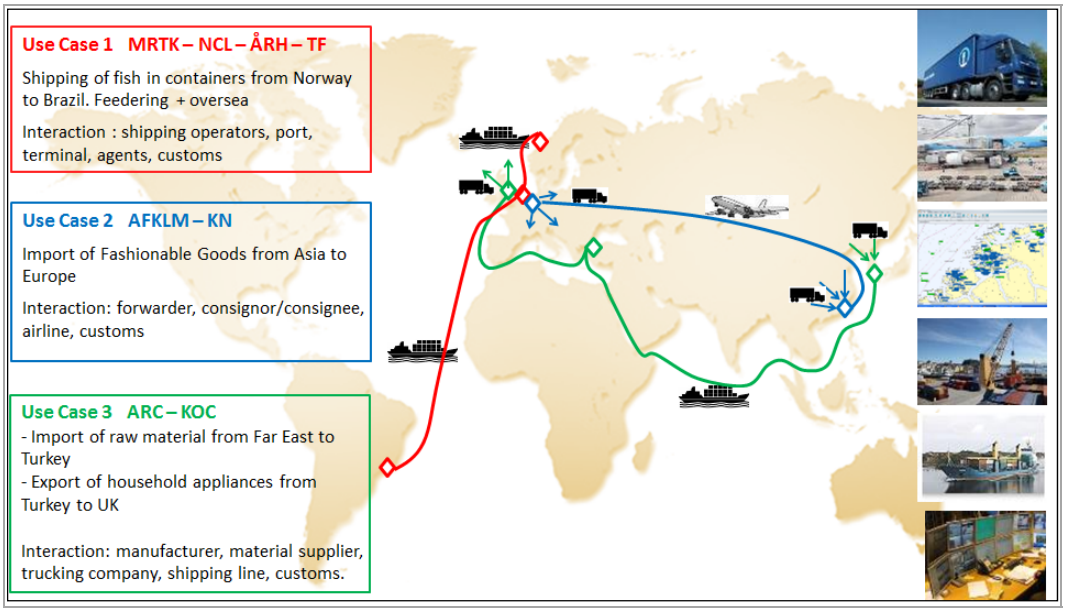


Figure 3: FInest's three use cases

The five use case scenarios to be used for demonstration of Finest capabilities in real-life set ups are summarized below. Each of them depicts a to-be business situation in which business interaction and information exchange is supported by the FInest platform. Out of these five scenarios, three will be used as a trial in the coming project cSpace (highlighted in blue).

Table 2: To-be use case scenarios

	To-be Scenario	Use Case #	Main Challenges addressed
1	HANDLING OF LATE BOOKING CANCELLATION	UC1	Late booking cancellation Data exchange and quality
2	RESOURCE COORDINATION	UC1	Resource coordination at port Terminal Planning Loading and unloading scheduling Data exchange and quality
3	REAL-TIME EVENT HANDLING	UC2	Order Management Monitoring & Visibility of Shipments Deviation Management Data exchange and quality
4	E-PLANNING	UC3	Transport order creation Data exchange and quality
5	AUTOMATED SHIPMENT TRACKING	UC3	Cargo/shipment tracking Monitoring & Visibility of Shipments Data exchange and quality

The FInest scenarios to be tested as early trials in cSpace correspond to two distinct trials:

- **Trial 3: Fish distribution (re)planning**, which two main aspects are *handling of late cancellation* (=FInest scenario 1), and *transport demand planning* and *tracing of cargo* (=extensions of FInest scenario 1)
- **Trial 7: Import and export of consumer goods**, including *Operational planning* (= FInest scenario 4) and *deviation management* (= FInest scenario 5).

In addition, some of the other cSpace trials originating from the project Smart-Agrifood are clearly relevant as use case scenarios for testing FInest features: e.g. Trial 4 "Fresh fruit and vegetables quality assurance" and Trial 5 "Flowers and plants supply chain monitoring". Both providing novel cases of deviation management and intelligent cargo not covered in the FInest use case scenarios, but which can be managed by combining FInest capabilities and additional services and applications described in cSpace.

4. Phase II Experimentation Plan

4.1. Use case trials in Phase II of the FI PPP Program

In the phase II, use case trials will be executed to demonstrate the potential of Future Internet and among others the FInest concept (in the follow-up project cSpace), exploiting real world use cases and trial sites. Some of these trials are built on the scenarios defined in FInest WP2, while the others are complementary trials from the project Smart Agrifood, focusing on production and distribution of agricultural products.

The work to be done (in cSpace WP400) will be to identify appropriate test sites, develop **test protocols**, develop domain specific test applications, **conduct the tests** and **report on the performance of the tests** (with respect to the planned outcomes and underlying technology support capabilities), as well as prepare for large scale rollout of tested and proven trials.

Much of this work has been prepared in FInest WP2:

- The *test protocols* corresponding to the experimentation specifications / test scenarios, presented in chapters 6.x.3 for each scenario (result of Task 2.3)
- The test will be conducted following the process described in chapter 4.2 (defined by FInest WP4, and corresponding follow up cSpace WP300).
- The performance assessment will be based on the evaluation method and criteria presented in chapter 5 (results of Task 2.4)
- The whole is presented in form of an experimentation plan for each of the scenarios in chapter 6 (result of Task 2.5)

The timeline for the cSpace use case trials (WP400), corresponding to the Phase II experimentation plan for FInest use case scenarios, is presented in the Gantt chart in Figure 4.

To start, the trials will be fine-tuned and experimentation lay-out completed with all necessary data. The first part of Phase II will also be used to set up a list of domain- and trial-specific requirements for Applications to be developed by the technical team. The second part of Phase II will serve to realise the planned experiments and evaluation of the solution.

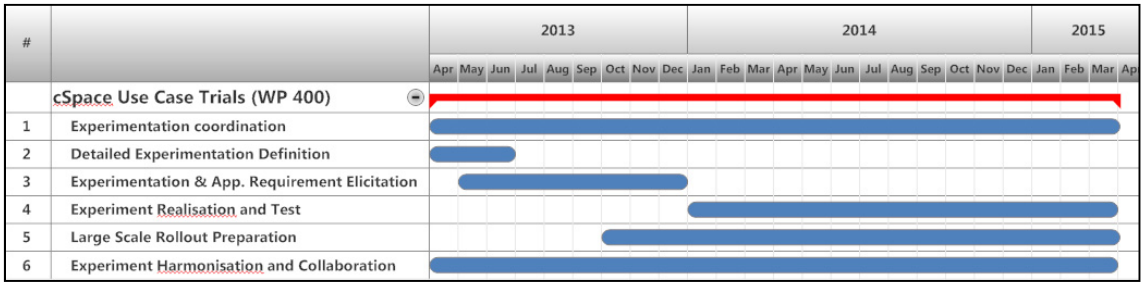


Figure 4: Timelime for cSpace use case trials, i.e. Phase II experimentation plan for FInest use case scenarios.

4.2. Experimentation process

FInest WP4 has defined an experimentation infrastructure (to be further developed in the project cSpace, as part of the WP 300) which will serve for conducting experiments with real-world test data. These experiments will enable to test the FInest applications in real-world scenarios before these processes are implemented in real life. The purpose of the experimentations in the phase II of the FI PPP is to assess the FInest solution and its capabilities, verifying that the system responds as expected and provides the expected effects.

The experimentation process to be supported by this experimentation infrastructure was introduced in the Deliverable 4.3, and briefly summarized below.

(1)The business user defines an experimentation specification for each scenario, including test scenario, data and necessary facilities to carry out the test and the relevant criteria for success of the test and performance assessment.

(2) The tester/experimenter takes this scenario and configures the experiment.

(3) Once the experiment is configured, it is executed and the results are recorded in log files.

(4) These log files serve as basis for reports on execution performance.

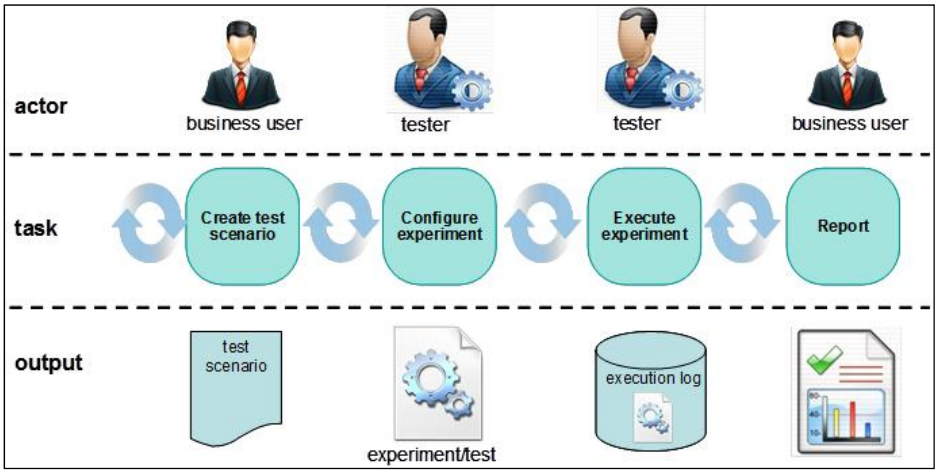


Figure 5: High-level Experimentation Process (Scource: D4.3)

Following this model, the role of WP2 is to provide (1) *experiment specifications* ("test scenario") for each scenario, together with (2) the criteria for assessment of the solution. This information is given for each of the selected scenarios in chapters 6.x.3, and 6.x.4.

The template used for describing the *test scenarios* from the perspective of the business user (i.e. first phase of the process described above) consists of a table summarizing a set of actions

to be performed during a test session. Each step (one step = one row in the table) describes *how actors in the scenarios are interacting and doing business by using the FInest platform*.

For each step, the following information is provided:

Table 3: Template for describing the test scenarios (test protocols for experimentation)

STEP	ACTOR	PROCESS DESCRIPTION	EXPECTED RESULT	TEST DATA
Number of the step	The business user performing the action	Execution of step, description of the action of the user, as interaction with the system, with partners, or internal process.	What is expected by the user from the system in the way it responds to commands and data required	Input to the system

In addition, we formulated a template to be used in the evaluation phase (last phase in Figure 5). The template is presented in chapter 5.2.3, Table 4. It describes how FInest components are used, the expected effect on operation and the evaluation criteria for assessment of the FInest solution (Evaluation).

5. Evaluation methodology

In the use case trials phase, the scenarios defined in FInest WP2 will be used as basis for testing the FInest solution and evaluating its contribution to improved collaboration and integration.

The previous deliverable (Deliverable D2.4) introduced the underlying framework for evaluating and assessing the improvements in the transport and logistics business by optimized integration and collaboration.

The goals of the evaluation are (1) to test FInest, (2) to verify to what extent it helps in addressing the business challenges and needs of the transport and logistics domain, and (3) to evaluate the potential performance improvement enabled by the solution. The difference between (2) and (3) is that the former evaluate the direct effects of FInest in a given scenario, while the latter is meant for assessing the overall potential contribution of FInest (direct and indirect affects) in a broader context.

The evaluation will be done at the scenario level, i.e. focusing especially on (1) the direct effect expected from FInest on collaboration and integration, and on (2) the potential contribution to business-relevant improvement which can be attributed to enhanced collaboration and integration among business partners. This does not mean a complete supply-chain performance analysis, as considered in the last deliverable, but a simple and straightforward methodology which includes solution evaluation and benefit analysis.

The goals of the evaluation include:

- **Use acceptance test**: ***does it work?*** Does the system respond as expected? are the business processes correctly supported? This will be assessed during the scenario test.
- **Solution evaluation**: ***does it help?*** Do the FInest capabilities provide the expected effect? This will be assessed based on the test results.
- **Benefit analysis**: ***what is potential benefit?*** How much can I gain from using FInest? This will be assessed through a quantitative analysis independent of the test.

We will briefly describe each of them in the following subsections.

5.1. User acceptance test

5.1.1. Purpose

To test FInest (*does it work?)* the **user acceptance** test will aim at verifying that the platform "can support day-to-day business and user scenarios to validate rules, various workflows, data correctness, and overall fit-for-use, and ensure the system is sufficient and correct for business usage" [2].

5.1.2. Method

The experimentation, and more precisely the scenario test described in chapter 4.2, will be used as a method for user acceptance test. It will consist of a set of actions to be performed by a tester, together with a description of the responses expected from the system. This way, the test will enable to tell whether the platform provides the functionalities required (thus fulfilling the business requirements), and to take notes of the errors encountered during the test for feedback.

Each step in the scenario will be checked to see if each business requirement (expectation about FInest capabilities to support the business processes described in the scenario) has been covered. This step is described in detail in the experiment process in D4.3.

5.1.3. Template

The template for the test is described in chapter 4.2, Table 3.

5.2. Solution evaluation

5.2.1. Purpose

The purpose of the evaluation is to verify how much FInest helps in addressing the challenges and needs of the domain in terms of collaboration and integration. D*oes it help? Do the FInest capabilities provide the expected effect?* The principle behind this **solution evaluation** is inspired by the SHAPE project[3]: translating business goals into capability requirements, and assessing the solution's capabilities and how much they contribute to fulfill the business goals, by defining metrics/KPIs that enable the measurement of the effect (or effectiveness) of the capabilities.

The test scenario (*to-be* scenario) will be assessed according to each evaluation criterion and compared to the baseline (*as-is* performance).

5.2.2. Method

The assessment of the FInest solution (direct effect) will be conducted for each specific scenario, and will be based on the data resulting from the experimentation (to be found in the log file from the experiment).

The proposed evaluation process, for each scenario, is as follows:

[2] Bordo, V. 2010. *Overview of User Acceptance Testing (UAT) for Business Analysts (Bas)*, A 60-minute webinar, Developmentor, March 2010

[3] SHAPE project and evaluation method presented in D2.4

1. **Identify FInest capabilities:** specify which FInest capabilities/functionalities are put in use in the scenario (e.g. event notification, support for transport ordering, search for services offered by LSP, …)
2. **Describe the required effects of FInest capabilities**: The business challenges (described in D2.3) are translated into improvements goals, and expected effects of the technical capabilities. For each capability, describe the expected effect in the context of the scenario (e.g. automatic notification of delay, quick overview of available transport capacity…)
3. **Identify KPIs**: For each "effect of capabilities", define a measure that is quantifiable and robust against manipulation (e.g. man-hours, reaction time, error rate…) in order to be able to make a statement about achieved improvement in the given scenario.

> *Steps 1, 2 and 3 are accomplished during the last period of the FInest project, and presented in Chapters 6.x.4. The following steps are to be conducted during the Phase II / trials experimentation.*

4. **Define the baseline**, i.e. the as-is value of these measures (general or specific to scenario) corresponding to the current performance level (without the help of FInest). The current performance can be expressed as an average performance, possibly accompanied with target or benchmark performance level to be used in the improvement assessment afterwards.
5. **Test the scenario.** The experiment is executed (scenario test) and the results (score of each metrics) are reported. The report is then used to evaluate how well FInest fulfills expectations. Also screen shots from the test are stored to illustrate the utility of FInest from a user perspective. This will serve to graphically show the benefits of the FInest solution with respect to collaboration and integration.
6. **Consolidate and Analyze results**: the results collected from the test are compared with the baseline figures, thus concluding on improvement along each of the criteria. The screen shots are also used as basis for subjective evaluation of aspects that are difficult to quantify (friendliness, fit-for-use, etc.). Using screen shots, these positive effects of the use of the FInest solutions are directly visible and thus easier to comprehend.

Figure 6 summarizes this initial methodology, providing a description of the activity to be conducted for each step, the necessary input to the activity, and the required outcome.

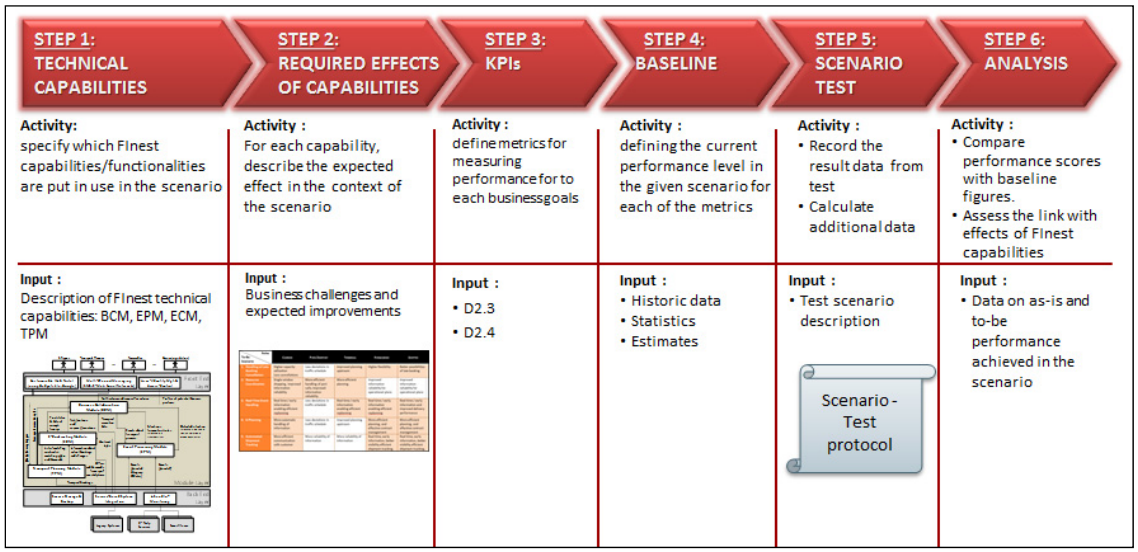


Figure 6: Methodology for evaluation of the FInest solution during Phase II experimentation

5.2.3. Template

Table 4 is the template used for presenting the FInest capabilities illustrated in each scenario, the expected effects and the criteria for measuring this effect. This template is used for each scenario in Chapter 6. The list of "FInest capabilities" (in purple color) is based on information given in M18 deliverables from WP1, 3, 5, 6, 7, 8, where the functionalities / capabilities of each of the 4 FInest modules have been described.

Table 4: Template for indicating FInest capabilities illustrated in a scenario and measurement criteria.

	Summary of FInest capabilities	Effect of capability illustrated in the Scenario (direct effect of FInest)	Measurement criteria
	Overview based on deliverables from WP1,3, 4-8	*Fill in the "expected effect" of the capabilities that are taken in use in the scenario*	*Suggest a metric to measure the effect of capability*
BCM	*The Business Collaboration Module (BCM) keeps all the information that is needed for executing a logistics process and notifies the user about the occurrence of certain events (deviation, or completion of a process), therewith allowing for the end-2-end visibility*		
	Global knowledge base for collaborative business processes		
	Manages all information of transport processes and make it available to its user in real-time		
	Allows users to enter additional information visible to other users with access rights		
	Gather external events and keep information up-to-date during the execution phase		
EPM	*The Event Processing Module (EPM) enables real-time tracing and advanced control for planning and execution , including SLA monitoring and rule-based analysis of (un)expected events detected through various sources.*		
	Support for user-events (manual inputs)		
	support for automated events (e.g. from a sensor network)		
	Pro-active event management (e.g. providing forecast features)		
	Produce 'event notification' for other modules (e.g. for triggering automated status updates)		
TPM	*The Transport Planning Module (TPM) supports dynamic (re)planning activities: finding suitable transport offers to match the deman, negotiating terms, bookings etc.*		
	Standard description of transport demands and services to facilitate information handling/ exchange (distincts systems, info sources, market places etc.)		
	Find services (from long-term contracts and spot market) that fulfil the demand, using the ECM		
	Configure Transport Chain Plan based on the service and demand descriptions		
	Optimization of resource use (transport route)		
	Allow re-planning (e.g., change of route due to some delay)		
	Supports negotiation service provider and client. Transfer to BCM when plan ready for execution		
	Functionality for booking of the services, notification to concerned parties, order status.		
ECM	*The E-Contracting Module (ECM) provides support for service provider selection, contract negotiation and agreement, contract management and the definition of contract related service requirements.*		
	Represent in an electronic and online form the attributes of T&L contracts, so that they can be automatically searched		
	Detect and signal near-real-time deviations on agreed terms from the contracts		
	Manage the life-cycle of contracts		
	Signal the need to re-evaluate long term contracts due to many deviations		
	Publish demand and offers on e-market places (enable quotations...)		
	Match-makings between offers and demands		

The table only shows the two columns that were filled up during the last reporting period in FInest. At the beginning of the Experimentation phase, additional information will be needed, as described in chapter 5.2.2 above: Baseline / as-is performance and test results.

5.3. Benefit analysis

5.3.1. Purpose

The aim of the benefit analysis will be to verify the business value generated by the FInest solution. Indeed, improvement in business processes, new opportunities and better performance in the "non-IT" part of the business cannot be tested by just checking that the IT works correctly. What we actually want to improve is the performance of the "non-IT" part of the T&L business – we should remember that the FInest technology is the *means* to improve business, not the goal in itself.

It is not expected that the use of FInest will contribute equally to all elements of performance, but from a business perspective, a complete picture of potential improvement is necessary for assessing not only fit-for-use, but also expected benefits.

To evaluate the **potential improvement in supply chain performance** that can be reached by using FInest, it is necessary to go further than the experimentation of the scenarios designed specifically for demonstration purposes.

The underlying idea illustrated in each scenario is to use cloud-based applications to support collaboration and efficient information exchange in order to improve planning of operations, handling of events. However, the expected performance improvement (in terms of operational efficiency) can vary greatly depending on the type and extent of an event (timing or volume of cancellation), the market situation (offer / demand), etc. In order to assess the real potential of FInest, it is important to see the scenarios in various contexts.

It is therefore necessary to test various combinations of events and in various conjunctures - which together can give a more correct picture of the reality -, rather than just testing one specific/limited scenario.

5.3.2. Method

Each scenario described by the use cases is a specific combination of events and event-handling. To extend the scope of analysis, we need to generalize the core elements of these scenarios and create additional combinations of events, which can be used as a basis for a quantitative analysis. The purpose is not to describe many more scenarios in details, but to take the existing ones as a starting point, and build a data foundation for enabling testing variants of the scenario already described.

The principle is simple: in order to avoid (1) waiting for the Phase III and real-life testing, or (2) having to experiment a too high number of scenarios in the EE, a quantitative analysis is suggested (as a supplement to the experimentation) based a set of estimated data about distinct events and factors affecting operations, probabilities, handling efficiency, impact on business performance. This dataset is then used for calculations.

The process suggested is the following:

1. **Identify the main events**: Take the selected scenario as starting point, and list up the events and other influence factors that form the core of this scenario (because they affect the operations and trigger action).
2. **Build the dataset for benefit analysis**: for each event, provide information regarding (a) the frequency of the event, (b) its scope and timing, (c) how efficiently it is handled, (d) the impact it has on performance, as well as (e) how it would be handled by using the FInest platform for supporting operations and (f) which impact that would have on performance. This information can be based on historical data, estimates, or on most common examples. At this stage of the project, the initial dataset presented in chapters 6.x.5 consists of "educated guesstimates" based on discussions with person directly involved in the operations covered in the use cases.
3. **Define measurement goal**. In order to use the dataset correctly, it is important to define what needs to be measured (e.g. handling / operational efficiency, capacity utilization, or readiness / proactivity etc.). This will in turn determine which criteria and data shall be used, and most importantly, which method to be used for analysis.
4. **Build the model**. The method for measuring the potential improvement enabled by FInest will depend on the model to be used. Two main models can be used, depending on the complexity of the assessment.

- Model 1: A **direct calculation of benefits**: This can typically be set up as a single spread sheet. These kinds of models are suitable for problem sets with fairly low complexity, when the possible variations in the scenario can be set up as few simple tables. For instance, the potential saving in operational costs/man-hours a port can save thanks to a system that enables to switch from manual to automatic info/data transfer can be easily calculated with a linear function, when one have data about current operational costs and estimates about expected improvements in efficiency for handling port calls and booking of resources.
- Model 2: **Discrete event simulation**, creating randomness and ensuring statistical significance. This alternative could be used to generate "reasonable" estimates for the impact of the system. This method is suitable for more complex problems, when the impact of the use of FInest may vary depending on the state of several other factors outside of FInest's control. For instance, using FInest to quickly find replacement cargo after a late cancellation will only have an impact if there actually is replacement cargo present. The amount of replacement cargo and the endpoints of cargo's transport need will also vary. Setting up a simulator model with random events representing the state of the cargo availability may be a way of estimating the impact of using FInest for handling late cancellation problems.

  Setting up a simulation model and running a simulation can be orchestrated as follows:

  Several actors in the actual scenario (e.g. shipping line, fish exporter that may cancel late, exporter with a yet unfulfilled transport demand) can be set up as scripted players in the simulation, with some stochastic behaviour in the scripts (e.g. amount to transport, time between actions etc.) to emulate the more complex situation in the "real world". Some of this behaviour will be affected by FInest (e.g. time from an exporter has a transport demand till contact with the shipping line is established), changing the distributions of stochastic variables for the models with or without FInest, making it possible to compare the two situations. The simulations are run many times and results of FInest and non-FInest situations can be compared.

5. **Conduct the analysis**, and conclude on the potential contribution of FInest in improving supply chain performance.

This benefit analysis and evaluation method is not covered in the cSpace Description of Work, but still recommended in order to assess and prove the strength of the collaboration platform concept.

5.3.3. Template

The template used for presenting the data for benefit analysis is presented in Table 5. This dataset will serve as a basis[4] to calculate the potential benefit enabled by FInest based on distinct combinations of events.

Table 5: Dataset for benefit analysis

		as-is				to-be		
EVENTS	Scope	Frequency	Time of notification	Handling efficiency	Performance	Time of notification (earliest possible)	Handling efficiency	Potential performance improvement
					ESTIMATES			

[4] It can also serve as basis to set up several tests around the scenarios in the experimentation environment

Description of the table's fields is presented below.

	EVENTS	All events which can affect the scenario or variables affecting the scenario outcome. Bookings, updates, cancellations, accidents, delays, gaps, market situation, transport capacity, information availability, etc.
	Scope	To get an indication of the size of the event. E.g. number of bookings; of containers for one booking; of hours in delay etc.
AS-IS	**Frequency**	How often does this event occur? *This info is meaningful for evaluating the potential benefit (in volume)*
	Time of notification	If timing of notification is important, and if there are most often delays in distribution of information: when is notification of event generally received (hours after event or before next stage of transport plan). *This information is used as a baseline for evaluating the potential improvement in information access enabled by the FInest solution.*
	Handling efficiency	How much effort/resource/time/interaction does the handling of the event (booking, error, delay, change in order…) generally takes. *This information is used as baseline for measuring the potential cost saving that the solution can contribute directly to.*
	Performance	To be understood as performance linked to the event: how well is it handled (effectiveness), why, or what is the impact on business performance. *This information is relevant for linking operations and business performance, and to be used as baseline for measuring the potential performance improvement that the solution can contribute to.*
TO-BE	**Earliest possible notification**	Same as "as-is Time of notification", but indicating earliest possible or expected notification (provided that all actors have access to up-to-date info at any time. *This info will serve to measure the potential for improvement.*
	Handling efficiency	Expected improvement in handling efficiency by using FInest (e.g. quicker access to info, right info, % reduction in planning time, % reduction in phone calls). *This info is to be used for measuring the potential improvement.*
	Potential performance improvement	Similar to as-is, but what is the expected improvement given that FInest provides the support expected (e.g. higher capacity utilization, profit, lower CO2 emission). *This info will serve for measuring the potential improvement enabled by using FInest.*

5.4. Summary framework for experimentation and evaluation

To summarize the interplay between the evaluation process and the experimentation, the trials experimentation, based on each individual scenarios, will first be used for evaluation of the solution (*does it work?* and *does it help?*). In addition, a quantitative analysis (desktop study) is suggested to calculate the *potential benefit* enabled by using FInest. This shall be based on estimations and statistics enabling the simulation of a wide spectrum of scenarios. Figure 7 depicts the relationship between the experimentation and desktop study envisioned for phase 2.

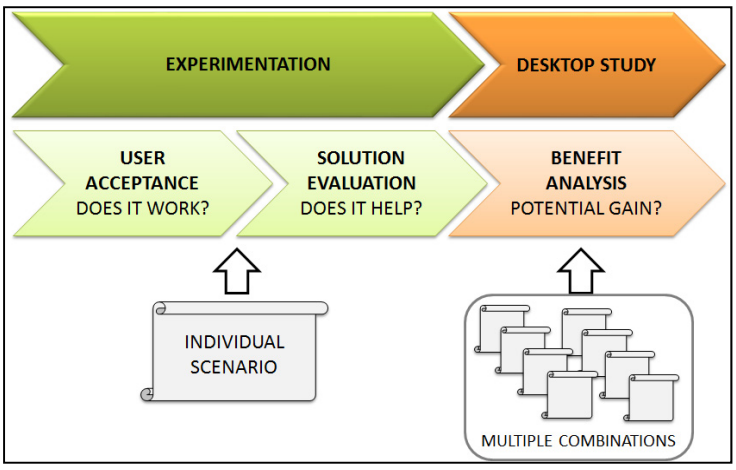


Figure 7: Summary framework for experimentation and evaluation envisioned in Phase II

6. Individual Phase II Experimentation Plans

In this chapter, each of the five FInest use case scenarios presents its own experimentation plan for real-world use case trials (to be conducted in phase II of FI PPP, preparing for large scale trials in Phase III). This includes:

1. **A description of the experimentation** as a real-world use case trial (how the scenario will be tested, the responsible partners, the experimentation site defined)
2. **A summary of the scenario** selected to demonstrate FInest (the story and the users of the system)
3. **The test protocol**, listing up all the steps to be conducted during the test, and expected results. This will be used by tester.
4. **The FInest capabilities** that are put in use in the scenario, their expected effects and criteria for measurement. These data will be used to evaluate the change in performance between the current situation (without FInest) and the to-be situation illustrated in the scenario.
5. **Potential benefit:** Generalization of the scenario into a set of events and associated performance information, to serve as a data basis for measuring potential benefit. These data will be used in a benefit analysis, independent of the experiment, using methods like direct calculation or discrete event simulation.

6.1. Scenario 1: Handling of Late Booking Cancellation

6.1.1. Experimentation lay-out: Trial "Fish distribution (re)planning"

The scenario 1 will serve to test FInest and other Future Internet based application through **a real-world use case trial** called "Fish distribution (re)planning".

This trial is concerned with the planning of logistics and transport activity in the fish industry, a crucial process for ensuring performance across the whole supply chain. The main challenges addressed are *low predictability of transport demand* and *late shipment booking cancellations*, mostly due to lack of collaboration or access to information, affecting directly the resource and asset utilization of service suppliers (carrier, terminal..). Furthermore, data quality at the planning phase is essential for enabling effective monitoring of transport execution.

The trial is built on a case of export of fish from Norway: Fish exporters produce fish product (dry and frozen) continuously, sell it to retailers/wholesalers overseas, then contact a cargo agent for carrying out the logistics operations, including planning, booking/contracting of transport services, customs declarations, follow up, and tracking and tracing of cargo. The carriers are responsible for shipping the fish cargo from Ålesund to continental Europe, then overseas. Carriers receive bookings continuously as well as cancellations, which they need to handle in the best possible way in order to maintain an acceptable level of capacity utilization. Trial "Fish distribution (re)planning" focuses on the feedering part of the transport chain, i.e. shipping from Norway to continental Europe.

The Figure 8 schematises how interaction among actors and information systems is envisioned with the use of Future Internet technologies, thus enabling integrated planning among different parties.

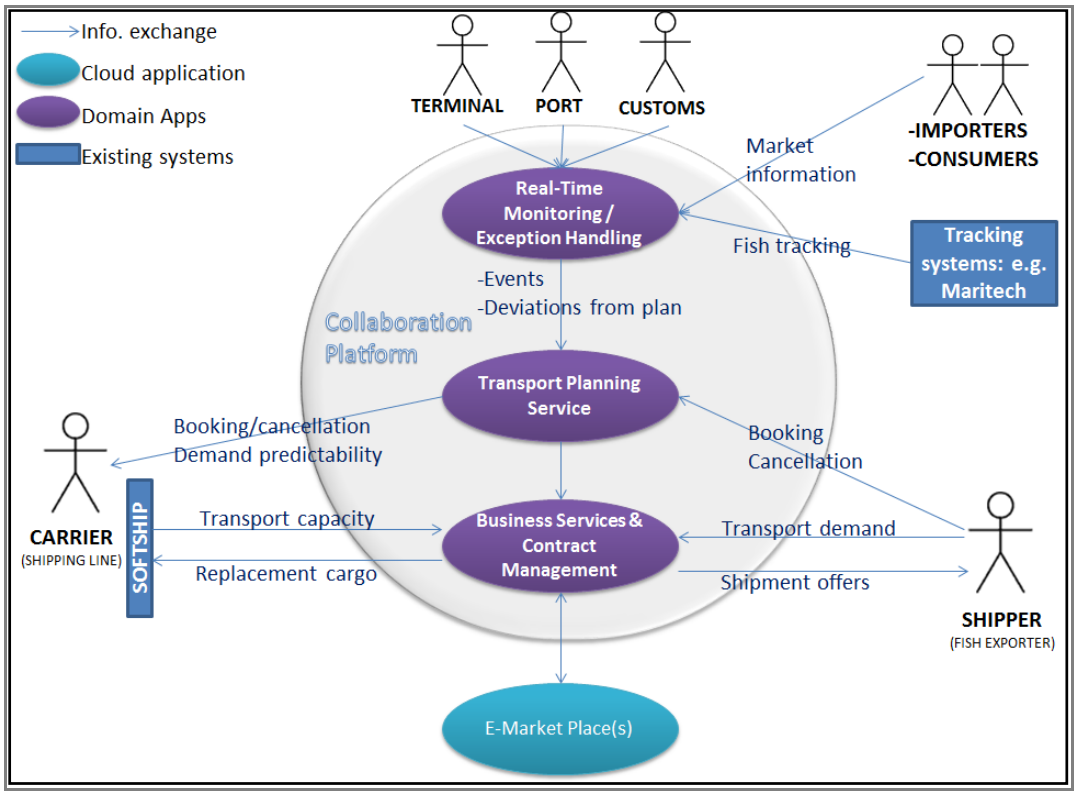


Figure 8: Conceptual description of the Fish Distribution (Re-) Planning Trial

The trial will show-case the innovations of FInest / cSpace by addressing the following key activities in the supply chain:

- Distribution (re)scheduling: for the shipper, this includes finding a transport supplier, creating a shipment order, developing a transport execution plan, and rescheduling transport in case of deviation (e.g. lack of import license from country of destination).
- Transport demand (re)planning: for the carrier, this includes demand planning/forecast, resource management and (re)planning of transport operations in case of deviations.
- Tracing of cargo: tracing of cargo at product level is essential for monitoring of transport along the whole chain, but also for detecting deviations at the planning phase (e.g. delayed cargo before reaching the port terminal).

The trial will explore Future Internet applications that can contribute to better collaboration and interaction, necessary for improving logistics operations. It will be used to test applications that can contribute to two main performance aspects of transport planning (two main challenges):

- Improved Booking Reliability: improved upstream planning so that the carrier gets more visibility, more reliable booking, and early notification of changes. The trial will demonstrate how a better integration of the supply chain, in terms of information distribution and accessibility, can contribute to better planning and resource utilization.
- Handling of Late Cancellations: provide to the carrier quick access to online e-market place and ability to reschedule bookings, find replacement cargo or additional last minute cargo in a shorter time window compared to what today's IT network can offer. Combined with pricing policies that encourage early booking and dissuade dummy booking and late cancellations, this solution is believed to have a strong positive impact on capacity utilization as well as cost efficiency, especially for the short sea shipping spot market.

The business actors in the trial represent the carrier (container shipping operator) and shipper (fish exporter or cargo agents), and the trial will focus on how collaboration and integration among them. The trial protagonist is NCL, one of Norway's largest short sea shipping companies, with a large network of fish exporters/ traders. It will also be necessary to involve other actors like fish producers or any stakeholder who holds information required for improving visibility and planning (e.g. traffic information, cargo tracing databases etc.).

The experimentation site will be around NCL and other actors and information systems involved in the planning phase of fish export. The experiment will follow the scenario and test protocol described in the next sessions, representing the actors in real-life situations, business activities and events, and show how cSpace enables them to interact more effectively to increase supply-chain efficiency. This will be simulated in the test platform described by WP4. The test will use a mix of simulated and real data. The test platform will be connected to existing systems and databases if possible.

6.1.2. The scenario / story

The scenario features, on one side, a carrier (container feeder shipping operator NCL) dealing with shipping reservations and late cancellations, and on the other side, shippers (fish exporters) posting transport need on e-market places, receiving offers, making reservations, confirming reservations, cancelling reservations.

The story is built around the voyage of one of NCL's containerships, from Ålesund to Rotterdam, scheduled on Oct. 20th 2012 (the voyage is part of a regular feeder route).

The first part of the story focuses on improving booking reliability, and illustrates how improve information sharing upstream in the value chain can increase demand visibility, booking reliability and planning efficiency. On the week preceding the departure, NCL receives shipment booking either directly or by accessing an online market-place where fish exporters post shipping demands continuously. NCL selects the shipping demands matching the specific voyage, and send them offers through the platform. These offers are either rejected or accepted, as pre-paid or non-binding reservations. When the day of departure approaches, NCL requires the shippers to confirm their reservations. The ones that are not yet confirmed 24hours are studied more closely, and based on information about cargo or other operations available for FInest, probabilities of cancellation/confirmation is calculated by FInest. This provide a support for NCL to decide to ignore this reservation, and open for booking of other cargo/shipments, thus to anticipate cancellations before it is too late.

The second part of the story illustrates the re-planning of shipping operation plan and handling of late cancellations in the short period preceding the departure. It shows how the carrier NCL can handle cancellations more quickly, and how they can efficiently identify replacement cargo through an intelligent search engine connected to e-markets places, in order to keep a satisfactory capacity utilization rate.

The business users represented in the test scenario are:

1. **NCL: the container ship operator** that provides feedering services from the Norwegian coast to Europe, including the voyage on focus in the scenario from Ålesund to Rotterdam (part of a regular route), served by the vessel Clarissa.

2. **Norway Goodfish (NG): the fish exporter** that uses the FInest platform for sending reservations to sea carriers, confirm a specific booking to NCL for the Clarissa voyage (from Ålesund to Rotterdam), then cancel the shipment due to lack of export license.

3. **Fish4Life (F4L):** the fish exporter that registers a late need for transport, due to a recent deviation in own transport plan (requiring the cargo to leave Ålesund today instead of tomorrow).

4. **Fish exporter A and B**, with minor roles: both book shipment at NCL on the same voyage. But as the departure date approaches, FInest detects a high probability of cancellation, based on information like cargo location and booking history. This detection of possible cancellation enables NCL to anticipate and open for more shipment bookings before it is too late.

6.1.3. Test protocol

Table 6: Test protocol for "Fish distribution (re)planning" Trial (= Scenario 1 "Handling of late cancellation".

STEP	ACTOR	PROCESS DESCRIPTION	EXPECTED RESULT	TEST DATA
Create shipping demand *Fish exporters use the FInest platform to publish demand for container shipping on marketplaces*				
1	NG	Logs in and open the section "My transport plans"	A list of current transport plans is displayed	Appendix 1
2	NG	NG logs in and open the field "Shippings"	a list of current open reservations and confirmed/prepaid reservations is displayed	Appendix 2
3	NG	Click on the icon "create a new shipping demand".	A window "create shipping demand" appears, containing a purchase number generated automatically by FInest	Purchase number "64511-AD415-45453-JS555"
4	NG	Fill up the fields "specify origin / destination address" for each leg of the transport plan, and register the information about the shipment.		See appendix 3
5	NG	In the box "Publish demand on the following marketplaces", cross the box "Finest platform" and "Public Market Place A", then click on "search"		
6	NG	Confirm by clicking on "create shipping demand"	The window disappear and the user is sent back to the initial page displaying an overview of planned shipments, reservations and confirmed reservations	
7	NG	Wait for offers	∞ ∞ Information processing / reply from other parties The shipping demand is registered on FInest and external market places, thus accessible by any carriers searching the e-market place for transport needs on a particular route. The carriers send booking offer to the shippers by answering the request, through the FInest platform.	
8	Other exporters	Fish exporters A and B do the same procedure, and register demands for shipping from Ålesund to Rotterdam corresponding to the same voyage (date).		
Treatment of requests for shipping *The carrier NCL answers the pending requests for shipping by sending offers to the fish exporters.*				
9	NCL	Log in and open the field "shipping demands"	The page displays a list of all shipping requests which correspond to routes/voyages covered by NCLs vessels.	
10		NCL select all the shipping requests matching the next voyage of the vessel Tina.	The requests from NG and fish exporter A and B appear on the list.	Appendix IV
11		Checks capacity, and send offer to each of the fish exporters.	∞ ∞ Information processing / reply from other parties ∞∞	

		Waits for confirmation.	The offer is received by NG.	
Receive offer(s) from carriers *NorwayGoodFish (NG) receives offers from carriers, accept or reject offers, make normal or confirm reservations.*				
12	NG	Go back to the field "shippings" (transport plans), select the shipment on focus (Nr 64511-AD415-45453-JS555 , Ålesund to Rotterdam, departure Oct. 20th), and click on "View shipping details and bookings".	A window appears, showing three tables: (1) current binding or prepaid reservations (empty), (2) the non-binding reservations (empty), and (3) the received offers. The "Received offers" table contains 3 offers (from NCL, Eimskip, and ECL) with each 3 set of price levels (non-binding, binding post-paid and pre-paid).	appendix 5
13	NG	NG selects the offer from NCL, in order to make a reservation.	A window opens and gives two alternatives: — Alternative A: non-binding reservation — Alternative B: binding reservation, choosing between pre-paid or post-paid reservation (subject to cancellation fees).	
14	NG	Click on "make a non-binding reservation" (alternative A)	The offer disappears from the "received offers" table, and appears in the "nonbinding reservation" table, with status "reserved".	
15	NG	Rejects the offers from Eimskip and ECL by first selecting the offer, then clicking on "decline offer"	The column "status" in the "received offers"-table is updated to "declined" for both carriers.	
16	NG	Logs off	∞ ∞ Waiting for information processing / reply from other parties ∞∞ The reservations or declinations are communicated to the carriers.	
17	Other exporters	Fish exporters A and B follow the same procedure and accept the offer from NCL: A as a binding / pre-paid reservation, and B as a non-binding reservation.	∞ ∞ Waiting for information processing / reply from other parties ∞∞ The carrier NCL receives the reservations and transfers them to own planning system (for preparing discharge/loading lists and stowage plan).	
Treatment of pending reservations When the departure day approaches, the carrier requests a confirmation of reservations. The shipper confirms by prepaying the shipment.				
18	NCL	Log in, select the voyage, and open the field "offer pending confirmation".	The page displays a list of all reservations received so far. The status column shows whether the offer has been pre-paid, accepted as non.-binding reservation, rejected, or not answered yet. NCL can see that the offer sent to NGF has been "accepted as non-binding reservation".	Appendix 6
19	NCL	72 hours before departure, NCL needs the shippers to confirm the reservation. Selects the non-confirmed reservations and click on "request for confirmation".	∞ ∞ information processing∞∞ The request is received by NGF, and fish exporter B, and accepted as a pre-paid reservation.	
20	NCL	NCL receives an notification from FInest and check the page "offer pending confirmation"	The offers have now the status as "accepted and pre-paid".	
21	NCL	To transfer the information to the back end system Softship, click on "transfer all confirmed".	The info is received by the back end system, and NCL can update the operational plan for the given vessel / voyage.	
Confirmation of booking The shippers respond to the request for confirmation of reservation sent by NCL.				

22	NG	NG receives a notification from FInest, logs is and open the page shipping.	The table "non binding reservations" is updated, and the column "status" for the given shipment displays "please confirm".	Appendix 7
23	NG	Select "confirm booking"	A window opens, and gives the possibility to choose between pre-paid (with discount) or post-paid reservation.	
24	NG	Select "pre-paid".	[Transaction effectuated through another system].	
25	NG	Go back to the page "shipping"	The offer appears in the "binding / prepaid reservation" table, with status "pre-paid"	
26	NG	Logs off	∞ ∞ information processing ∞∞ The reservations are communicated to the carrier(s).	
27	Fish B	Exporter B does the same procedure.		
Early anticipation of cancellations				
28	NCL	48 hours before departure, NCL is still waiting for some confirmation	The "offer pending confirmation" displays the non-yet-confirmed reservations, together with a probability of confirmation. For exporter B, the probability is of 30%, which is based on the absence of confirmation and past booking history from the shipper.	
29	NCL	NCL notice the low probability for confirmation from exporter B, and opens for more bookings.		
30	NCL	24 hours before departure, NCL receives a warning from FInest, indicating a possible cancellation of one of the bookings	The booking from exporter A appears with 40% probability of cancellation, due to tracing information indicating that the cargo has not yet arrived at the terminal.	
31	NCL	NCL notice the low probability for confirmation from exporter A, and opens for more bookings.		
Late cancellation by the fish exporter *6 hours before departure, because of problems with the Brazilian customs regarding the import license, NorwayGoodFish (NGF) needs to cancel the shipment.*				
32	NG	Go to the field "shippings" and select the concerned shipment (Nr Nr 64511-AD415-45453-JS555 , Ålesund to Rotterdam, departure October 20th 2012), click on "View shipping details and bookings"	Shipment details appear.	Appendix 8
33	NG	Find the shipment in the "binding and prepaid reservation", and then click on "cancel prepaid booking".	A pop up window appears with a warning regarding cancellation penalties.	
34	NG	Click on "Cancel reservation".	∞ ∞ Waiting for information processing / reply from other parties ∞∞ The cancellation is communicated to the carrier via FInest. The carrier search for solutions to offer later departure time to the shipper.	

Sending new offer to rebook the late cancellation: *NCL receive notifications of cancellations of bookings (binding reservations) and handles these cancellations by first offering a new departure time to the shipper, and secondly by finding replacement cargo for filling up the capacity now available.*				
35	NCL	NCL receives a notification from FInest, logs in , and goes to "recent cancellations"	A table appears with a list of all the approaching departures (according to remaining time before gate closing).	
36	NCL	To view the status of cancellations of the vessel Anna, leaving in xx hours, click on the vessel's raw in the table.	A table appears below summarizing all the cancellations made to the voyage of the vessel Anna.	Appendix 9
37	NCL	In order to keep the customer's booking, NCL proposes to NG to rebook the cargo to a later departure on one of NCL's vessels. Select the cancellation from NG that has just arrived, and clicks on "new offer".	A new window showing the cancelled booking is displayed	
38	NCL	NCL select a new departure date and time, propose a discount for rebooking, and click on "send offer"	∞ Waiting for information processing / reply from other parties: ∞ The offer is received by NG.	
39	NG	(not illustrated in the demo; to be described more in details) NG received a notification from FInest. Go back to the overview of planned and reserved shipments by clicking on the field "shippings".	On the line corresponding to the recently cancelled shipment, the status is changed to "new offer received"	
40	NG	Open the offer, and click of accept	The list of "shippings" is updated with a new departure date/time, with the same carrier, and status is "reserved".	
Search for single cancellation replacements *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*				
41	NCL	Go back to the "cancellations Anna" table, select the cancellation from NGF, and click on "search alternatives". In this scenario, the Alternative A is chosen.	A window "Search for single cancellation replacements" opens. The window displays the information about the booking being cancelled, together with a list of open demands that FInest has identified through e-market places, and that resemble the recent cancellation. This list of "candidates" for the given voyage also shows the % match between each candidate and the booking cancellation (quantity, origin, destination etc.). — Alternative A: 100% match. Sending direct offer — Alternative B: less than 100% match. Different origin & destination (additional transport needed). Sending offer using a Freight Forwarder.	Appendix 10
42	NCL	Choose the one with 100% match, coming from the fish exporter Fish4Life, and click on "send an offer directly".	∞∞ Waiting for information processing / reply from other parties ∞∞ The offer is received by Fish4Life as a last minute booking offer, accepted as a binding booking.	
43	F4L	*Describe the shipper receiving the offer right before departure….and sending a confirmation to NCL*		
44	NCL	Open the offer pending confirmation	see the status from the offer made to Fish4Life as "accepted"	

45	NCL	Select it and click on "transfer selected",	∞∞ Information processing ∞∞ The booking is transferred to the back-end system (and the operational plan and discharge / loading list can be updated).	
Finding replacement cargo through capacity-based search for shipping demands per vessel *It is now 4 hours before departure, and NCL is now looking for replacement cargo for filling as much capacity as possible in the short time window remaining. The chart displays the capacities of a vessel between the single ports on the voyage and the capacity utilization rate for each part of the tour. The carrier finds the best possible matches (covering maximum capacity) and sends offers to the respective shipper(s).*				
46	NCL	Go back to the "recent cancellations" field, select the vessel Anna, and click on "find shipping demand for vessel".	A window opens, with a chart displaying the entire planned voyage of the vessel Anna, the ports of call, the scheduled departure date, the remaining time before gate closing, and the capacity utilization between each port. On the top, you can see a "shipping demand filter" enables the carrier to refine the search.	
47	NCL	Fill up the "filter window", by selecting "direct", between 2 and 1 hour, and max TEU.	Above the chart, you see a list of shipping demands (retrieved by Finest on e-market places) matching the capacity offered by the voyage of the vessel Anna.	
48	NCL	Select the first shipping demand (clicking on it)	A green bar appearing automatically on the voyage chart, showing that xx % of the capacity of Anna would be covered by that shipment on the stipulated itinerary.	
49	NCL	NCL selects the shipping demand and click on "send offer" Repeat the same procedure for all the shipping demands identified.	∞ ∞ Information processing / reply from other parties ∞∞ The offer is received by NG. NCL waits for reply.	

6.1.4. Effect of capabilities (evaluation criteria)

Table 7: Effect of FInest capabilities illustrated ion scenario 1, with evaluation criteria.

	Summary of FInest capabilities	Effect of Capability illustrated in Scenario 1	Measure
BCM	*The Business Collaboration Module (BCM) keeps all the information that is needed for executing a logistics process and notifies the user about the occurrence of certain events (deviation, or completion of a process), therewith allowing for the end-2-end visibility*		
	Manages all information of transport processes and make it available to its user in real-time	Access to real-time, up-to-date and correct information	Number of iteration to obtain up-to-date information (request, confirmation etc.)
EPM	*The Event Processing Module (EPM) enables real-time tracing and advanced control for planning and execution , including SLA monitoring and rule-based analysis of (un)expected events detected through various sources.*		
	Support for user-events (manual inputs)	Early warning of cancellations	Time to replan Timing of notification (between earliest possible event detection and reception of notification)
	Pro-active event management (e.g. providing forecast features)	Demand predictability and forecast, and anticipation cancellations, based on automatic retrieval of information from existing systems	Number of events correctly anticipated (e.g. correct overbooking) for a total number of events
	Produce 'event notification' for other modules (e.g. for triggering automated status updates for the events	Automatic distribution of warning msg to all concerned stakeholders	Number of human intervention to send notification (per number of receivers)
TPM	*The Transport Planning Module (TPM) supports dynamic (re)planning activities: finding suitable transport offers to match the deman, negotiating*		
	Allow re-planning (e.g., change of route due to some delay)	facilitate replanning and offers for rebooking	retention rate (rebooking)
	Functionality for booking of the services, notification to concerned parties, order status.	Efficient handling of booking, cancellations, requests, offers etc.	Man hours, leadtime and number of human intervention per handling (booking, rebooking)
ECM	*The E-Contracting Module (ECM) provides support for service provider selection, contract negotiation and agreement, contract management and the definition of contract related service requirements.*		
	Publish demand and offers on e-market places (enable quotations…)	access to information about transport demand & offer on open market	Number of replacement of total cancellations (per voyage) in the last 24, 12, 6 hours.
	Match-makings between offers and demands	identification of cargo available for transport	Time & resource used to find replacement and last minute cargo (per booking or per voyage)

Goals / main KPIs

LOWER OPERATIONAL COSTS (EFFICIENT HANDLING)
*automatisation of info exchange
*correct information, right time etc.
*efficient handling of booking/cancellations

OPTIMAL USE OF SHIP
Replanning of voyage thanks to better information (reduce unavoidable waiting time at port)

LESS CANCELLATIONS (EFFECTIVE HANDLING)
Demand visibility (readiness) thanks to better access to market and cargo info (integration uptstream)

INCREASE CAPACITY USE
Higher load factor thanks to:
* efficient exhcange of information
* time to replan / early warning
* retention of cancellations
* replacement of cancellation

INCREASE SALES
* retention of cancellations
* larger/open market - facilitate late booking

6.1.5. Potential benefit

This scenario is one of many combinations of possible events. For evaluating the potential benefit and business value of using the FInest solution, a benefit analysis is suggested, based on distinct sets of events, scope, and frequency. The following table is an initial collection of data to be used in a benefit analysis.

Table 8: Dataset for benefit analysis of the "planning and handling of late cancellation" concept.

DATASET FOR BENEFIT ANALYSIS								
		as-is				to-be		
EVENTS	*Scope*	*Frequency*	*Time of notification*	*Handling efficiency*	*Performance*	*Earliest possible notification*	*Handling efficiency*	*Potential performance improvement*
booking	1 to xx containers	1	7 to 1 day before departure	planning cost per manual booking: - manhours - nbr of interactions	manual handling of booking requests requires human interaction (receiving email og phone call, registrering and confirming the booking)	unchanged	Efficient booking management. Planning cost per EDI booking: - manhours - nbr of interactions	bookings can be handled at any time thanks to automatic info handling. The shipper gets an immediate confirmation. Significantly less errors in info-exchange.
reservation (incl. Dummy bookings)		% of bookings resulting in a cancellation	more than 2 days before loading		no difference between reservation and booking. Often dummy bookings. No visibility: - late notification of cancellation - financial loss if no replacement found	earlier notification, to avoid penalties.		possibility to make reservation. More visibility for the carrier. - earlier notification of cancellation (less late cancellations - up to 20% reduction) - more time to replan - no financial loss due to late cancellation
early cancellation or change in booking size	number of containers	30 % of bookings	more than 2 days before loading		Little preparedness: - number of anticipated cancellations (with overbooking)			More preparedness: - number of anticipated cancellations (already covered by overbooking)
late cancellation	1 to xxx containers	30-40% of bookings	2 days to 2 hours before loading	replanning cost per late cancellation: - manhours - nbr of interactions	- Low replacement rate with late warning and manual search for last minute cargo - Financial loss if no replacement	unchange, but fewer late cancellations	Efficient deviation management. replanning cost per late cancellation: - manhours - nbr of interactions	replacement rate with earlier warning (more time to find replacement) and automatic search for last minute cargo: - Up to 15% more capacity utilization per voyage - Up to 15% increase in sales (access to new customers)
ASSUMPTIONS / EXTERNAL FACTORS								
match maker or earlier notification of cancellations will have no value-added for situations where no cargo is available for transport.								
100 % match, available cargo for last minute booking	available immediately							
100% match, but cargo located 1-2 hours from point of departure	must be transported to the port terminal first							

ESTIMATES

6.2. Scenario 2: Resource Coordination at Port & Terminal

6.2.1. Experimentation lay-out: Resource hub and integrated planning

Scenario 2 will serve to demonstrate the possibilities offered by future internet technologies to support integrated planning of port call, i.e. coordination of resource planning among all actors involved: port, terminal, ship agents, authorities, and other stakeholders.

The scenario illustrates how the challenge to achieve an effective handling operation in port and terminal can be overcome by getting the right information at the right time from a carrier to the port and the terminal, and made available for all stakeholders.

This shall be supported by a common system for resources and services management for the whole port and terminal community, to facilitate coordination and cooperation across organization boundaries and support vessel voyage and port call planning.

The scenario features, on one side, vessel representatives (vessel captain or ship agent) responsible for planning the call at each port along the route, and on the other side, a port, terminal and other services providers offering ship and cargo handling services.

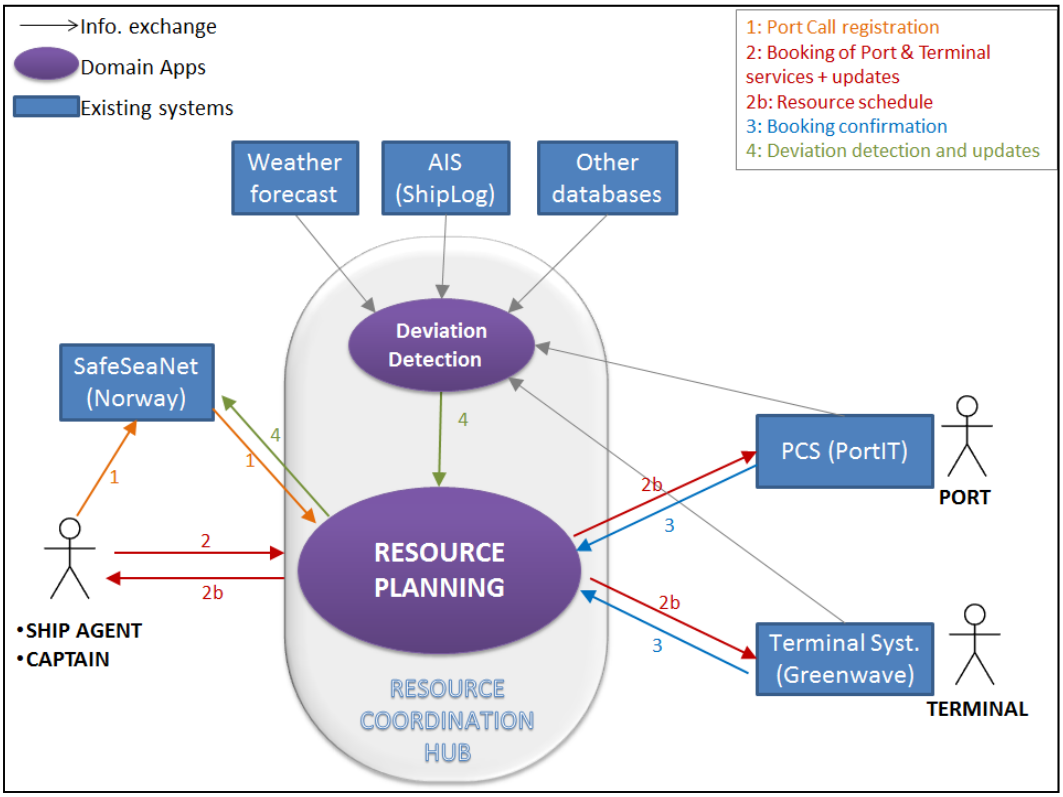


Figure 9: Description of the "Resource coordination Hub" concept.

For a complete presentation of the resource hub concept, see Annex 1.3

The business model supported by the FInest platform is *the semi- automatic handling of port call based on real-time information enabled by synchronization of resource planning at among the port and terminal service suppliers*. The purpose is to support *integrated planning* of port calls. The ship can register its port call and book services through the platform that display real-time information about resource availabilities, while the port and terminal service providers can

coordinate their services and resources based on real-time information provided by the platform regarding bookings and resources available.

The main expected benefit is the coordination of information among multiple actors based on automatic exchange of real-time data, enabling more efficient planning of services at port and terminals as well as support for optimization of ship voyage.

The experimentation method envisioned is a prototype testing at the port of Ålesund.

6.2.2. The scenario / story

The scenario features 4 ships - Clarissa, Tina, Samba and Challenger -, sailing on regular routes and calling at the port of Ålesund. It covers the interaction among all involved actors during the planning phase until the vessel arrives at port.

The ship agents prepare port call by registering it on SafeSeaNet 2 days before arrival. 1 day before approaching port, the captain/ship agent confirm ETA / ETD to port, reserve a quay, book ship services from port and services providers, as well as cargo handling services from the terminal. All booking is made online and is based on real-time information about resource availabilities at the port, which enable the ship agents to adapt the slot time if necessary.

The resource coordination platform establish the most appropriate and precise resource plan possible based on, on one side, information about the ship's ETA/ETD and services needed (some service require different amount of time), and on the other side, the port's and terminal's resource availability. This draft of resource plan is transferred to the port and terminal service providers simultaneously. After verification of these service reservations and available capacity / contracts / special cases, they can confirm the bookings directly via the platform.

The scenario relates 2 main deviations:

The first deviation is a delayed ship affecting the next port call. The day of the port call, a deviation is detected by FInest, based on automatic cross-check of AIS data with ships voyage plans. A warning is sent by FInest to the port and the terminal, together with an indication of potential resource conflict, because the two slot times are likely to overlap.
A solution is reached, reducing the operation time by one hour only. An updated resource plan is transferred to the delayed vessel, and a notification is sent to the second vessel so that it can adapt its speed in order not to have to queue at the port. Finally information on updated vessel port call is made available in the collaboration space so that other actors can use this information if necessary (e.g. use real-time information about port traffic is valuable for cargo owner in search of last minute booking, as described in scenario 1).

The second deviation is a change of quay, resulting in conflict of quay between two ships. A similar procedure occurs, and the port and terminal reach a solution quickly thanks to full overview of resources available. The ship is able to switch quay (for access to specific services offered at the quay), while the other ship, supposed to use that quay is rescheduled for another one, while transfers of cargo are ensured.

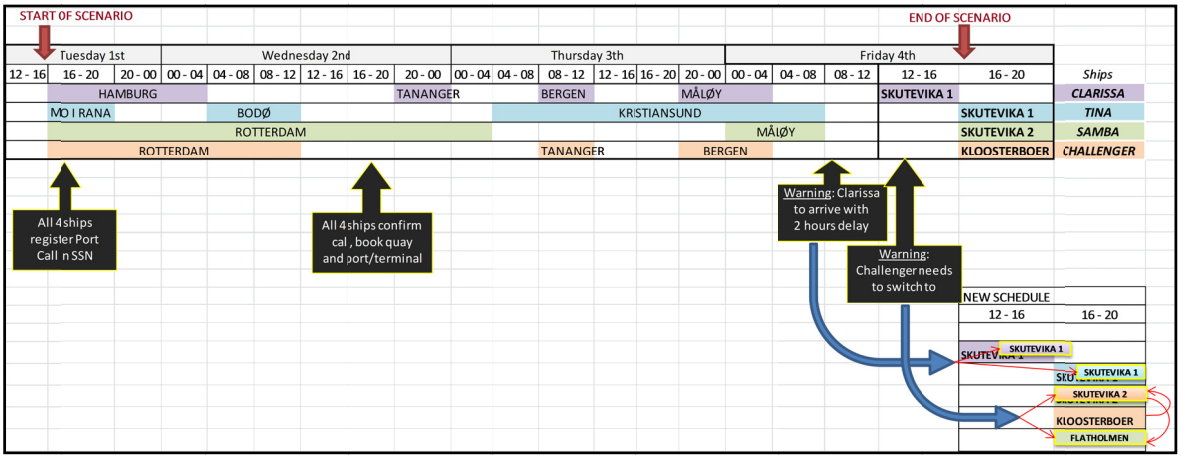


Figure 10: Timeline of scenario 2

The business users represented in the test scenario are:

Type of Actor	Users represented in the Scenario	Role in the scenario
Shipping Agent and/or Captain	Vessel Tina	Register the port call on SSN, book resources and adapt ETA-ETD based on availability of quay. Before arrival, receives a notification of change in quay availability, and needs to postpone arrival by one hour.
	Vessel Clarissa	This vessel creates a deviation from plan because of delayed arrival (noticed through AIS system). This affects the port call of Tina, supposed to occupy the quay right after Clarissa. Rescheduling of resource for Clarissa at port/terminal is also necessary (delay)
	Vessel Challenger	This vessel changes quay short time before arrival (due to special services needed at Skutvika; reparation on a crane). This deviation will create a resource conflict with the vessel Samba. To avoid crash and queuing at port, the collaboration platform is used to quickly re-plan the port call of Samba (appointing another quay).
	Vessel Samba	This vessel has a planned port call at same time as Clarissa, on the second quay of the Skutvika terminal. However, short time before arrival, it receives notification of change of quay due to another vessel (Challenger) occupying the Skutvika quay.
Port service provider	Ålesund Port, "ARH"	This user is handling the port call and coordinating port services and resources based on real-time information about resources needs and resources availability at the port and terminal area.
Terminal service provider	Tyrholm og Farstad, "TF"	This user receives info about ship arrival and need for cargo handling services, while gets access to real-time information about resources needs and resources availability at the port and terminal area in order to coordinate own resources.

6.2.3. Test protocol

Table 9: Test protocol for "Resource coordination" scenario.

STEP	ACTOR	PROCESS DESCRIPTION	EXPECTED RESULT	TEST DATA
Planning voyage The ship agent Tina-agent, 3 days before planned arrival at the Port of Ålesund, notify of Port Call in Safe Sea Net for vessel Tina				
1	Tina-agent	Log in and access own menu	On the Menu window, the ship agent / captain can see "Planning Voyage", "Port Call Administration", "Port & Terminal Services", Destination information", and "Locations and Vessels"	
2	Tina-agent	Choose "Planning Voyage"	The Safe Sea Net Portal opens	
3	Tina-agent	Registration of port call notification in Safe Sea Net	∞ ∞ Operation done outside FInest ∞∞ The data registered in SSN are automatically stored in FInest, and transferred to the Ports concerned.	Ship name, IMO nr; last 10 ports, ETA-ETD, ISPS info, crew info Appendix 1
4	Other vessels	Vessel Clarissa and Samba (NCL), and Challenger (ECL) register port call at Ålesund on the same day in SSN	Clarissa with slot time 12-16; Samba, Challenger and Tina 16-20	
Port Call Administration *2 days before* planned arrival at the Port of Ålesund, NCL confirms port call, book a quay for vessel Tina, as well as all services and resources needed from the port/terminal				
5	Tina-capt	Log in and go to "Port Call Administration"	A window entitled "My Vessels" opens, corresponding to the vessels operated by NCL, as well as their voyage status, next destination, E-ATD/E-ATD	List of "my vessels" Appendix 2
6	Tina-capt	Select Tina on the list by double-clicking	A window entitled "Port Call Administration" opens with information on the vessel Tina (same as registered in SSN)	
7	Tina-capt	On the drop-down list, select "Port of Ålesund / 02/02/12 (data of next port call)"	The drop down list displays all the ports at which the vessel is schedule to call during the actual voyage. When a specific port call is selected, the system runs and retrieve information registered earlier on the Safe Sea Net portal. A window appears, including: 1) General Information (SSN info including security documents), 2) Time Slot (ETD/ETD) and quay availability (displaying only quays adequate for the cargo to be discharge), 3) Positions (AIS / map)	
8	Tina-capt	In the box "Time slot", go to the "select a quay" drop-down list and select Flatholmen.	The system compares the berth capacity available at the port (information retrieved from the Port Community System) to the slot time of the vessel, and a warning is generated informing about mismatch. A chart is displayed showing the time slot and quay availability. This means that either the ship must update its ETA / ETD, or choose another quay.	Quays availability information in appendix 3
9	Tina-capt	Choose the other quay Skutvika		
10	Tina-	In the field "Cargo", upload the discharge and	Alternatively, the information from Softship can be automatically retrieved by the platform and stored.	

	capt	loading list.		
11	Tina-capt	Click on "send for confirmation"	∞ ∞ information processing ∞∞ The system runs, connects to the Port's back end system, which confirms the booking of quay for the vessel Tina. A message appear "Quay Booking Confirmed"	
12	Tina-capt	Continue on "Book Port/Terminal Services" (in the main menu)	A window entitled "Port and Terminal Services" appears. On the top, summary of the actual port call is displayed, followed by a field containing a long list of services and resources available at the destination.	
13	Tina-capt	Fill out the list of services and resources needed for Tina for the actual port call by clicking of the followings: weather information, mooring assistance, fresh water, unloading, loading	The system used information available from the ship to pre-register needs for resources (e.g. water or bunker volume)	Appendix 4
14	Tina-capt	Click on "send for confirmation"	∞ ∞ information processing ∞∞ The system runs. Based on the booking information as well as information about capacity availability at port and terminal (based on information from the Port Community System PortIT and the Terminal Depot System Greenwave), the system establish a resource schedule (draft) showing which resource is planned to be used and at what time period. This is shown in a new window entitled "Service booking confirmation" that appears when the draft is ready. The status of booking is also displayed as "waiting for reply" or "confirmed" so that the captain knows the status. This plan is communicated through Finest to the corresponding service providers with request for confirmation.	Appendix 5
15	Tina-capt	Log off and continue other business	…	
16	Other vessels	Vessel Clarissa and Samba (NCL), and Challenger (ECL) book quay and other resources at Ålesund on the same day	Skutvika terminal (capacity for 2 ships) is booked by Clarissa 12-16, and Samba and Tina (time slot 16-20) Challenger with slot time 16-20 books at the Kloosterboer Terminal (private quay not operated by ÅRH)	
Booking Confirmation by Port and Terminal Services All bookings are sent to the service suppliers, who confirm or propose another time. The system updates the resource plan progressively as service suppliers confirm the booking				
17	ÅRH	Receive booking request (email). Login, and go to "resource status"	See a chart displaying the overview of vessels visiting the port.	Appendix 6
18	ÅRH	Click on the vessel Tina and "confirm booking"	The vessel box changes from red to green. And a window with the draft resource plan appears, indicating the resources booked and time-period. The user can confirm or edit the propose schedule (based on more ad hoc information).	
19	ÅRH	Confirm all resource/service booked by click on "confirm"	The services/resources change status to "confirmed"	
20	TF	Receive booking request (email) for unloading and loading services. Login, go to "resource status"	See a chart displaying the overview of vessels visiting the terminal Skutvika.	Appendix 6

21	TF	Select vessel Tina and click on "confirm"		
22	Tina-capt	NCL receives a notification of update is the service booking status. Log on, go to the " Port & Terminal Services" field, and Select Tina voyage 09ff, and port call Ålesund 04/01/2013.	The "service booking confirmation" list appears showing all status as "confirmed"	Appendix 5
23	Tina-capt	Log off and continue voyage.		
24	Other vessels	Same procedure repeated for Clarissa, Samba and Challenger	The port confirms the quay reservations as well as port resource booking, and the terminals confirm the booking of cargo handling and other necessary resources. Each ship / ship agent receives an overview of resource schedule for its port call at Ålesund	
Deviation 1: ship Clarissa is delayed => need for re-planning of port call for Clarissa and postponing the next port call's ETA (Tina). FInest compares information from AIS with vessel schedules, and detect a deviation from plan for the vessel Clarissa. A re-planning is necessary.				
25		Approx. 3 hours before Clarissas ETA, FInest detects a deviation	∞ ∞ information processing ∞∞ The resource plan for Clarissa is updated. A warning to the port and terminal is sent announcing a 2 hours- delay of Clarissa, together with suggested new resource plan, highlighting the conflict in availability (two vessels at port at the same time, same berth, because Tina is scheduled right after Clarissa)	
26	ÅRH / TF	Receive warning by FInest. Log in and go to "Resource status". The system proposes a new plan, based on new ETA, because no other quays are available for Tina's slot, or cannot be used	The new plan proposed appears for Clarissa, highlighting the conflict with Tina (overlapping slot times) and need to reschedule Tina's call.	Appendix 6
27	ÅRH	The port and the terminal check with other port community members (port and terminal services) if services can be carried out in a shorter time	A chat window is open, connecting ÅRH, TF, mooring crew, etc. The parties check whether the port call of both Tina and Clarissa (mooring, ship services, cargo handling) can be executed quicker. The conclusion is positive.	
28	ÅRH	The resource plan for Clarissa is updated, new schedules are produced by FInest, and the port & terminal click on "accept the new schedule"	∞ ∞ information processing ∞∞ Clarissa receives confirmation of new slot: ETA postponed by 2 hours, ETD by 1 hour.	
29	ÅRH	The resource plan for Tina is updated, new schedules are produced by FInest, and the port & terminal click on "accept the new schedule"	∞ ∞ information processing ∞∞ Tina receives a notification of changes in slot time, with ETA postponed by one hour, but that the ETD is unchanged.	
30	Tina-capt	The vessel receives the warning about change of slot time. Opens the message and logs on directly on FInest and the vessel call page for Tina at Ålesund 02/02/12.	An update in resource schedule appears, based on an ETA postponed by one hour.	
31	Tina-capt	The ship accept the new time slot and adapt the vessel's speed accordingly		

Deviation 2: ship Clarissa is delayed => need for re-planning of port call for Clarissa and postponing the next port call's ETA (Tina). The ship Challenger needs special services (reparation of crane) at the Skutvika terminal instead of Kloosterboer, and must change its booking				
32	Challenger	3 hours before arrival, Challenger sends a request directly to Skutvika. Terminal TF then registers the change of quay in the FInest platform.	A warning appears indicating that the quay is not available (already occupied/booked by the ship Samba). Underneath, an overview of over adequate quays is displayed. No other quay is available for Challenger, but the vessel Samba can use Flatholmen, provided that the cargo to be loaded is transferred there on time.	
33	ÅRH / TF	TF opens the chat window, to connect with the port and the Flaholmen terminal	The actors discuss simultaneously the possibility of moving Samba to Flatholmen, and Challenger to takes its original place at Skutvika. Agreements are made about the moving of Challenger cargo from Kloosterboer to Skutvika, and Samba cargo from Skutvika to Flatholmen.	
34	ÅRH / TF	Agreed changes are done manually	New resource schedules appear for both Challenger and Samba, with status "waiting for confirmation"	
35	ÅRH / TF	ÅRH and TF confirm the resource schedule.	Status is changed to "confirmed". And a notification is sent to the two vessels.	
36	Samba	Samba receives notification about change of terminal, together with an update resource schedule. This creates no inconvenience for the vessel.		
Information spreading *Updated information on re-schedule is sent to other actors depending on that information, and made available in the collaboration platform*				
37	KN	The deviations detected and re-schedules are notified by FInest to the cargo-agents and other actors, so that they can adapt and if necessary reorganize transport in order to best utilize time and the transport assets available.		
38	NCL	The information about the changes in Slot time of both vessels is made available of the collaboration space, so that "gate-closing time" for the vessel is updated. This real-time information, translated into "time-to-departure", is used by the ship operator in the case of handling of late cancellations of shipments (scenario 1) and defines the remaining time for finding replacement cargo.		

6.2.4. Effect of capabilities (evaluation criteria)

The following table summarise the FInest capabilities illustrated din the scenario, the expected effects and criteria for measuring the improvement in collaboration and integration enabled by FInest.

Table 10: Effect of FInest capabilities illustrated ion scenario 2, with evaluation criteria .

	Summary of FInest capabilities	Effect of Capability illustrated in Scenario 2	Measure	Specific description in the Scenario 2
BCM	*The Business Collaboration Module (BCM) keeps all the information that is needed for executing a logistics process and notifies the user about the occurrence of certain events (deviation, or completion of a process), therewith allowing for the end-2-end visibility*			
	Manages all information of transport processes and make it available to its user in real-time	Real-time / up-to-date information	Number of iteration to obtain up-to-date information" (number of cases when a booking/reservation was made based on outdated information.	Booking of quay based on real-time information on availability; no unecessary back-and-forth for obtaining a correct time.
	Gather external events and keep information up-to-date during the execution phase	Easy-to-find info or info incoming automatically (no need to ask, avoid unecesary check-ups) during planning and execution phase	Number of manual interventions & time (manhours) to find right information	> the ship gets automatic warning if the slot time needs to be updated. No need to check during voyage. > the port/terminal get automatic warning if vessel delayed. No need to check before arrival.
EPM	*The Event Processing Module (EPM) enables real-time tracing and advanced control for planning and execution , including SLA monitoring and rule-based analysis of (un)expected events detected through various sources.*			
	support for automated events (e.g. from a sensor network)	Early warning / Notification asap in case *of change (ETA, resource availability status etc.)*	Timing of notification (between earliest possible event detection and reception of notification)	the vessel Tina receives a notification of new slot time immediatly when information is available, rather than getting the information later when entering the port.
	Pro-active event management (e.g. providing forecast features)	Forecast, visibility, anticipation of event, based on automatic retrieval of information from existing systems	Number of events correctly anticipated (= before receiving confirmation) for a total number of events	> The port receive automatic warning of inemperies, with estimation of potential delay in next ship calls. > When booking port services, the EPM can read in the ship information system the level of fuel, water etc., and estimate the volume to be ordered.
	Produce 'event notification' for other modules (e.g. for triggering automated status updates for the events	Automatic distribution of warning msg to all concerned stakeholders from same source	Number of human intervention to send notification (per number of notification sent)	the ETA information is sent to all concerned parties simultaneously and automatically, the ship does not need to inform SSN, the port, the terminal separatly.
TPM	*The Transport Planning Module (TPM) supports dynamic (re)planning activities: finding suitable transport offers to match the deman, negotiating terms, bookings etc.*			
	Standard description of transport demands and services to facilitate information handling/exchange (distincts systems, info sources, market places etc.)	Harmonization of information and messages	Number of voyage number (SSN, Port, agent...)	The system allows a unique number (SSN)
	Configure Transport Chain Plan based on the service and demand descriptions	Efficient booking	Booking lead time from request to confirmation (waiting time for response etc.)	Thanks to correct info at time of booking, the ship gets quick confirmation, and no unecessary communication to update the booking.
	Optimization of resource use (transport route)	calculate a draft resources plan based on available real time info on resource availability	Manhours (supplier) to coordinate all resources until final plan (port, terminal etc.)	Common interface with all systems of the port and terminal service suppliers allows for an effective and efficient configuration of resources.
	Allow re-planning (e.g., change of route due to some delay)	Recalculation of plan based on updates / events	Manhours to replan port call in case of event (same as above)	
	Functionality for booking of the services, notification to concerned parties, order status.	One-stop shopping: coordinate bookings, booking requests and confirmation betweeen port/terminal and ship via one single window	Number of registrations /interaction (ship-port, ship-terminal etc.) per port call	The captain ship can register all port call related information in one place
ECM	*The E-Contracting Module (ECM) provides support for service provider selection, contract negotiation and agreement, contract management and the definition of contract related service requirements.*			
	Represent in an electronic and online form the attributes of T&L contracts, so that they can be automatically searched	Search for services takes into account existing bilateral contracts.	Number of errors in match-making, i.e. number of irrelevant matches per total number of offers found	Terminal selection limited by existing agreement between carrier and terminal (the quay "Skutvika" appears as "default quay" for NCL)

6.2.5. Potential benefit

This scenario is one of many combinations of possible events. For evaluating the potential benefit and business value of using the FInest solution, a benefit analysis is suggested, based on distinct sets of events, scope, and frequency. The following table is an initial collection of data to be used in a benefit analysis.

Table 11: Dataset for benefit analysis of the Resource Coordination Hub concept.

		as-is				to-be		
EVENTS	***Scope***	***Frequency***	***Time of notification***	***Handling efficiency***	***Performance***	***Time of notification (earliest possible)***	***Handling efficiency***	***Potential performance improvement***
Port call notification / booking of quay	ca 4-6 timer	1000 anløp per måned	48 - 0 hours before ETA	**appr. 0,2 man-year** for treatment of port call notification, booking of quay, confirmation to ship agent.	Much human intervention leads to vulnerability and high risk of errors, delay in information transfer. Limited visibility and capacity to schedule (much based on personal experience).	48 - 0 hours before ETA.	**up to 75% reduction** in resource, due to full automatisation of port call notification.	less errors, more efficient and reliable booking of quay, easier schedule of quays
example 1: early port call notification (over 24h before ETA)	port call duration 4 hours (cargo handling)	90 %	24-6 timer før ETA	one port call notification requires at least **5 interactions:** ship agent - SSN, SSN - port (24hrs b.ETA), ship agent - port and ship agent - terminal (6 hrs b-ETA), then port-ship and port-terminal (arrival)	problem of info mismatch, or unreliable info (too early or not communicated to all parties)	24hrs b-ETA, same time as SSN	automatic retrieval and update of information of data from SSN can **spare most of the direct interactions**	same info for all; up-to-date info;
Example 2: Late port call notification (less than 6 h before ETA)	port call duration 2 hours (change of seafarer or technical problem)	10 %	6-0 time before arrival	1 man-hours (port) and at least 5 interactions (port with agent, ship, terminal, mooring crew, pilot) per port call	too little time to replan correctly; must find a semi-solution; loss of resources that could have sesrved for a better purpose	reduction in last minute notification	up to 50% improvement (man-hour and nrb of interactions)	quicker replanning and better overview of available resource enable better rescheduling of resources in emergency situation
Earlier arrival								
Example 1: earlier departure from POO	0,5-2 hours before first ETA	15 % of calls	1-0 hours before arrival	**appr. 0,2 man-year** (call-round every Thursday-sund morning)				
Example 2: error in registration of ETA		5 % of calls	0 hours before arrival	**appr. 0,2 man-year** (call-round every Thursday-sund morning)		24 hrs b-ETA		Automatic information control enables reduction of errors, thus better preparedness
Example 3: replanning of ship voyage	earlier or later ETA	up to 10 times per port call	48 - 0 hours before arrival	**appr. 0,2 man-year** (call-round every Thursday-sund morning)		48-24hrs		jo tidligere informasjonen, jo lettere det er å finne en tilpasning (annen kai, flytte neste anløp osv.)
Later arrival								
Example 1: weather conditions	1-4 hrs delay	15 %	0-2 hrs b-ETA	up to 8 man-hours in lost manpower (port control, mooring crew, etc.) per delay		up to 24 hrs b-ETA		
Example 2: delay in departure from POO	0,5-2 hrs	15 %	0-2 hrs b-ETA	up to 8 man-hours in lost manpower (port control, mooring crew, etc.) per delay		up to 6 hrs b-ETA		
Change of quay (unnotified)								
Example 1: Same ETA, but different quay	1 ship - 1 change of quay	20 %	0 hrs before arrival		new quay; and old one reused for other ship og service.	12-24 hrs b-ETA		
Example 2: 2 ships arriving simultaneously (one late/one early)	2 ships - one quay	20 %	0 hrs before arrival			2-24 hrs b-ETA		
Late departure								
Example 1: delay in loading	delay up to 2 hours	30% of calls	95% less than 1 hr before ETD			at least 2 hrs before ETD		
Example 2: ship asks to stay longer	overnight	10 %	when arriving					
Booking port resources	water, mooring, electricity, bunker, pilot	100 %	6-0 hrs b-ETA	appr. 1 man-hour per port call for planning of resources, and a least 5 interactions: port <=> mooring crew, service crew (water, electricity, bunker),		24 hours before ETA.	**up to 75% reduction** in resource (man-hours + interactions), due to full automatisation of port call notification.	
Example 1: Booking of pilot when approaching the port, due to bad weather			2-0 hrs b-ETA			24 hours before ETA.		improved readiness to change (better anticipation of possible delay due to weather)
Example 2: Booking of water when needed / at port		99% of port calls			Must find available resources; sub-optimal use of resources (water, crane, manpower) because late information, and could plan the service better			better planning: Improved use of reosurces and disponility of manpower for other works

6.3. Scenario 3: Real-time event handling

6.3.1. The scenario / story

The scenario explains how the challenge of gaps between the original booking and the actual shipment can be reduced or managed as good as possible. In this scenario, the shipper, trucker, forwarder and air carrier are working together in one supply chain. The demonstrator focuses this time only on the execution of a freight transport and shows how deviations can be managed.

The business users represented in the test scenario are:

Shipper: Is triggering the freight transport and "causing" the deviations in the shipment because they want to ship more after the original booking is made. The shipper has asked the forward to organize the whole transport, from end to end.

Trucker: The trucker is asked by the forward to pick up the goods to be shipped at the shipper and bring it to the forwarders warehouse.

Forwarder: The forwarder is arranging the whole transport and made an agreement with the air carrier for the shipments.

Air carrier: The airline is execution the air transport.

6.3.2. Test protocol

Table 12: Test protocol for "Real-time event handling" scenario

STEP	ACTOR	PROCESS DESCRIPTION	EXPECTED RESULT	TEST DATA
Change request from shipper				
1	*Shipper*	*Logs in into the finest platform*	*His basic booking window is displayed*	*See demonstrator 3*
2	*Shipper*	*Goes to the booking he wants to change*	*He sees the booking he wants to change*	
3	Shipper	*Changes booking from 3-5 pallets*	*A change request is set up*	
4	Shipper	*Submits booking*	*A change request is being sent toward the forwarder and carrier*	
Change assessment and proposal from air carrier				
1	*Carrier*	*Carrier logs in into the Finest platform*	*He sees the standard Finest screen with different opportunities*	
2	*Carrier*	*The carrier goes to "my bookings"*	*The carrier has an overview of his bookings and where the changes are*	
3	*Carrier*	*The carriers selects the booking to investigate the changes*	*The carrier get all the details from the booking*	
1	*Carrier*	*BLACK BOX*	*Start up replanning*	
2	*Carrier*	*The carrier enters the new proposal into the system*	*The carrier gets a screen where he can fill in the changed offer. Flight nr. Date, time of departure and arrival, freight dimensions to be transported and price*	
3	*Carrier*	*The carrier confirms his new offer*	*He gets a confirmation button to push on.* *The proposal is sent to the forwarder*	
2	*Carrier*	*The carrier logs off*		
Change assessment and proposal from forwarder				
1	*FWD*	*Log in to FInest*	*Access granted to myFInest*	
2	*FWD*	*Go to my bookings*	*Booking App will opened*	
3	FWD	*Select booking to be changed*	*Record selection and details provided*	
4	FWD	*Enters new values*	*Booking details are amended*	
5	FWD	*Recalculating charges*	*According to changes the charges will changed based on the agreement with the shipper or general freight tariffs (as set up somewhere in the business partner/ contact management app)*	

6	FWD	*Submits changes to shipper for confirmation*	*Send notification to shipper for change confirmation/ booking is highlighted as waiting for approval from client*	
7	SHP	*Shipper receives and confirms changes*	*Change notification appears as urgent in INBOX Crosschecks and approves changes. Submits change confirmation*	
8	FWD	*Confirms approval*	*Automatic update of the booking* *Status change to confirmed*	
9	FInest	*Send change notification to carrier*	*Carrier receives change notification from Finest* *Booking details is automatically updated*	
Change assessment from shipper including submission				
1	*SHP*	*Log in to FInest*	*Access granted*	
2	*SHP*	*Open current shipment panel*	*Shipment app / ERP is opened*	
3	SHP	*Select shipment*	*Shipment overview displayed*	
4	SHP	*Open shipment details*	*Details of selected details are shown*	
5	SHP	*Change shipment details*	*Details are changed*	
6	SHP	*Submit changes to FWD*	*Submit button is engaged message is displayed "changes submitted"*	
7	SHP	*Receive new proposal from FWD*	*message received / INBOX highlighted*	
8	SHP	*Confirm or reject new proposal*		
8.a1	SHP	*confirm new proposal* *submit confirmation to FWD*	*Submit button is engaged message is displayed "changes confirmed"*	
8.a.2	FInest	*Send Notification to carrier*	*Carrier notification message is send automatically*	
8.b.1	SHP	*Reject new proposal* *Submit rejection to FWD*	*Shipment changes to open* *Booking at forwarder cancelled*	
8.b.2	Finest	*Send notification to carrier*	*Carrier notification message is send automatically*	
8.b.3	SHP	*Got o e-market place*	*e-market place app is opened*	
8.b.4	SHP	*Drop service demand*	*Service request is entered*	

6.3.3. Effect of capabilities (evaluation criteria)

Table 13: Effect of FInest capabilities illustrated ion scenario 3, with evaluation criteria .

	Summary of FInest capabilities	Effect of Capability illustrated in Scenario 3	Measure
BCM	The Business Collaboration Module (BCM) keeps all the information that is needed for executing a logistics process and notifies the user about the occurrence of certain events (deviation, or completion of a process), therewith allowing for the end-2-end visibility	The BCM organises information availability on time, in full. So, at the end it gives a time advantage. Pooled information will provide a more reliable data base (data integritiy) for the operation within the supply chain.	# adaptions to the original plan (plan stability) Plan attainment (do we full fill the plan) Longterm monitoring of manual effort
	Manages all information of transport processes and make it available to its user in real-time	The BCM organises information availability on time, in full. So, at the end it gives a time advantage.	Time between first occurrence event and corrective action (reaction time period as a measure?)
	Allows users to enter additional information visible to other users with access rights	Improves the status update awareness among the SC partners	Service Quality SLA metrics (KPI)
	Gather external events and keep information up-to-date during the execution phase	Actual/up2date information for a partners in the supply chain	
EPM	The Event Processing Module (EPM) enables real-time tracing and advanced control for planning and execution , including SLA monitoring and rule-based analysis of (un)expected events detected through various sources.	Events are faster communicated towards different players in the supply chain. This makes it possible to react earlier than before. Making it possible to reduce/minimize the negative effects of this event. Will increase the transpanrency as well as the scalability of deviations might be caused due to risks & threats (proactive forcasting)	KPI - shipments on time etc
	Pro-active event management (e.g. providing forecast features)	Both forwarder and airline know earlier when changes occur and can adapt accordingly. Effects can be like: better asset utilization, hire the right number of people to handle the freight until loading into the aircraft	Asset utilization # offloads due to more cargo delivered then booked
	Produce 'event notification' for other modules (e.g. for triggering automated status updates for the events	Increases data quality and integrity, will assis to support more accurate planning and asset utilization.	
TPM	The Transport Planning Module (TPM) supports dynamic (re)planning activities: finding suitable transport offers to match the demand, negotiating terms, bookings etc.	planning and replanning is a black box in Use Case 3 but the planningfunction of AFKL will definitely get better plannings input than before.	Plan attainment Plan stability Plan accuracy are from my point of view the most three basic KPI's. Let's start with these
	Configure Transport Chain Plan based on the service and demand descriptions	Enables to create detailed end to end transport plans including the defintion of transport specific event rules. Decreases manual interaction while planning and moniroting.	Manual effort - head count
	Allow re-planning (e.g., change of route due to some delay)	Improves service quality in regards of (forecasted) deviations	Defined customer specific KPI
	Functionality for booking of the services, notification to concerned parties, order status.	reduction of manuel effort	Monitoring manual effort
cSpace	Demand predictability (App specific)	By getting earlier info regarding events/gap on the plan, AFKL will be better capable of handing demand deviations	Plan accuracy. How close to real time can we get with our planning?
	info from trusted sources	Real freight is conform the data received	

6.4. Scenario 4: ePlanning (Transport Order Management)

6.4.1. Experimentation lay-out

ePlanning scenario addresses the challenges encountered during the operational planning of the transport activity from the view point of a consumer goods manufacturer and will serve to test the capabilities of FInest through the real-world use case trial called "Import and Export of Consumer Goods".

The import and export of consumer goods trial addresses a supply chain network which can be differentiated by several dimensions; by the nature of the markets (i.e. consumer expectations in the markets), by product ranges (relative importance i.e. priority of a product in that specific market), by sourcing types (production or trading) and also by the agreements and the content of the business done in collaboration with transport service providers and their capabilities. International transport is always constrained by the laws and enforcements by the legal authorities (i.e. customs); however impact of such mechanisms on the business flow will not be included in the scope of this trial.

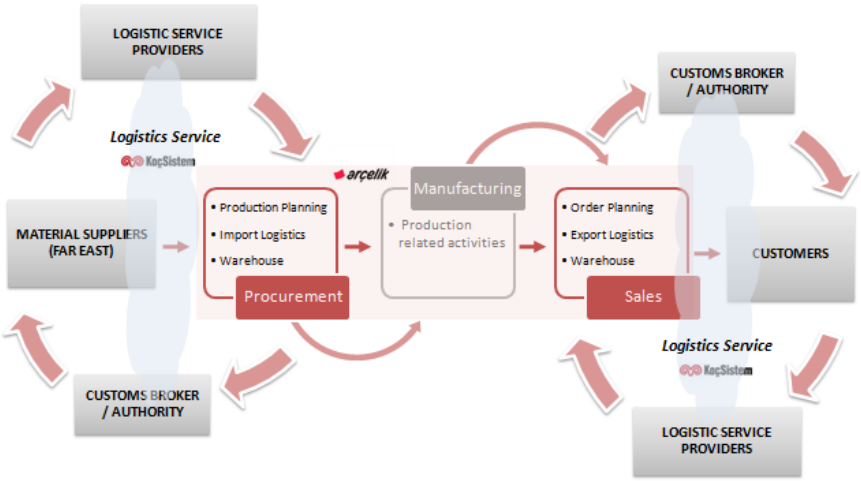


Figure 11: Layout of Import and Export of Consumer Goods Trial

As depicted in the figure given above, the process starts with a procurement order of raw materials from (a) material supplier(s) located in the far-east and inbound transportation of the materials to the facility of Arçelik where they will be transformed into finished goods that in turn will be exported as consumer electronics goods to the UK.

The trial includes operational planning of logistics activity in line with the existing production plans (for inbound) and promises to customer (for outbound), purchasing/planning of logistics operations and the timely monitoring and coordinating the execution of the transport activities. The trial can easily be scaled up to the total supply chain and also other supply chains in Phase 3.

End-to-end collaborative supply chain planning, along with the enhanced visibility, is essential. Linking demand with supply throughout the entire supply chain is required for implementing tailor-made supply chain strategies in order to increase reliability and responsiveness to customer with a cost efficient and high quality manner. Cloud-based collaboration services and

apps can lead to wide acceptance with a large number of small suppliers and dealers, as it significantly reduces the investment in such IT.

6.4.2. The scenario / story

ePlanning scenario mainly focusses on the management of the transport service, i.e. transport order & booking and organizing the execution of an inbound process for Arcelik. The story is built around the procurement of raw materials from far east and planning of its transport in collaboration with supplier and transport service providers.

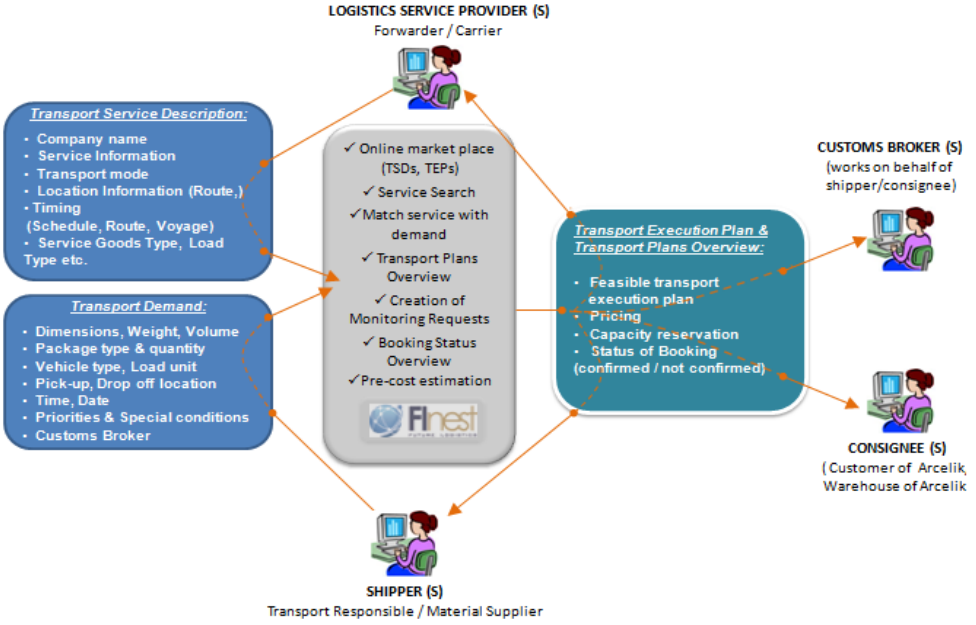


Figure 12: Conceptual description of the e-planning scenario

The main emphasis in this scenario is on "fast and seamless" information sharing through one channel by exploiting the capabilities of future internet applications. Figure 12 above schematizes the information flow through the envisioned platform between main actors and its content.

The main business users represented in the test scenario are:

Transport Planner (Logistics Responsible from Arçelik): the person in charge of shipment planning in coordination with production planning (due to the agreed Incoterms with material supplier), hence the main decision maker in the current setting.

- Checks and confirms transport demand
- Decides on the final transport plan
- Responsible from shipping arrangements and booking

Logistics Service Provider (s): the person(s) in charge of planning and execution of shipment.

- Publishes transport service description (real-time schedule, updates, routes etc.)
- Confirms/Rejects bookings

Material Supplier (Cargo Shipper): is the actual owner of the goods to be transported.

- Responsible for preparing the goods for the transport
- Creating the packing list information and describe the transport demand accordingly

In addition to the main actors stated above, the scenario is extended to include other actors namely production planning, logistics contract manager and warehouse representatives which in real-life takes active roles in the process however their level of activeness is limited to an extent in the test setting.

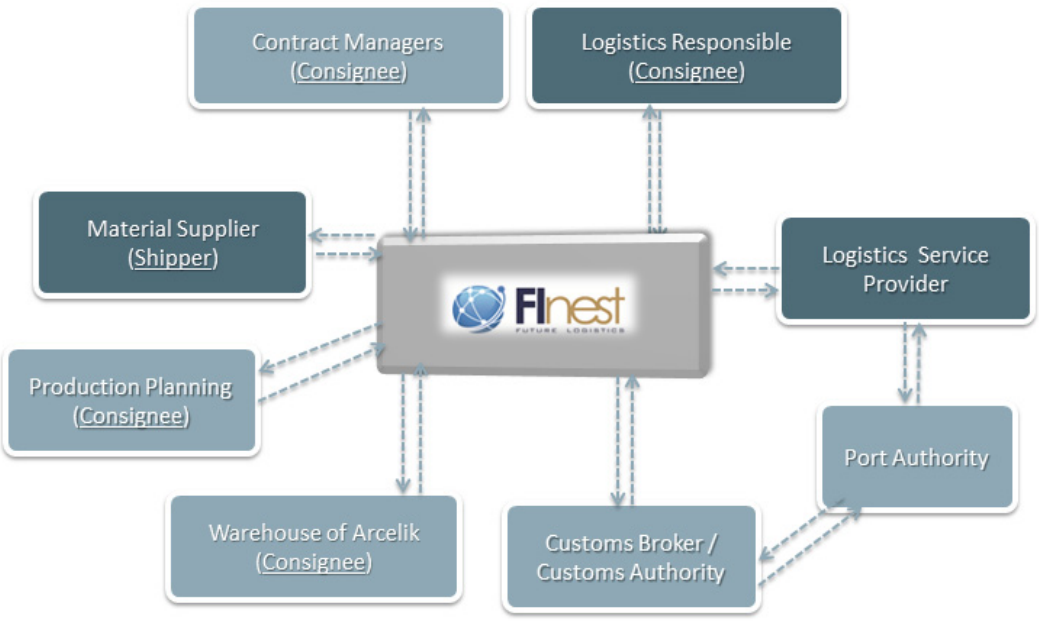


Figure 13: Actors of the e-planning scenario and interactions

6.4.3. Test protocol

Table 14: Test protocol for "e-planning" scenario.

STEP	ACTOR	PROCESS DESCRIPTION	EXPECTED RESULT	TEST DATA
Initiate shipping demand				
Production Planner (from Arcelik) finalizes the shipping request and triggers Material Supplier (MS) i.e. Shipper and Logistics Responsible (LR) i.e. Consignee for the start of the transport planning process				
1	PP	Log in and Open "My Orders"	A list of material purchase orders from different suppliers are displayed	See Appendix 1
2	PP	Production Planner can edit/cancel order (e.g. change requested time) or request shipment for the order (i.e. trigger material supplier and logistics responsible for transport planning)	Buttons for "editing/cancelling" the order and also for "requesting delivery" are displayed and PP can do alterations using the buttons	See Appendix 1
3	PP	Selects Item 4 in order with reference number 1000242701 and clicks "Request Shipment button"	Overview of Selection is displayed on the screen	See Appendix 1
Describe the shipping demand				
Material Supplier (MS)- Responsible from Hanshin Machinery start to describe the shipping demand				
4	MS	Log in and open the field of "Transport Demand"	A list of purchase orders/sales orders that are under his responsibility and are /will be ready for shipment is displayed	See Appendix 2
5	MS	Select the orders of whose transport demand he is willing to describe	Overview of the selection is displayed	See Appendix 3
6	MS	Click on "Create Shipping Order Form" from selected orders	Packing list information is displayed. Packing list is created automatically (transfer from legacy system). The screen should also include fields for manual entry of the packing list (in case no automatic transfer is possible)	See Appendix 3-4
7	MS	Click on " Store Shipment Creation"	A unique transport demand number will be assigned by FInest and displayed for the stored transport demand	See Appendix 4
8	MS	Click on " Finish Shipment Creation"	System sends notification to the Logistics Responsible (LR)	See Appendix 4
Publish on Market Place				
Logistics Responsible (LR) publishes the demand to collect spot quotations				
9	LR	Log in and Open the field of "Transport Demand"	A list of transport demands are overviewed	See Appendix 5 -I
10	LR	Selects demand details of 1617129 from the list	The details of the demand is overviewed	See Appendix 5-II and Appendix 5-III
11	LR	Selects 1617129 from the list	Overview of Selection is displayed on the screen	See Appendix 6
12	LR	Click on "Publish on marketplace"		See Appendix 6
Plan transport				
Logistics Responsible (LR) plans the transport and places the transport order				

13	LR	Open the field of "Transport Demand"	A list of transport demands are overviewed	See Appendix 6
14	LR	Selects 1617129 from the list	Overview of Selection is displayed on the screen	See Appendix 6
15	LR	Click "Plan Transport"	Overview of Transport Alternatives is displayed	See Appendix 7-I
16	LR	Click on "Details"	Detail of the Transport Service is overviewed	See Appendix 7-II
17	LR	Selects the transport alternatives	Overview of Selection is displayed on the screen	See Appendix 7-III
18	LR	Click "Monitoring Requests"	A list of Expected Notifications are displayed	See Appendix 8
19	LR	Selects the transport alternatives and Click on "Customs and Agents"	A window opens which includes some fields to be filled	See Appendix 9-I
20	LR	Selects customs agency from the predefined list and Click on "Back"	The address and contact details of the customs is overviewed	See Appendix 9-II
21	LR	Click on "Book Selected Transports"	A summary of the order together with the Shipment ID and its status is displayed.	See Appendix 10
Confirm/Reject/Edit Booking Request				
Relevant Logistics Service Provider(s) (LSP) are informed about the booking request				
22	LSP 1	Selects "My Orders" and accept/rejects/edits booking	A list of transport orders of which only he is responsible are displayed and he replies to the demand	See Appendix 11
23	LSP 2	Selects "My Orders" and accept/rejects/edits booking	A list of transport orders of which only he is responsible are displayed and he replies to the demand	See Appendix 12
24	LSP 3	Selects "My Orders" and accept/rejects/edits booking	A list of transport orders of which only he is responsible are displayed and he replies to the demand	See Appendix 13
Monitor Booking				
Logistics Responsible (LR) monitors the status of his bookings				
25	LR	Click on "My Bookings"	Screen showing the status of the bookings is displayed.	See Appendix 14-I
26	LR	Select 67352 and click display details	Screen showing the details of the selected booking is displayed.	See Appendix 14-II
Finalise Packing List				
Material Supplier (MS)- Responsible from Hanshin Machinery finalizes the packing list				
27	MS	Selects "My Shipments" and 1617129 from the list and clicks on "Edit Packing List"	The packlist details are overviewed and can be altered.	See Appendix 15-I and Appendix 15-II
View incoming transport				
Warehouse Responsible (WR) views incoming transport orders and confirms the arrival				
28	WR	Selects "Incoming Orders"	A list of incoming orders is overviewed.	See Appendix 16
29	MS	Clicks on "Unloading Completed" when the products are unloaded	The status is updated to unloading completed.	See Appendix 16

6.4.4. Effect of capabilities (evaluation criteria)

Table 15: Effect of FInest capabilities illustrated ion scenario 4, with evaluation criteria .

	Summary of FInest capabilities	Effect of Capability illustrated in Scenario 4	Measure	How to quantify?	Degree of Complexity	Explaination for Use case 3
BCM	*The Business Collaboration Module (BCM) keeps all the information that is needed for executing a logistics process and notifies the user about the occurrence of certain events (deviation, or completion of a process), therewith allowing for the end-2-end visibility*					
	Global knowledge base for collaborative business processes	Improved collaboration & allignment between business partners due to data from one source	*Number of intervention with systems and contacts for information sharing & processing *Time spent for information sharing & processing	Quantitatively	Medium	Currently neccessary data is distributed over multiple sources (several different systems and contacts); therefore it creates a burden of collecting & macthing information from several different sources.
	Manages all information of transport processes and make it available to its user in real-time	Real-time/correct information on transport alternatives Ease of real-time/correct information on the current status of the shipment for re-planning purposes	*Number of iteration to obtain up-to-date information *Number of transport orders revised since the information is not real-time on the time of	Quantitatively	Hard	The ship names are frequently updated espacially import operations and several orders are revised later on since the information is not real-time on the time of the order creation.
			*Efficiency of the process	Qualitatively	Medium	If a ship name changes, materail supplier asks the confirmation of Arçelik Import department-> Import responsible asks to the logistics service provider whether there is a change in ships, gets confirmation -> Import responsible informs material supplier about the change -> Then material supplier starts loading.
	Allows users to enter additional information visible to other users with access rights	Eliminate manual non-value added processes while describing the demand (today mostly manual and spreadsheet driven) Eliminate some of the manual human errors on demand description Ease of describing demand & booking	*Time (Man hours spent, FTE) for manual nature of demand description	Quantitatively	Medium	Currently material supplier describes the demand on excels (which are not always filled in the requested format) and send the excel file, namely "the shipping order form" back to the Import responsible-> Then import responsible creates an entry to the system based on the information given on "the shipping order form". In the envisioned solution, material supplier makes the demand description online, hence eliminates non value added activities.
	Gather external events and keep information up-to-date during the execution phase	Efficient replanning & planning with up-to-date information from one source	*Time (Man hours spent, FTE) for final transport plan composition in case of deviations (time to respond to a deviation) *Number of manual interventation/iteration to obtain up-to-date information during execution	Quantitatively	Hard	During the execution phase, it is not always easy to obtain up-to-date information in case of deviations to immediately start replanning
EPM	*The Event Processing Module (EPM) enables real-time tracing and advanced control for planning and execution , including SLA monitoring and rule-based analysis of (un)expected events detected through various sources.*					
	Support for user-events (manual inputs)					
	support for automated events (e.g. from a sensor network)	Early warning in case of deviations	*Number of on-time informed deviations/all deviations	Quantitatively	Hard	It is not easy to determine the number of deviations informed real-time
	Pro-active event management (e.g. providing forecast features)	Early warning for deviations and proactive deviation management for replanning	*Number of predicted deviations / all deviations	Quantitatively	Medium	e.g. Prediction of a transport delay which might trigger replanning
	Produce 'event notification' for other modules (e.g. for triggering automated status updates for the events	Real-time Alerts/Warnings to main responsibles which will lead them to take counter actions if the transport order not confirmed or transport service description is altered	*Time to respond to an event	Quantitatively	Hard	Real-time warning if the transport order is not confirmed
TPM	*The Transport Planning Module (TPM) supports dynamic (re)planning activities: finding suitable transport offers to match the deman, negotiating terms, bookings etc.*					
	Find services (from long-term contracts and spot market) that fulfil the demand, using the ECM	Ease of configuring transport alternatives	*Time to form the best transport plan	Quantitavely	Hard	Currently the search of alternatives and up-to-date services is done manually (if necessary) to form a transport plan.
	Configure Transport Chain Plan based on the service and demand descriptions	Ease of booking, easy of invoice verification	*Number of transport orders with manual errors/ All transport orders	Quantitavely	Medium	Currently transport orders with manual errors (inconsistencies in information content etc.) ar being reported in Import Logistics; therefore they can be eliminated if there would be a automated match between service and demand.
	Allow re-planning (e.g., change of route due to some delay)	Fast and efficient replanning	*Time for replanning	Quantitavely	Hard	Currently replanning requires manual intervention with several different systems and manual correction of data in them. This feature might helpto react to changes in plans in a short notice
ECM	*The E-Contracting Module (ECM) provides support for service provider selection, contract negotiation and agreement, contract management and the definition of contract related service requirements.*					
	Represent in an electronic and online form the attributes of T&L contracts, so that they can be automatically searched	Ease of access to the necessary info from contracts Ease of benchmarking of different contract variables for analysis Ease of invoice verification	*Time spent for invoice verification	Quantitavely	Hard	Automated contract search & data extraction rather than the inefficinet nature of handling with paper based contracts
	Publish demand and offers on e-market places (enable quotations…)	Ease of configuring transport alternatives	*Time to form the best transport plan	Quantitavely	Hard	Currently the search of alternatives and up-to-date services is done manually (if necessary) to form a transport plan.

LOWER COST:
--> Optimize transport partner selection:
* Improved visibility on available services & alternatives and current status of contract conditions (tariff, quotas etc.)
* Automated cost calculation
--> Reduced operational costs:
* Less manual intervention to obtain & share information (automated info exchange i.e. automated shipment tracking with the help of future internet infrastructure)

HIGHER CUSTOMER SATISFACTION:
--> Improved collaboration due to up-to-date information from one source
--> Better planning & allignment due to increased visibility on the status of the shipments

LOWER THROUGPUT TIME (Lead time from the description of transport need till arrival of goods to destination):
--> Less manual intervention for info sharing & processing for transport booking
--> Easier & faster to find partners with the help of dynamic market place
--> Dynamic transport planning & replanning
--> Higher responsiveness due to early warning of deviations & proactive deviation mngt

EFFICIENT PROCESS MANAGEMENT:
--> Increased visibility on processes (responsibles, bottlenecks etc.)
--> Increased visibility on enviromental performance
--> Proactive event management
--> Automated and on-time detection of contract violation
--> Electronic distribution of contract specific execution information
--> Improved process mngt with rule based alerts/notifications

6.4.5. Potential benefit

Table 16: Dataset for benefit analysis of the e-planning concept.

		as-is				to-be		
EVENTS	*Scope*	*Frequency*	*Time of notification*	*Handling efficiency*	*Performance*	*Time of notification (earliest possible)*	*Handling efficiency*	*Potential performance improvement*
Inefficiencies in demand description								
Example 1: delay in demand description by material supplier	**Import Shipments**	**12 %**	On average 9 days delay after the ex-factory date (only the orders with delays are taken into account)		If the shipping order form (demand description) arrives later than expected, the planning time period shortens. Hence this case requires urgent planning and might result in extra costs for expeditment or other unexpected costs. Also collaboration in this case is harder than normal cases.	3 days after ex. factory date		For planning purposes demand description should arrive asap without any delay. With automated notifications and control of the process in a common platform, we expect an improvement in the process.
Example 2: manual data entry errors during demand description at Arcelik Import Logistics	**Import Shipments**	**1 %**		approx. 0,06 man-year	Errors should be corrected immediately in order to avoid any inconsistencies in the transport planning process. Therefore are checked periodically and responsibles manually correct their errors.		0 man hours	The transfer of demand description will be automated hence human intervention and the risk of errors will be limited to a certain extent. No errors will be expected in the Arcelik side. Therefore no manhours required for correction purposes.
Schedule/ Route updates								
Example 1: ETA update / Route al	**All Shipments**	**83 %**	2,7 days on average (absolute basis)	approx. 3,28 man-year	All the information updates should be transferred to other systems which are currently not communicating. Therefore a manual effort is spent for ensuring information is up-to-date and in line in all systems.		0 man hours	The system will automatically update relevant data if there is an update in the shipment schedule. Information in all relevant parties will be synchronized and in line since it will be distributed from one source.
Example 2: Port call or Vessel can	**All Shipments**	**< 1% of the voyages, can have an impact on < 2% of sales orders (educated guess)**		Port call/ vessel cancellation requires at least 4 interactions: 1-Collaboration with production planning about the change 2-Inform material supplier about the change to update shipping documents 3-Replan the shipment with logistics service provider 4-Update all the information in the transport planning system **Inform customers if necessary about the delay.			Only interaction with FInest	All information will be distributed through one channel to the relevant parties and information updates in the system will be automatized therefore unneccessary human efort for manual data processing will be eliminated.
Inefficiencies in transport order creation process								
Example 1: Redundant steps in transport order creation process	**All Shipments**	**100 %**		Transport order creation requires at least five interactions: 1- Production Planner - Material Supplier 2- Material Supplier - Arcelik Logistics Responsible 3- Arcelik's Logistics Responsible - Contract Manager or info 4- Arcelik Logistics Responsible - Logistics Service Provider (Turkey) - Schedule and booking 5- Logistics Service Provider (Turkey) - Logistics Service Provider (abroad) *Arcelik's Logistics Responsible - Production Planner (if necessary) ** More interaction exists but not listed in this example Approx. 6,29 man-year is spent for transport order creation.	Currently transport order creation consists of the below steps: 1- Request demand description from material supplier (SOF) if not available. 2- Request (if not already available) schedule from transport service provider 3- Check if the status is up-to-date if neccessary 4- Check the expected arrival time of the shipment to the facility in Turkey and decide whether the shipment is suitable for production plan 5- Calculate container utilization & check alternatives to optimize it 6- Check costs of the alternatives 7- Look up the shipment ID (voyage number) from the schedule and copy it to the transport order creation system		All parties will communicate using FInest platform. We expect an improvement of at least %10 by FInest solution.	We believe redundant steps (especially manual information transfer & one-to-one collaboration burden) can be eliminated to an extent where the transport responsibles can create transport orders more effectively and can communicate their needs with logistics service providers in a more accelerated manner.

6.5. Scenario 5: Automated Shipment Tracking for Export to UK

6.5.1. Experimentation lay-out

Scenario 5 addresses the challenges related with shipment monitoring during the execution of phase of transport to the consignee in the "Import and Export of Consumer Goods" trial.

The transport chain planning and optimisation with effective and proactive deviation management is necessary to ensure on-time delivery in full and high on shelf availability at the destination with high customer satisfaction level. Re-planning should be triggered at the right time to prevent delays to prevent loss of sales, loss of company prestige, reliability and goodwill of customers. The trial will explore the benefits of future internet applications that can improve collaboration with real-time information sharing through one channel and increased level of interaction between involved parties.

6.5.2. The scenario / story

Automated shipment tracking scenario mainly focuses on the process of shipment status monitoring and timely deviation handling with automated notifications and triggers for re-planning. The scenario starts when the consumer appliances or materials leaves the pick-up locations and continues till their journey to their destination.

The main requirements of the scenario are listed below:

- ✓ LSP has real-time tracking systems available and accepts to share its data with the FInest platform. Real time tracking data will be simulated in the trial.
- ✓ Real-time data on shipment status (event) is extracted from information sources electronically.
- ✓ Actors can define their points of interests and performance criteria (e.g. agreed duration) for their monitoring requests (alert rules) and can subscribe to the events that they are interested.
- ✓ After the execution phase of the shipment is started, according to the monitoring requests they defined, actors receive notifications/alerts. Cargo deviations and time deviations are informed to the parties when they happen (within a very short notice) or prior to the event to ensure a proactive approach in re-planning.
- ✓ The shipment status is visible to the all parties involved (who have authorization to see it) from one source.
- ✓ By using sorting/reporting features, users can form lists/reports including information about the shipments that they would like to monitor if they have authorization; hence can manage their workload effectively by planning current & proceeding operations based on more reliable data.

The story is built around one particular shipment of washing machines from Arcelik's warehouse located in Istanbul, Turkey to the customer's warehouse located in the United Kingdom. The factors leading to re-planning (such as an update on production plans) and timely monitoring the status of the shipment (for customer to support him for unloading organization) are presented as well as how future internet can improve the planning approach with on-time notifications and fast & seamless information sharing.

Figure below schematizes the envisioned interactions between actors and information systems with the use of future internet technologies.

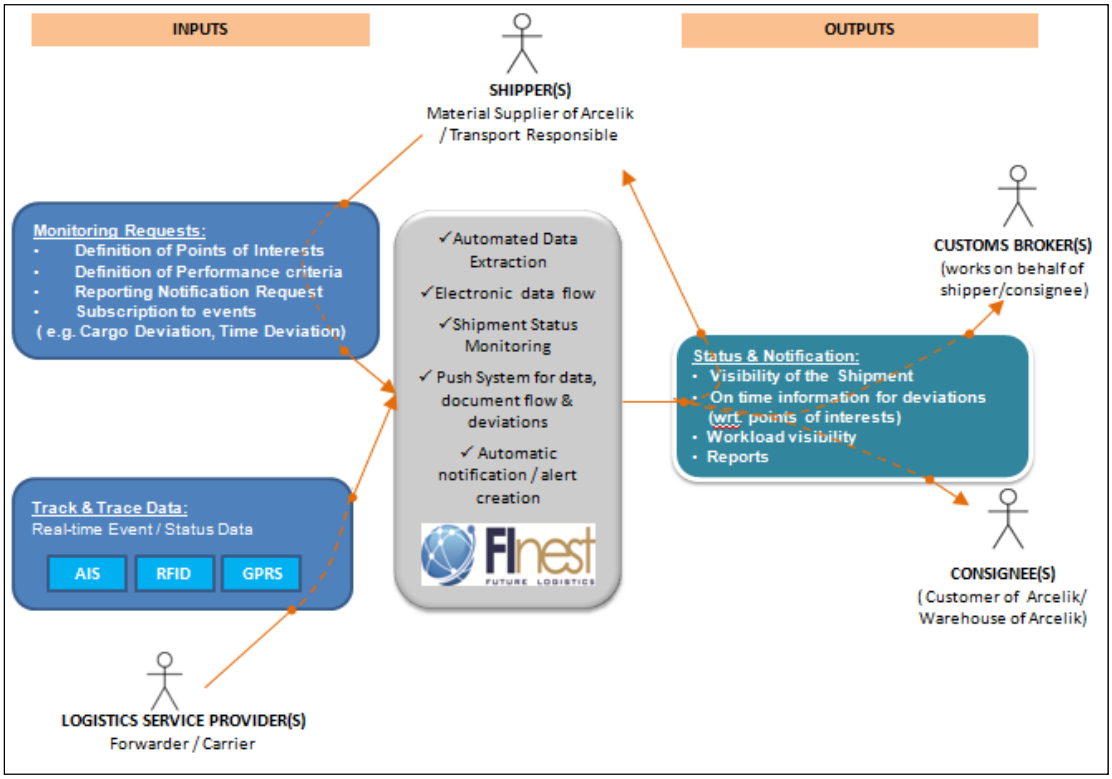


Figure 14: Conceptual description of the Automated Shipment Tracking scenario

The business users represented in the test scenario are:

- ✓ **Order Management:** Describes initial transport demand depending on the production plan
- ✓ **Logistics Responsible (Transport Planner):** the person in charge of shipment planning, deciding on the final transport plan and booking. In the current scenario Arçelik is responsible from shipment planning (due to the agreed Incoterms) hence the Transport Planner is the Logistics responsible from Arçelik for both Import and Export use case scenarios. Transport planner either can act as a "Supplier" (export case) or "Receiver" (import case).
- ✓ **Warehouse Responsible:** the person who is responsible from supplying the goods to be transported and status updates related with loading and unloading.
- ✓ **Export Customs Agency:** the person in charge of execution of the customs operations in the exporter country.
- ✓ **Inland Transporter at exporter country:** the person in charge of execution of inland shipment in Turkey. Confirms/Rejects bookings.
- ✓ **Carrier:** the person in charge of execution international leg of the shipment. Confirms/Rejects bookings.
- ✓ **Import Customs Agency:** the person in charge of execution of the customs operations in the importer country.
- ✓ **Inland Transporter at the importer country:** the person in charge of execution of inland shipment in UK. Confirms/Rejects bookings.
- ✓ **Customer:** the person who will receive the goods.

6.5.3. Test protocol

Table 17: Test protocol for "Automated shipment tracking" scenario

STEP	ACTOR	PROCESS DESCRIPTION	EXPECTED RESULT	TEST DATA
Update transport demand				
Order Manager updates the demand description and informs Logistics Responsible				
1	OM	Order Manager opens "My Orders" and selects the ones whose production date is delayed	A list of orders is overviewed	Appendix 1
2	OM	Selects all items in Purchase Order 7500130082 and clicks "Notify Logistics"	Notification is sent to the Logistics Responsible	Appendix 1
Update transport plan				
Logistics Responsible (LR) re-plans the transport to the next standard (predefined) voyage				
3	LR	Opens "My Transport Plans"	A list of plans some of which has notifications are overviewed	Appendix 2
4	LR	Selects all items in Purchase Order 7500130082 and clicks "Transfer to next shipment"	The planned vessel name is changed to "BARBARA" and the revised plan is overviewed	Appendix 3
5	LR	Selects the revised items and Clicks "Notify Consignee"		
Confirm / Edit new transport plan				
Beko PLC edits the new transport plan				
6	PLC	Opens "My Transport Plans"	A list of plans some of which has notifications are overviewed	Appendix 4
7	PLC	Selects all items in Purchase Order 7500130082 and clicks "Edit Shipment"	The Requested shipment type is changed from "Standard" to "Expedited" and delivery point is altered as "Currys Retailed Limited London Warehouse"	Appendix 5
8	PLC	Clicks on "Notify Shipper"		
Re-planning of the shipment				
LR re-plans the shipment				
9	LR	Opens "My Transport Plans"	A list of plans some of which has notifications are overviewed	Appendix 6
10	LR	Selects all items in Purchase Order 7500130082 and clicks "Replan"	Re-planning takes place (black box) and new plan is overviewed	Appendix 7
11	LR	Selects all items in Purchase Order 7500130082 and clicks "Notify Consignee"		
Checks the news				
LR checks the general news about the events he is subscribed				

12	LR	Opens "My News"	Screen showing information about the locations of interest is displayed	Appendix 8
Monitoring requests definition				
Logistics Responsible (LR) defines new points of interests				
13	LR	Opens the field of " My Monitoring Requests"	List of subscribed monitoring requests are displayed	Appendix 9
14	LR	Clicks on "Add New Monitoring Request" and adds new monitoring requests for transport order 67373	New subscribed events are displayed	Appendix 9
Execution starts with loading at the Warehouse				
Warehouse Responsible (WR) enters shipment reference when loading is completed				
15	WR	Opens "My Transport Plans"	A list of shipments are related with the warehouse are displayed	Appendix 10
16	WR	Selects order 67373 and clicks the "Details"	Screen showing shipment details are displayed	Appendix 11
17	WR	Enters details about the container	Screen showing shipment details are displayed	Appendix 11
18	WR	Clicks on "Rate Service"	Black box	
Monitor the status of the shipment				
Transport Planner monitors the status of the shipment				
19	LR	Opens "My Transport Plans"	A list of plans some of which has notifications are overviewed	Appendix 12
20	LR	Selects Transport order no 67888 and Clicks "Details"	Details of the deviation is overviewed	Appendix 13
21	LR	Selects Transport order no 66798 and Clicks "Details"	Details of the deviation is overviewed	Appendix 14
22	LR	Selects Transport order no 67373 and Clicks "History"	The status of the transport is overviewed	Appendix 15
23	LR	Selects Transport order no 67373 and Clicks "History"	The status of the transport is overviewed	Appendix 16
23	LR	Selects Transport order no 67373 and Clicks "Notify Consignee"		
Monitor the status of the transport				
Consignee monitors the status of the transport (for unloading organization)				
25	PLC	Opens "My Transport Plans"	Screen showing information about the status of the incoming shipments displayed together with alerts	Appendix 17
26	PLC	Selects all items in 67373 and Clicks "Update Unloading Appointment"	Unloading Appointment renewal (Black box) - Screen showing updated unloading date	Appendix 18

6.5.4. Effect of capabilities (evaluation criteria)

Table 18: Effect of FInest capabilities illustrated ion scenario 5, with evaluation criteria .

	Summary of FInest capabilities	Effect of Capability illustrated in Scenario 5	Measure	How to quantify?	Degree of Complexity	Explaination for Use case 3
BCM	*The Business Collaboration Module (BCM) keeps all the information that is needed for executing a logistics process and notifies the user about the occurrence of certain events (deviation, or completion of a process), therewith allowing for the end-2-end visibility*					
	Global knowledge base for collaborative business processes					
	Manages all information of transport processes and make it available to its user in real-time	Automate cargo tracking & monitoring Ease of real-time/correct information on the current status of the shipment	*The number of supply chain disruptions due to trade compliance errors and limited visibility with time lags *Time spent for tracking purposes to obtain up-to-date information	Quantitatively	Hard & Medium	
	Gather external events and keep information up-to-date during the execution phase	Ease of monitoring the status of the shipment	*Time (Man hours spent, FTE) for tracking & tracing	Quantitatively	Medium	Currently LSPs manually updates the events on Arcelik in-house software, some of which are not done real-time. Automated up-to-date information will reduce the man-hours spent for tracking in Arcelik. In addition to this, the burden of event reporting in our partners will also be eliminated if the system can be fully automated.
EPM	*The Event Processing Module (EPM) enables real-time tracing and advanced control for planning and execution , including SLA monitoring and rule-based analysis of (un)expected events detected through various sources.*					
	Support for user-events (manual inputs)					
	support for automated events (e.g. from a sensor network)	Early warning in case of deviations	*Number of on-time informed deviations/all deviations	Quantitatively	Hard	It is not easy to determine the number of deviations informed real-time
	Pro-active event management (e.g. providing forecast features)	Early warning for deviations and proactive deviation management	*Number of predicted deviations / all deviations	Quantitatively	Medium	e.g. Prediction of a transport delay during execution phase
	Produce 'event notification' for other modules (e.g. for triggering automated status updates for the events	Real-time Alerts/Warnings	*Time to respond to an event	Quantitatively	Hard	Real-time warning if there is a deviation from the plan during the execution phase (one should keep in mind that not every deviation leads to replanning)

6.5.5. Potential benefit

Table 19: Dataset for benefit analysis of the automated shipment tracking concept.

DATASET FOR BENEFIT ANALYSIS (Scenario variations)

		as-is				to-be		
EVENTS	*Scope*	*Frequency*	*Time of notification*	*Handling efficiency*	*Performance*	*Time of notification*	*Handling efficiency*	*Potential performance improvement*
Exact status of the shipment not known								
Example 1: Time spent to find out the up-to-date status	All Shipments	100 %		Approx. 4,04 man year is currently spent for monitoring & tracking purposes	A lot of time is spent to monitor the status of the shipments and determine the real-time process step. Most of the time it is hard to find out the actual events leading to delays due to existance of contradicting information from different parties The approach for replanning is reactive to a delay which creates risks for the company.		**2,0 man year**	The process step will be transperant to all relevant parties with real-time data. One stop for tracking all shipments will reduce the time spent for tracking purposes. With automated notifications, it will be possible to take action on-time and approach to problems will be more proactive.
Example 2: Departure date is not up-to-date	All Shipments	10 %	on average 2,16 days delays in departure status updates	If the logistics responsible notices or informed manually about a delay in departure, he interacts with several different parties to understand the reason of the delay, its scope prior to take a decision about replanning	Import Trial one-to one interaction with material supplier, forwarder local agent, forwarder foreign agent, Inland transporter, production planning Export trial one to one interaction with forwarder local, inland transporter, customer, sales planning		**0,5 days delay on status updates**	Since the information transfer is real-time (or very close to real-time), we expext an improvement in the delays in status updates. Additionally information will be distributed from one source which in turn will reduce the time spert for one-to-one communication hence the decisions can be taken more effectively in a shorter notice
Status not informed on time								
Example 1: Late arriva notice	All Shipments	9 %	On average 2 days delay on arrival information		The departure date on the system is not updated real-time; thereforethere is risk of delay in replanning.		**0,5 days delay on status updates**	We expect improvement in the timing and accuracy of status updates.
Example 2: Arrival notice not on the IT system	All Shipments	66 %		Unnecessary time spent for information transfer	For almost %66 of the shipments, either the arrival notice is informed to the logistics responsible manually or not notified.		**For %100 of the shipments, status info will be available in the IT system**	For all shipments, the status of the shipment will be recorded with time tags, therefore information related to all shipments will be available in the system
Informed delay of unknown length & scope								
Example 1: Force majcr /stike on the border gate / congestion	All shipments	<2 %		Information about a delay arrives but a lot of time is spent to gather information about the cargo content and its related plans. Replanning is very time consuming and most of the time all the registries on SAP and tracking system is updated manually.	The sequence of information exchange is summarized below: 1- LSP informs logistics responsible about a possible delay in a location 2- LR tries to determine which products are in that location 3- LSP sends truck plates/vessel names 4- LR check inhouse tracking system and notes purchase order numbers or sales numbers in that particular shipment 5-LR informs PPs anc customers about the delay by mail and request information about the urgency of the products 6-If replanning not required, LR registers the delay manually to SAP and to the tracking system for each affected item 7- If the delay is prolonged, LR again checks with production or customers.		**Only interaction will be with FInest**	Information will be distributed real-time to all relevant parties, therefore the time spert for replanning will be reduced dramatically.

7. Conclusion

This report concludes the two-year work of WP2, and introduces the plan for trial experimentation during the Phase II of the FI PPP.

Phase II of the FI PPP program will focus on conducting trial experiments of use case scenarios, showing how FI WARE services, applications and more specifically the cSpace (extension of FInest) Collaboration Platform can enhance business performance and sustainability. The work will include identification of appropriate test sites, development of test protocol, of domain specific applications, reporting of the performance of the tests, and preparing for large-scale trials in Phase III of the FI PPP.

The last six months of the FInest project have been used to prepare for Phase II, build Experimentation Plans for each of the five scenarios, refine the experimentation specification (scenario story and test protocol) and evaluation methodology. The evaluation has a double target: a technical target (relevance of the FInest solution and FI Ware) and a business target (assessment of performance improvement).

After a brief review of the work conducted in WP2 during FInest, and a presentation of the use case scenarios, the deliverable D2.5 provides a description of the experimentation envisioned in the Phase II and the suggested methodology to evaluate the solution and its potential contribution to performance improvement. Thereafter, each of the five FInest scenarios presents its own experimentation plan for large scale trials, together with the planned usage of FInest solution (illustrated through the test scenario), test protocols, data, and criteria to be used for evaluation.

The following Phase II project, cSpace, is a result of collaboration between the two Phase I projects FInest and Smart-Agrifood. The use case trials to be deployed on cSpace platform are derived from these two projects. From FInest, scenario 1 ("Late cancellation") will be experimented as the Trial 2: "Fish distribution (re)planning", while scenario 4 ("e-planning") and 5 ("Automated shipment tracking") will be experimented as Trial 8 "Import and Export of consumer goods". The other scenarios will be experimented outside of cSpace, in a more local setting. This will serve to develop improvement plans and locally adapted collaborations platforms, as it is envisioned for example in the area around the port of Ålesund and illustrated in scenario 2.

Annex 1. Supplement data for test protocols

Annex 1.1: data for scenario 1 *Late booking cancellation (appendices 1 - 10)*

Annex 1.2: data for scenario 2 *Resource coordination (appendices 1 – 6)*

Annex 1.3: Presentation of "Resource Hub" concept, featuring scenario 2

Annex 1.4: data for scenario 4 *e-Planning (appendices 1 - 16)*

Annex 1.5: data for scenario5 *Automatic shipment tracking (appendices 1 - 18)*