FInest – Future Internet enabled optimisation of transport and logistics networks

D1.5

Business Assessment
of designed technological Solutions

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Abstract

This report presents the fifth Deliverable of work package WP1, "Business Assessment of the designed technical solutions", that is concerned with the assessment of the designed technical solutions to establish a collaboration and integration platform for transport and logistics business networks (the FInest Platform). In a continuation of the preceding deliverables from WP1, it presents the refinement of the overall vision of the FInest Platform, reports on the activities for cross-WP alignment that have been undertaken in the period M13-M18 of the project, and presents the progress towards the realization of the domain specific requirements. In summary, the deliverable presents the work progress on Tasks T1.1 – T1.4 as defined in the project DoW.

Based upon, and in continuation of, the results as presented in the preceding reports of WP1, the work on the business assessment of the FInest Platform for the M18 milestone of the project has focused on the review and assessment of the FInest Platform along with the conceptual prototypes for its central components (WP5 – WP8). The business requirements identified (T1.2) and the analyses of the ICT solutions (T1.3) are the foundation of this review and for achieving the aim of the project itself.

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V1.0	12.10.2012	Released

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Acronyms

Acronym	Explanation
apps	FInest specific ICT
AWB	Air Waybill
BCM	Business Collaboration Module
D	Deliverable
ECM	Electronic Contracting Module
EPM	Event Processing Module
ERP	Enterprise Resource Planning
ICT	Information Computer Technology
OP	Operation Plan
SaaS	Software as a Service
SLA	Service Level Agreement
T&C	Terms & Conditions
T&L	Transport & Logistics
TAP	Transport Activity Plan
TEP	Transport Execution Plan
TIP	Transport Information Provider
TPM	Transport Planning Module

UI	User Interface
WP	Work package
FInest	Future Internet enabled Optimization of Transport and Logistics Networks

1 Introduction

The Future Internet Public Private Partnership (FI-PPP) focuses on the development of innovative open network and service ICT solutions with generic common enablers serving a multiplicity of demand-driven use cases in "smart applications". The work in Objective FI.ICT-2011.1.8: Use Case scenarios and early trials, focuses on vertical use case scenarios whose intelligence, efficiency, sustainability and performance can be radically enhanced through a tighter integration with advanced Internet-based network and service capabilities. The work includes use case characterization; specification of ICT solution requirements; development and technological validation prototypes, and large scale experimentation and validation.

In the FInest (Future Internet Enabled Optimization of transport and Logistics Business Networks) project we aim at developing such an infrastructure on the basis of the Future Internet technologies for the Transport and Logistics (T&L) domain. Modern transport and logistics is often a highly distributed inter-business activity spanning across several countries with each of the involved business partners aiming at optimizing their individual, commonly complex supply and production chains.

WP1 (**Domain Characterization and Requirements Analysis**) has as its goals the identification and documentation of the domain's requirements and the assurance of the suitability of the technological solutions designed to satisfy the identified domain business needs.

This report (**D1.5 Business Assessment of designed technological solutions**) will provide an analysis and assessment of the solutions designed by the technical work packages. The aim is to evaluate and ensure the appropriateness of these designs based on identified business requirements. The report is based on **T1.4,** which outlines the scope of the assessment. The bass of the assessment are the detailed domain requirements identified in **D1.3** and the analysis of existing ICT solutions.

The delivery of this report will fulfil the milestone **MS26**. Moreover, this report will, in order to ensure the domain relevance of the designed technological solutions, provide a brief overview of these solutions from the perspective of WP3. The assessment will consider the technological solution, defined by the platform architecture and its principle modules defined in WPs 5-8, as a unique idea for future ICT landscapes. The focus of the assessment is documenting possible improvements, opportunities and modifications inspired by the technological solution.

The assessment strategy is based on the results of T1.2 documented in D1.3. Additionally, a high level operational scenario, which reflects the results of the WP2 use case scenarios, will be elaborated. The requirements and demands of the domain and their reflection in the

proposed FInest platform will be elaborated in a questions and answer (Q&A) section. The assessment itself is focused on the business requirements of the domain, the impact of utilizing the Finest platform and the envisioned novel engineering and Future Internet technologies.

2 Designed Technical Solutions

2.1 Proposed Functional Model

The overall aim of the FInest project is to develop a novel ICT environment to ease collaboration (information exchange, communication, coordination) between stakeholders working in logistics business networks, providing a platform through which these stakeholders can assemble novel value-added services for planning, managing and optimizing transport and logistics processes for individual business purposes. For the realization, emerging Future Internet technologies shall be employed, leveraging on emerging technological capabilities.
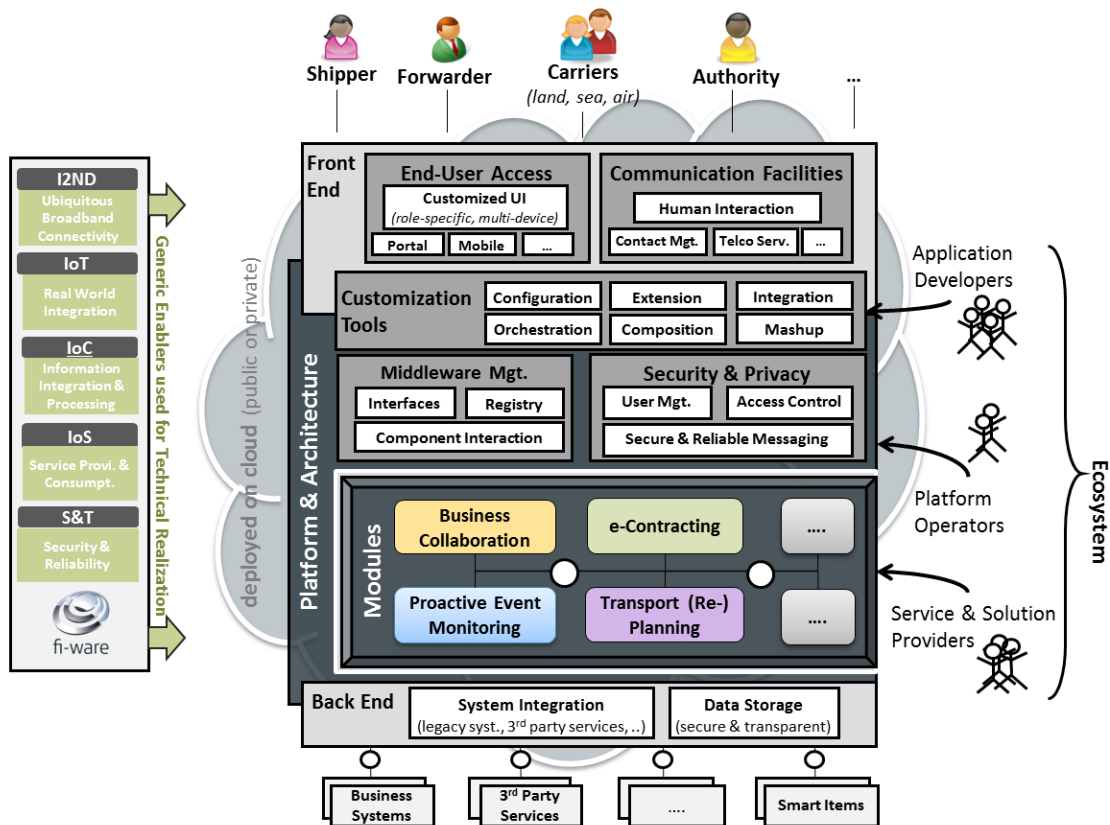

Figure 1: The FInest Platform - Refined Overall Vision

To accomplish this, the FInest Platform shall consist of the following main elements:

- A Front-End that provides a single point of access (multi-device) with personalization and customization facilities for individual business users, including integrated and easy-to-use facilities for real-time communication and information exchange between business partners and individuals;

© D1.5 Business Assessment of Technological Solutions

- A set of Customization Tools that supports the individual configuration of the available domain-specific capabilities for individual business purposes as well as the provisioning of additional services and apps by 3rd-party providers.
- A cloud-based platform and technical architecture wherein domain-specific capabilities – called 'Modules' – for better supporting the marketing, planning, execution, and completion of logistics processes are provided; these can be provided by various ICT solution providers, and are provided for consumption via the FInest Platform that is operated by a Platform Operator.
- A Back-End facility that supports the integration of external business systems (e.g. legacy systems, standard business software, external 3rd-party services) in order to import and export information into and from the FInest Platform.

The FInest project is developing the following four modules (cf. WP5 – WP8), which provide the basic domain-specific capabilities for better supporting the management of transport process throughout logistics supply chains, and hence are also referred to as the 'FInest Core Modules':

1. The Business Collaboration Module (BCM) keeps all the information that is needed for executing a logistics process where various different business partners are involved in with role-based access control, therewith allowing for the end-2-end visibility of transport and logistics processes;
2. The E-Contracting Module (ECM) provides computer support for service provider selection, contract negotiation and agreement, contract management and the provision of contract related service requirements to other modules that utilize this information for ensuring the effective and efficient network operation;
3. The Event Processing Module (EPM) enables real-time tracing and advanced control for the planning and execution of logistics processes through event-driven monitoring across domains and transportation modality, including SLA monitoring and the rule-based analysis of expected and unexpected events (e.g. triggering re-planning);
4. The Transport Planning Module (TPM) provides support for dynamic transport planning and re-planning activities. The main added business value shall be the support for exploiting the relevant and the most recent information for the semi-automated transport planning activities, including real time event data provided through the EPM, contracts between business partners that are managed within the ECM, the current status of a logistics process from the BCM for transport re-planning, as well as from external services or systems (e.g. transport offers from spot marketplaces).

2.1.1 Business Collaboration Module (BCM)

Logistics processes are distributed and involve numerous different stakeholders. Stakeholders may include customers (such as the consignor and the consignee), one or more transport planners, and a set of actual transport providers (carriers or shippers), insurance companies

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and other legal parties, governance authorities (e.g., customs or border control) as well as other partners. Each one of these parties needs information about the goods being shipped in order to successfully conduct a transport process. However, currently employed ICT systems have been developed for intra-organizational management and do not provide easy access for external partners. Coordination between the different stakeholders, therefore, requires manual intervention in order to share information. The large amount of manual intervention required hampers effective supply chain management and increases the likelihood of errors as well as shipping costs.

The *Business Collaboration Module* (short: BCM) introduces an infrastructure to securely manage end-to-end networks between transport and logistics partners. It integrates information from different sources – such as the *Transport Planning Module* (TPM), the *E-Contracting Module* (ECM) and the *Event Processing Module* (EPM) as well as external legacy systems (e.g. ERP) and user input – and makes it available for the different stakeholders. The main task of the BCM is to provide an overview of the current status of logistics processes and it acts as the central data storage component of the FInest platform. All information relevant to a specific logistics process is kept in a centrally managed storage, with access-control and provides customized views on the data for each involved stakeholder.

To enable this, the BCM uses so-called Collaboration Objects (CO) which implements a data-centric modelling approach [1,2]. Each CO encapsulates information about a certain aspect of the overall transport and logistics chain (e.g., a certain transportation leg or an involved carrier) and the process fragment associated with this aspect. Hence, a CO consists of two different elements: a data element and a process or lifecycle element. The combination of different COs describes the end-to-end transportation process and establishes a global view of the entire process. In addition, the distribution of information about the various aspects of the transport process over multiple COs enables privacy management due to the fact that only the information that is contained in the particular process aspect which a stakeholder is authorized to see is actually presented to this very stakeholder.

The general functionality of the BCM can be described as follows:

- Create a representation of the end-to-end transport and logistics process – To create a representation of the end-to-end process the BCM initializes the COs by integrating data from existing business (legacy) systems, transport plans from the transport planning system and end-user inputs.

- Store the CO-based process representation – The BCM stores the CO-based representation of the end-to-end process at a logically central, but physically shared, place (e.g. distributed database).

- Provide secure access to process data – Business partners have access to the shared database, but only to those stored COs that their user rights allow. The BCM uses the scattering of information among the COs to ensure security and only discloses the necessary objects to the client.

- Trigger user action– The likelihood of occurring changes during the execution of a logistics process have a relatively high impact. In most cases, different options are possible for reacting to an unexpected situation. The BCM informs users about such circumstances and lets the users decide how to react (potentially imposing changes to the process).

- Provide information about contract status – Special kinds of contracts in the T&L domain target at the amount of shipped goods and not at the conduction of a single process. For this reason, the BCM provides information about the contract status and makes it available for other modules (e.g. ECM), so that it is possible to observe how many transports have already been handled by a single contract.

2.1.2 E-contracting module (ECM)

Contracting within the transport and logistics domain for complex international movement of goods is currently a manual and time consuming process. The process begins with the identification of a need to ship something. Needs identification is followed by partner identification and qualification, partner bid development and bidding, bid evaluation and tentative partner selection. Once a tentative partner has been selected a contract is negotiated and agreed between various members of the contracting parties. The contract specifies all legal terms and conditions for the carriage of goods and SLA conditions such as: escalation processes for those occasions when problems arise, payment schedules and service level requirements. Unfortunately, all of this information is contained in a paper based document that is not generally available to the downstream individuals who are responsible for executing the contract.

The FInest E-Contracting Module (ECM) is being designed to address the highly manual nature of transport and logistics contracting and the problem of downstream transparency to contracted SLA conditions by exploiting solutions from e-contracting. It is important to remark that the legal terms and conditions of a contract are not in the focus of the ECM. The e-contracting module is envisioned as providing support for:

- A dynamic marketplace to support partner selection, bidding and spot market requirements;

- Semi-automated execution of contract negotiation, establishment and management;

- Electronic distribution of contract-specified execution information (e.g., SLA's, pricing, escalation processes, etc.);

- On-line management and review of contracts with automatic notification of contract end dates and renegotiation time fences.

The key architectural elements that are planned for the ECM include:

- Contract Repository – data repository for all established transport and logistics contracts, including a set of contract primitives (such as general attributes that characterize transport and logistics contracts);
- User Contract Demand Manager – single interface where actors (human or electronic) interact with the ECM and inform it of the type of contract (e.g., blanket, spot, etc.) to be negotiated;
- Blanket Contract Manager – service responsible for assembling the electronic form of a blanket contract, selection of partners (via auctioning or other processes) and contract creation;
- Spot Market Contract Manager – service responsible for selecting qualified bidding partners for a spot contract, developing and establishing the spot contract;
- Spot Marketplace – space for executing an auction process (offering, bidding, selecting, etc.);
- Special Contract Manager – service responsible for handling user requests associated with SLA violations or requests to handle special issues not covered under blanket contracts;
- Data Extractor – service responsible for generating information about/from contracts for other external modules.

2.1.3 Event Processing Module (EPM)

Event-driven architectures support applications that are reactive in nature, ones in which processing is triggered in response to events, contrary to traditional responsive applications, in which processing is triggered in response to an explicit request. In FInest, an event-driven architecture is employed for the purpose of end-to-end monitoring of a logistics process and to facilitate immediate and proactive response to problems and potential deviations occurring during execution time. The functionality can be described at three levels.

- On the surface, event processing provides visibility into the current status of the logistics process: the location of a shipment, whether it is on a carrier or in a warehouse, whether or not it was customs-cleared, etc.

- Beyond the functionality of mere track-and-notify, event-processing employs rules that encapsulate specific logic applied to events. The basic functionality of rules exists in indicating whether or not the logistics process progresses as it should, or whether something has gone wrong.

- At a deeper level, events potentially provide insights regarding parts of the scenario that have not yet been reached; for example, stormy weather near a seaport may indicate that a ship carrying the managed containers will be delayed in entering the port. Security alerts at an airport may imply flight delays. Detecting those events relevant to

the scenario at an early stage allows the system to respond to events *before* they occur, and thus to surface *proactive event-driven computing* functionality [6].

The Event Processing Module (EPM) can be characterized according to four elements, which are identified:

- Event Sources – FInest differentiates between two types of event sources. The first type refers to various existing (but usually incompatible) systems. These include airport systems, sea freight systems employed by ports and vessels, scanning and tracking systems of packages, and others. The second type refers to sources that will be provided by the Future Internet infrastructure and will allow more accurate monitoring, as well as predictive capabilities; these include, for instance, RFID tags, smart cameras on roads and other smart items.

- Events – FInest also distinguishes between two types of events: the events emitted by existing sources and events emitted from Internet of Things artefacts. While the latter must be defined and characterized in order to generate requirements from the Future Internet, existing events are described by domain sources such as *Cargo 2000*, which is an airline industry standard.

- Run-time Engine – The run-time engine exploits a set of rules to determine situations. Rules can either be permanent (for any scenario) or instantiated for a specific scenario, e.g., according to SLA parameters provided by the ECM or according to information about the execution of the transport plan (e.g., ETA for individual transport legs).

Determined Situations – In FInest, the results of event processing can be directed either to the human interface, and / or to one of the other technical components in order to trigger actions. The TPM should get information regarding future events that might trigger re-planning. The ECM and BCM should be notified of potential breaches of SLA's.

2.1.4 Transport Planning Module (TPM)

Efficient and effective transport planning and re-planning is all about making sure that relevant information is available at the right time and place to support supply chain operations. Planning consists of resource and information requirements which are tightly linked to resource status, availability, and configurability. Resources can be found both inside a logistics service provider (LSP) and outside an LSP, e.g., in ports or customs agencies. The ability to incorporate or "wrap-in" this information into the planning process is essential. Today this is mainly done through manual inter-organizational collaboration processes [9, 10].

The FInest Transport Planning Module (TPM) will make real-time information about resource status available across actors and organizational boundaries, which constitutes a significant improvement in planning and optimization processes. The TPM considers all elements that are part of an end-to-end supply chain planning process, structured according to the following four stages:

- Stage 1: Marketing of services – Relevant information includes: service category and type (vehicle services, terminal services, sea services, etc.); operation areas (location or district that the service should cover); environmental profile of the service; service capacities such as weight restrictions, dangerous goods limitations, availability; price information.

- Stage 2: Planning of a shipment – Relevant information includes: selection and negotiation of transport services to be included; pre-booking and booking of services; contracting with the service providers and with customs; reservation of space on the transport mean(s); definition of transport items (goods to be transported); split and joint booking activities; stuffing and stripping activities.

- Stage 3: Execution – Relevant information includes: status information and deviation reporting; information reporting to authorities.

- Stage 4: Completion – Relevant information includes: proof of delivery; invoicing; claims and deviation management; contract evaluation.

The TPM is being developed in order to support the planning processes regarding all these information aspects while being supported by the other modules of the FInest platform. For instance, the ECM will provide capabilities for contracting with service providers, as well as selection and negotiation of transport services. The EPM, as a further example, allows monitoring of progress and obtaining status information and deviations from the plan.

The TPM architecture includes several service components as below:

- Service search – This component supports searching for available services by interacting with the ECM. If no contracts are available, additional contracts (e.g., spot market contracts) can be requested.

- Transport chain composition – This component is used to create an end-to-end transport plan in which many services are included.

- Stuffing and stripping – This component assists in planning the stowage of goods, e.g., in a container on a ship.

- Planning handler and data extractor – These components provide statuses and can be used to store information based on the planned transport.

Based on the information processed through the TPM, a Transport Execution Plan is created that provides a complete overview of the planned transport for both the items to be transported and the services to be used that together make up the transport plan

3 Business requirements

In the M6 and M12 deliverables (D1.1 / D1.3) the domain specific business requirements have been identified and elaborated.

The supply chain and logistics sector is highly fragmented with numerous shippers, consignees and service providers as well as service solutions. The high fragmentation of the market and services leads to very fragmented communication and information exchange as well.

The domain business requirements have been elaborated and described in detail in D1.3. In summary the main topics identified are:

- Collaboration
- Planning
- Resource Management
- Monitoring &Visibility

The topics above reflect the areas where the transport and logistics domain is facing obstacles in achieving improvements to increase efficiency and minimize costs and investments.

It is a challenge for a shipper to provide a complete picture of even a single shipment or process without using outdated or non-validated information. The major issue is to receive the necessary information from the business partners participating in the shipment in a complete and timely manner. Collaboration with regards to information exchange is the key to providing this data in a consistent and responsive fashion.

The idea of having a single source, an n-to-1 relationship, of data would enable a supply chain operator to plan and process shipments via a collaborative ICT solution. If the service provided for access to legacy or external systems, then the operator could even utilize historical or operational data from these systems to enhance the plan and shipment process. The reality today is an n-to-n relationship in data exchange that requires a lot of manual and technical alignment effort. A single ICT solution for planning and monitoring of events and milestones will help to increase the transparency of the supply chain task and improve visibility in a way that resources can be utilized more efficiently.

Finding business partners on e-market places, as well as negotiating and closing contracts via an e-contracting tool, provides the supply chain planner with the opportunity to agree on SLAs and general contractual terms electronically. If such a service were to be integrated into a collaboration platform capable of tracking events and milestones, then the agreed to SLAs and contractual milestones might be transferred directly to the monitoring system and followed electronically by the planner..

A critical consideration in any type of collaborative ICT solution for supply chain activities would be its ability to implement strong security and privacy services. Such services are extremely important with regard to e-market places and e-contracting ICT solutions because of

the highly sensitive data being exchanged. Contract details, rate sheets and agreements as well communication details must be kept secret.

Scenarios such as those just described have informed the evaluation of general requirements from domain partners. In addition, requirements derived from the communication flow among the parties involved in a supply chain have also contributed to the detailed business requirements that serve as the foundation of this study.

4 Assessment approach

The assessment of the technological solutions incorporates different approaches to investigate from different angles if and how the considered concept might cover the domain expectations.

A general functional requirements assessment is used to determine how the platform and its modules are accessed and used by end-users. This assessment is general in focus and not domain specific.

An assessment based on operational requirements is also applied. In this assessment the technical solution is compared to domain requirements using an end-to-end test scenario for the comparison.

The assessment methodology requires input from work already conducted and documented in various deliverables of the project. More precisely, the Deliverable D1.5 is directly linked with the documents D1.3, D1.4 and D2.3 as well as D3.2.

In Deliverable D1.3, the detailed business requirements for the different modes used in transport and logistics were collected and analyzed, and significant and relevant business problems defined as requirements for a technical solution from the FInest project. These definitions served as the basis for both the technical design process and the design of the use cases for demonstration and evaluation purposes. As such, it is a major foundation for the project and the fulfillment of its goals.

In Deliverable D1.4, the current information and communication technologies used by transport and logistics companies in performing shipments, either domestically or internationally, have been documented and current state-of-the-art technologies and solutions for different processes in the transport and logistics domain presented. In addition, development trends for the ICT landscape in the domain have been illustrated.

In Deliverable D2.3, a set of real world use case scenarios from the transport and logistics domain has been presented. These use cases are used to demonstrate how the FInest solution might be employed in real world operations. The use case scenarios have been selected due to their representativeness as a challenging part of the business, and their ability to be tested with the help of real-world data and concrete business knowledge. The thorough explanation about current practices and business challenges has yielded an elaborate list of general requirements.

In the second deliverable of WP3 (Solution Design and Technical Architecture), Deliverable D3.2, the overall design of the FInest platform – which includes the overall vision for a FI-enabled collaboration platform for the transport and logistics domain – as well as the technical architecture of the platform have been described. Moreover, the work illustrated in the document demonstrates the alignment between the domain and use case analysis and the design of the technical solution, i.e. the FInest core modules.

The existing set of requirements and business challenges has been structured according to the major functional requirement categories identified through work in WP1. Within these requirement categories, various business needs are consolidated that form the base of the review and business assessment in the current deliverable. The review conducted using this foundation focuses on determining whether the technical solution described in WPs 3, 5, 6, 7, & 8 meets the identified requirements and is suitable for the call requirement of achieving "radical" business improvements.

Each of the business needs identified for the domain is evaluated with respect to its relevance in the end-to-end scenario or in the FInest Use Case scenarios. The results of this evaluation are documented in an assessment table. The assessment table results are used to evaluate the level of support provided by the technical solution. Finally, a determination is made as to the level of fulfillment achieved by the technical solution in meeting the identified needs.

4.1 General topics

The general domain requirements were indentified in D1.3. These requirements focus on the main areas of collaboration, planning, resource management plus monitoring and visibility. The assessment of the FInest platform follows these broad domain requirements categories and employs a user centric "how would the platform operate" scenario to determine how the proposed technical solution would respond to user requests for services in the categories. This approach operates in the following manner:

1. How will a user access the platform and establish their credentials and needs?
2. How will the platform ensure user security (access control, data access, etc.)?
3. Once access and rights are established, what is the user allowed to do, and how can the platform support the user?
4. How does the user find business partners, establish contracts, negotiate rates and define SLAs?
5. Once a partnership has been contractually created, how do the events that will occur during the shipment get planned, customized for the particular shipment, monitored and executed?
6. How does the user gain access to legacy and external system data and services so that the shipment plan can be properly executed and managed (e.g., how do back end invoicing processes get integrated into the execution plan)?

4.2 Relevance of D1.4 for the assessment

The FInest project's aim is to establish a collaboration platform that allows the different parties involved in logistics and SCM activities to efficiently and effectively execute transport and logistics operations in a highly distributed "cloud based" manner. The FInest platform is not being designed to replace existing operational applications, legacy systems or any other front

end software solution used in the domain, per se. It is being designed, however, to facilitate an ecosystem of service providers that may develop such systems in the future.

In deliverable D1.4 an overview of the areas and functionalities of applications and solutions that are available and operational in the transport and logistics domain was developed. Nearly all of the identified applications are front end operational applications. Looking at the aim of FInest and today's ICT landscape, opportunities for extending the value of the existing domain ICT exist. FInest can complement these existing applications, extending their capabilities through collaboration, e-contracting, and pro-active event monitoring.

Because FInest is not attempting to develop the functionalities that exist in the vast majority of the domain execution applications, this document does not attempt to evaluate it along these lines. Instead, the FInest technical solution is assessed in how well the platform and core modules support existing operations and enhance the services offered by legacy and external systems. Using this approach enables the review to identify additional modules that might further increase the value of the FInest service in helping users gain additional efficiency from existing applications while improving their ability to manage logistics shipments.

4.3   End-to-end scenario (for assessment purposes)

The end-to-end assessment scenario is a snapshot of a very common business process. The origin of the scenario is the establishment of a trade agreement between a shipper and consignee. The key element of the agreement that establishes the necessary relationships within the supply chain is the trade term (see D1.1) agreed between the parties. Trade terms define where ownership transfers from shipper to consignee, whether the shipment is insured and who pays for the insurance, who is responsible for arranging the transport of the goods and numerous other items related to the particular shipment.

In this scenario the INCO term EXW (ex works) has been chosen because it has a clearly defined point at which ownership, risk and payment occurs and places all responsibility for execution of the shipment in one party. This approach is necessary and sufficient for the assessment of the FInest technical solution as its scope and general nature enable a complete review of how well the proposed FInest solution will cover the transport and logistics domain requirements.

The figure that follows provides an overview of the scenario from the perspective of the consignee.
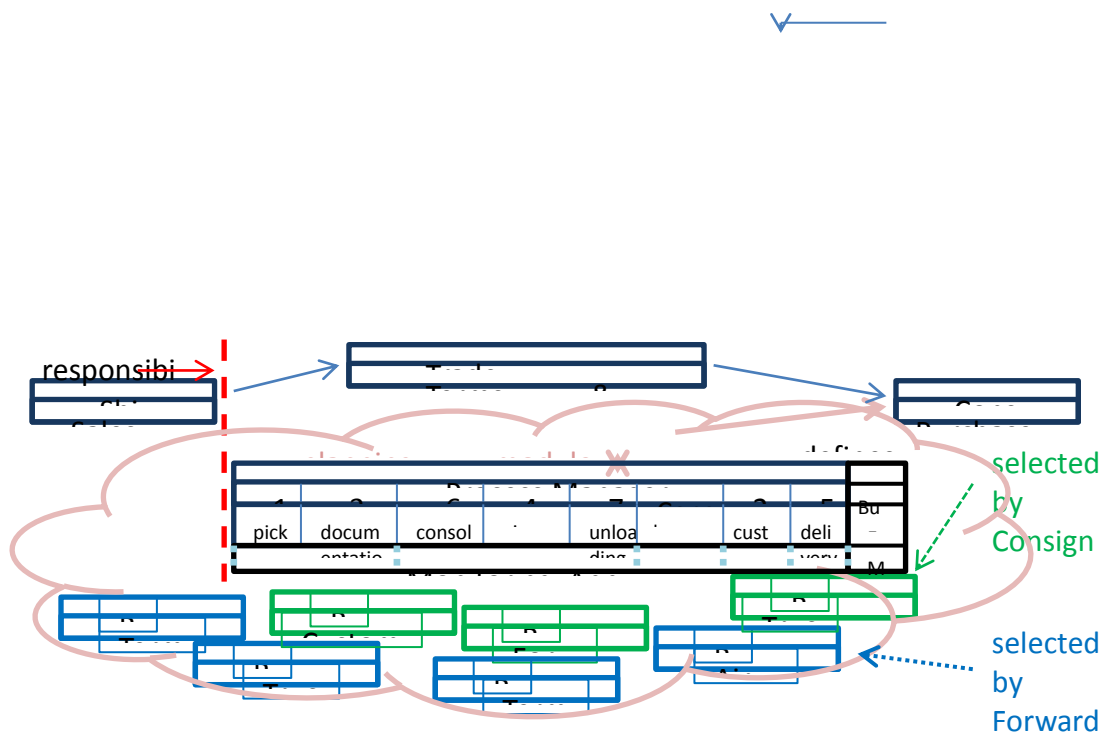
Figure 2: End to end process for operational assessment (own source)

Nine parties, including the shipper and consignee, are involved in fulfilling all tasks delivering the purchased items from origin to the destination. The different parties perform various tasks and and have different relationships that require collaborating and aligning to achieve the fulfillment of the service requested.There are vertical and horizontal relationships. Some tasks are outsourced to service providers.

Within the scenario each of the actors has to fulfill several tasks and to perform certain actions determined by the tasks.

- The scope of this exercise is to identify how a collaboration platform such as the FInest platform can support the identified domain operations. To address this scope, the scenario attempts to identify:Who are the actors?

- What are the tasks that need to be performed?

- Which actors interact with which other actors?

- What actions need to be taken to accomplish the tasks?

- What services does FInest need to provide in order for the tasks to be accomplished?

The charts that follow show the results of the exercise.

actor	tasks	interaction with	action	Service requested from FInest
shipper	create sales order prepare sales documentation	consignee	provide order details to consignee	store order details
Consignee	create purchase orders	shipper	confirm trade agreement confirm receipt of order details	send notification send notification
	select business partners	forwarder	send transport demand define SLA ask for offer agree on rates confirm booking	raise demand on e-market place manage service parameters manage quotations settle agreement notification to concerned parties
		trucker B	send tranport demand confirm booking	drop transport demand notification manage order status
		customs agent	send prealert send order details provide documentation	send service notification provide concerned data
	create transport plan	forwarder	demand /receive resouce planning data	assign resources, define date & location of service activities
		trucker B	demand /receive resouce planning data	assign resources, define date & location of service activities
		customs agent	demand /receive resouce planning data	assign resources, define date & location of service activities
	set milestones	forwarder	confirm mile stones	based on SLA set time stamps triggers on activities
		trucker B	confirm mile stones	based on SLA set time stamps triggers on activities
		customs agent	confirm mile stones	based on SLA set time stamps triggers on activities
	track & trace transport plan execution	forwarder	receive status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
		trucker B	receive status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
		customs agent	receive status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
	invoicing	shipper	iniciate invoices / credit notes	issue invoices / credit notes based agreements, SLA and milestone execution
		forwarder	iniciate invoices / credit notes	issue invoices / credit notes based agreements, SLA and milestone execution
		trucker B	iniciate invoices / credit notes	issue invoices / credit notes based agreements, SLA and milestone execution
		customs agent	iniciate invoices / credit notes	issue invoices / credit notes based agreements, SLA and milestone execution

Figure 3: Operational Requirement elaboration of the End to End Scenario part 1
(own source, 2012)

actor	tasks	interaction with	action	Service requested from FInest
forwarder	create forwarding order	shipper	integrate order details confirm forwarding order	exchange message send notification
	select business partner	trucker A	send tranport demand confirm booking	exchange message exchange message
		terminal A/B	send handling notification ask for confirmation	exchange message exchange message
		carrier	send transport demand ask for quotation agree on quotations define SLA confirm booking	drop transport demand notification manage quotation settle agreement manage service parameters send notification
	create transport plan	trucker A	demand /receive resouce planning data	assign resources, define date & location of service activities
		terminal A/B	demand /receive resouce planning data	assign resources, define date & location of service activities
		carrier	demand /receive resouce planning data	assign resources, define date & location of service activities
	set milestones	forwarder	confirm mile stones	based on SLA set time stamps triggers on activities
		trucker B	confirm mile stones	based on SLA set time stamps triggers on activities
		customs agent	confirm mile stones	based on SLA set time stamps triggers on activities
	track & trace transport plan execution	trucker A	receive status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
		terminal A/B	receive status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
		carrier	receive status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
	invoicing	trucker A	iniciate invoices / credit notes	issue invoices / credit notes based agreements, SLA and milestone execution
		terminal A/B	iniciate invoices / credit notes	issue invoices / credit notes based agreements, SLA and milestone execution
		carrier	iniciate invoices / credit notes	issue invoices / credit notes based agreements, SLA and milestone execution

Figure 4: Operational Requirement elaboration of the End to End Scenario part 2
(own source, 2012)

actor	tasks	interaction with	action	Service requested from FInest
trucker A	create transport order	forwarder	confirm transport demand	send notification
	create transport plan	shipper	demand /receive resouce planning data	assign resources, define date & location of service activities
		terminal A	demand /receive resouce planning data	assign resources, define date & location of service activities
		forwarder	demand /receive resouce planning data confirm schedule	assign resources, define date & location of service activities
	set milestones track & trace transport plan execution	forwarder	provide status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
	invoicing	forwarder	iniciate invoices / credit notes	issue invoices / credit notes based agreements, SLA and milestone execution
terminal A	create handling order	forwarder	confirm handling demand	send notification
	create handling plan	forwarder	demand /receive resouce planning data	assign resources, define date & location of service activities
		trucker A	demand /receive resouce planning data	assign resources, define date & location of service activities
		carrier	demand /receive resouce planning data	assign resources, define date & location of service activities
	set milestones	forwarder	confirm mile stones	based on SLA set time stamps triggers on activities
		carrier	confirm mile stones	based on SLA set time stamps triggers on activities
		trucker A	confirm mile stones	based on SLA set time stamps triggers on activities
	track & trace transport plan execution	forwarder	provide status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
		carrier	provide status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
	invoicing	forwarder	iniciate invoices / credit notes	issue invoices / credit notes based agreements, SLA and milestone execution

Figure 5: Operational Requirement elaboration of the End to End Scenario part 3
(own source, 2012)

actor	tasks	interaction with	action	Service requested from FInest
carrier	create transport order	forwarder	forwarder sends freight documentation integrate order / confirm transport job	exchange messages sent notofication
	create transport plan	forwarder	demand /receive resouce planning data	assign resources, define date & location of service activities
		terminal A	demand /receive resouce planning data	assign resources, define date & location of service activities
		terminal B	demand /receive resouce planning data	assign resources, define date & location of service activities
	set milestones	forwarder	confirm mile stones	based on SLA set time stamps triggers on activities
		terminal A	confirm mile stones	based on SLA set time stamps triggers on activities
		terminal B	confirm mile stones	based on SLA set time stamps triggers on activities
	track & trace transport plan execution	forwarder	provide status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
		trucker	provide status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
		terminal A	provide status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
	invoicing	forwarder	iniciate invoices / credit notes	issue invoices / credit notes based agreements, SLA and milestone execution
customs agent	create work order	consignee	receive order details	exchange information
	schedule work order	terminal B (customs authorities)	demand /receive resouce planning data not in scope	assign resources, define date & location of service activities
	set milestones	terminal B (customs authorities)	confirm mile stones not in scope	based on SLA set time stamps triggers on activities
	track & trace work order execution	terminal B (customs authorities)	provide status updates not in scope	capture real time event related data / proactive notifications on deviations / proactive replanning options
	invoicing	consignee	iniciate invoices / credit notes	issue invoices / credit notes based agreements, SLA and milestone execution

Figure 6: Operational Requirement elaboration of the End to End Scenario part 4
(own source, 2012)

actor	tasks	interaction with	action	Service requested from FInest
terminal B	create handling order	consignee	confirm demand	send notification
	create handling plan	trucker B	demand /receive resouce planning data	assign resources, define date & location of service activities
		forwarder	demand /receive resouce planning data	assign resources, define date & location of service activities
		carrier	demand /receive resouce planning data	assign resources, define date & location of service activities
	set milestones	trucker B	confirm mile stones	based on SLA set time stamps triggers on activities
		forwarder	confirm mile stones	based on SLA set time stamps triggers on activities
		carrier	confirm mile stones	based on SLA set time stamps triggers on activities
	track & trace transport plan execution	trucker B	provide status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
		forwarder	provide status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
		carrier	provide status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
	invoicing	consignee	iniciate invoices / credit notes	issue invoices / credit notes based agreements, SLA and milestone execution
trucker B	create transport order	consignee	receive transport demand confirm transport demand	exchange messages sent notification
	create transport plan	terminal B	demand /receive resouce planning data	assign resources, define date & location of service activities
		consignee	demand /receive resouce planning data	assign resources, define date & location of service activities
	set mile stones	terminal B	confirm mile stones	based on SLA set time stamps triggers on activities
		consignee	confirm mile stones	based on SLA set time stamps triggers on activities
	track & trace transport plan execution	terminal B	provide status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
		consignee	provide status updates	capture real time event related data / proactive notifications on deviations / proactive replanning options
	invoicing	consignee	iniciate invoices / credit notes	issue invoices / credit notes based agreements, SLA and milestone execution

Figure 7: Operational Requirement elaboration of the End to End Scenario part 5
(own source, 2012)

© D1.5 Business Assessment of Technological Solutions

Due to the modular and fractal structure of logistics activities and processes several of the identified functionalities/services appear within several interactions among the business partners. The services requested have been consolidated, therefore, and grouped concerning their relevance to the business requirements categories identified in D1.3.

Business alignment / E-contracting

- Raise demand on e-market

- Manage service parameters

- Manage quotations

- Settle agreement

- Booking notifications to concerned parties

- Drop transport demand notification

- Invoicing process

Planning

- Proactive notifications on deviations

- Proactive re-planning options

- Define, date & location of service activities

Resource Management

- Assign resources

Monitoring & Visibility

- SLA /activity based setting of time stamp triggers

- Capturing real time event related data

5 Functional Evaluation

The general functional evaluation examines generic topics that are necessary in order for FInest to be used as a platform for domain operational issues.

The assessment approach attempts to cover the topics from different perspectives.

- General functional requirements that primarily examine how technical solutions will be accessible by end users and how they can be utilized. These topics are not domain specific.

- Operational requirements that examine how domain business activities can be carried out.

5.1 Business Collaboration

5.1.1 Business Alignment

Today, with all the communication technology available, still it is difficult finding business partners when a company is not present in a certain area of the market. FInest addresses the issue of finding business partners through a dedicated e-contracting module (ECM) with functionality for discovering business partners. The FInest platform also offers a business networking service enabling users to find business partners and communicate within the FInest community. These two approaches to partner discovery are outlined below.

1. **Option 1: via the ECM**, users can search for partners based on their published T&L service descriptions and offers (known and previously unknown business partners).

2. **Option 2: via the 'social networking & collaboration' features,** End-Users shall be able to find partners (similar to Facebook or LinkedIn), and also to communicate with each other in an unstructured manner on both **general topics** (e.g., new governmental regulations) as well as on **ongoing business activities and transactions** (e.g., for tendering, order & quotations, …)

Self presentation

The FInest platform itself will contain certain functionalities to capture participant data that could be utilized to show presence in the community or finding other participants

Service profile & advertising

These basic functionalities will allow users to create a profile of the participants capabilities and services for offer. Also general SLAs and terms and conditions for the individual's services might be placed in the profile to be available to interested parties. Via the "Apps & Services store" the self presentation and service profile of an ecosystem application or service provider can be individualized according to company specific standards.

Market entry & partner selection

FInest enables all participants setting up a company specific profile to present themselves and their services to all other parties if they so wish.

Communication and coordination of tasks and events

FInest will provide specific partner-to-partner communication tools similar to those found in today's social networks (chat, email, etc.). The FInest core modules provide access to all relevant execution information in real- time.

5.1.2 E-marketplace

The FInest ECM core module is a dedicated tool to deal with contractual relationships among the domain partners. It offers features where market participants may offer or demand all types of logistical services. Demand requirements can be generated by external ICT systems, FInest ecosystem apps, or by operational events that are being monitored.

Self presentation

Based on the functionalities FInest described above each participant is able to create a public individual profile presenting their capabilities and service offerings. There might be, via the Apps & Services store, more sophisticated and individual profile design options.

Service offering

The company profile is linked to the e-market place of the ECM, which allows users to offer or demand services. There are browsing functionalities so that users can look for potential partners and select certain parties for closer review. The ECM also connects to external marketplaces to link to potential partners for offers and demands.

Market entry & partner selection

FInest enables each party to publish their company profile or look for business partners who have also registered as "members" of the FInest community. A much broader audience is available through the open community concept enabled through FInest than would be available to a single company through current strategies of sales and marketing.

5.1.3 E-contracting

Providing offers and quotations for requested services

The FInest ECM provides features that enable end users to manage quotations for demands and the resulting offers. Based on the quotation, contracts can be established via the ECM. The FInest Application and Services store is also envisioned as hosting third party applications that provide more sophisticated contracting options than are currently being planned for the ECM.

Negotiating Quotes and offers

The ECM provides different options, public or private, for negotiating rates and charges.

Reserving and booking capacity

The transport contract or agreement established in the ECM will create a transport plan via services provide by the FInest TPM module. This plan will trigger the assignment of

appropriate resources to accomplish the plan and these resources will be booked. The ECM and/or the FInest BCM will instantiate this information for tracking and monitoring purposes and update authorized personnel whenever there is a change to the plan.

Defining Service levels (SLA) and agreeing on terms and conditions

Service level agreements (SLAs) are managed in the ECM. The service parameter that is defined by a SLA is linked to the FInest EPM where individual events and event rules can be set up to trigger notifications based on the SLA. These notifications can be sent to external systems, apps used for shipment execution and selected from the FInest App and Services store or directly to authorized end user monitoring devices so that actions can be taken.

Closing legally binding contracts

The ECM provides options to settle legally binding agreements. Certain types of contracts are available through the ECM. The focus of these contracts is on rates to be charged and SLAs. The areas of focus are those parameters that can be directly supported and linked for monitoring to the BCM and EPM. There might also be apps constructed, using the tools provided for application development for the FInest App and Service store, that extend the services of the ECM providing more sophisticated options and features for certain individual requirements.

Order Management

Order management, from a systems perspective, is not in the scope of FInest. It can be supported via customized applications developed for, and hosted by, the FInest Apps and Services store, or by integration with legacy systems. The modules of FInest will support and provide data to the order management system as required.

Store order details

The BCM will create a collaboration object (for information on collaboration objects please see FInest deliverable D5.3) for each transport execution plan (TEP). The collaboration object acts as a lifecycle monitoring mechanism and captures data relevant to the transport execution activities as established in the TEP. Similar to the discussion on order management services, transport orders (i.e., company specific orders for transportation services), are not envisioned as being managed by the current set of modules and services being developed for the FInest platform.

5.1.4 Administration of business partners

Services for the administration of business partners are not covered by the ECM, and not in scope of this phase of the FInest project. These functionalities can be provided by tools from the proposed App and Services store or through integration with external applications. This is possible since the FInest platform, while not currently being developed to provide these services, does collect the raw data that such services would need to manager partners.

Support planning and execution of transport orders

FInest has dedicated modules, the BCM and TPM, that provide comprehensive support for transport planning and order execution. The BCM creates a dedicated collaboration object for each transport order that tracks all activities related to the order throughout the order's lifecycle. This tracking is conducted in real-time and all relevant events are logged and stored as well as communicated to authorized systems or users as required. The TPM provides complex planning and re-planning services based on the particular mode of transport and the characteristics of the product being transported.

Supporting partner selection

FInest, through the services provided by the BCM, ECM and TPM modules collects all relevant data needed to manage and select partners. Information on past performance can be provided to third party systems for analysis and partner rating. Should third parties wish to develop applications for use in the FInest App and Services store that do partner ratings, the FInest platform can provide these applications with the required data.

Providing correct information on time to the concerned parties

The core modules of FInest interact with one another and external sensor information in "real-time". These data are used to update all authorized and integrated external systems, third party applications employed for the transport service out of the FInest App and Services store, and end user monitors with notifications and statues, also in near real-time.

Invoicing and accounting.

Managing the financial stream is not in the present scope of the FInest project. FInest could support this functionality using data from the ECM, BCM and EPM modules and provided to external applications, e.g. legacy systems, or custom applications developed for the FInest App and Services store and selected for use in a particular transport execution service.

5.1.5 Security and privacy

Managing sensitive data

The management of company specific data related to the execution of a transport activity is extremely critical to the acceptance of the FInest collaboration service by domain partners. FInest addresses this critical issue by establishing a sophisticated framework of security/privacy and trust components that ensures that FInest is **secure by design.**

- Users can only see what he / she is allowed to see (access control)
- All information and data is transferred, stored, and handled through encryption and error handling routines that have been defined through Generic Enablers developed under the FI WARE initiative

The security framework provides all relevant security technologies and processes that are required for ensuring that the FInest platform is secure by design. Every developer – for both the FInest components and for applications and services developed in accordance with the App and Services store SDK – must use the security technologies defined in the FInest design

specification for their implementation (compliance is checked at 'deployment time'). To ensure that the security framework is followed, a 'usage framework' will be provided that supports the developers in properly using the necessary and optional security features, along with a 'deployment / publishing' checker.

Determining underlying legislation (storage, processing)

Because governmental jurisdictions do not uniformly handle the issues of security and privacy, companies can run the risk of having their data reviewed by governmental authorities without their consent. The FInest team understands the need to address this issue, but has as yet not found a viable solution to the problem. On-going work with the FI WARE team and the FI PPP governmental regulations working group continues on this topic to see if a viable solution can be developed. It should be noted that the FInest security framework does allow users to exclude certain storage and processing providers. However, this is only a first level defense against unauthorized data access as authorized cloud based data and processing service providers may have back up and surge contracts with other infrastructure service providers that store and process data in jurisdictions that allow governmental access to data without due process.

5.1.6 Technical collaboration

The integration of external ICT services (e.g., legacy systems) to the FInest platform is an integral part of collaboration requirements for domain partners. FInest is aware of the high importance of such integration and approaches this issue with a two-step approach.

1. The first step involves the option for users to establish and support "ad hoc" integration scenarios. A tool will be provided through which the end user (or IT Expert) can define the data mapping (in a graphical manner) and, based on this, a connector is generated that can automatically import / export data between the FInest platform and the legacy system.

2. In a second step it is planned to build an 'Integration Hub' with more exhaustive connectors based on commercial solutions for this type of service.

The identified domain requirements detailed below are not addressed by the current FInest solution, but are understood as being required in future iterations and development of the service.

- Providing an integration platform for external ICT
- Enabling data integration
- Various standards messages / databases
- Ensuring intractability

Smart and easy modes of interacting and communicating

The FInest platform supports a number of different mechanisms for interacting with users and applications. Automated demand notifications can be generated through the interaction of the EPM and the BCM in which a requirement for a service is identified based on user defined rules and a request is sent to the ECM to find a suitable service provider. This type of automated action would most likely occur during the execution process when a deviation from plan has been noted and the FInest service determines that one or more SLAs cannot be met without finding a replacement service provider.

End user notifications, or external application notifications, are also addressed through the EPM/BCM processing of real-time events. Based on the configuration of the FInest system for a particular transport operation, end users can be notified if certain events occur, or do not occur. These notifications are generated through the joint interaction of the EPM (listening for, and evaluating relevance, of events) and the BCM (managing where event notifications should be sent). External systems can also be notified in a similar manner.

5.2 Planning

5.2.1 Planning / Re-planning

Incorporate relevant events into planning/re-planning

Execution planning services will be accomplished through the functionalities of the TPM:

- enter data for a contracted shipment (pick up location, destination, timing, service levels, etc.),
- use the TPM to automatically construct and display possible routes,
- choose one of the routes and 'instantiate' it (i.e., perform the bookings in the legacy system and instantiate the plan in the BCM for monitoring).

Future development of planning and booking applications that are hosted in the FInest App and Services store should be able to address all aspects of the planning process for the execution of a shipment. The development of these types of value added applciations and services are what will allow the FInest collaboration service to achieve its vision of:

- 'all information to every stakeholder in real-time' enabled by the BCM and EPM
- 'all you need in 1 place user experience'
- support for stakeholders to act in open and evolving business networks via the ECM and the 'social networking and collaboration' features of FInest, and building sophisticated IT solutions for business opportunities.

Define event (event rules) for meeting the monitoring & visibility demand

FInest will offer end users the opportunity to define individual 'notification profiles', stating the kind of 'event' they want to be informed about and how they want to be notified. Based

on these end-user requirements, the 'Event Handling Rules' are defined / initiated, and events are captured automatically.

Re-using existing planning data (and experiences) for re-planning transport orders

FInest supports the creation of plan "templates" based on previously developed plans as well as historical information for the selection of partners should replanning be required. If replanning is required, the existing route plans and service requirements are first employed to determine if alternative modes of transport might be used to meet the service requirements. Should the existing route data not be suitable even using alternative modes of transport, new routes are constructed based on the next best alternative to the original plan. The end user is always given the responsibility of making the final plan selection.

Align resource management with transport plans and business environment conditions

The function of resource management is out of scope for this phase of the FInest project. In the initial development resource management has been assumed to be handled via legacy or external systems. It is envisioned that in the future third parties will develop resource management applications and services for the FInest App and Services store based on data from the TPM and ECM.

Enable collaboration and collaboration with partners

The FInest platform's primary purpose is to enable businesses to collaborate with one another in an easy and secure manner. To accomplish this, the FInest platform incorporates services similar to consumer oriented social networking sites. These services include profile registration, "friends" search capabilities, email and chat services. In the future, it is anticipated that services analogous to Facebook's "like" and Amazon's star rating systems will be added to allow businesses to see how well potential partners perform on certain service tasks and dimensions.

5.2.2 Strategic planning

FInest will support the evaluation of trade lanes and shipping routes via the basic functionalities of the TPM integrated with third party applications. The current proposed functionality of the FInest platform does not natively include such services. It is expected, however, that third parties will develop such services and deploy them for use in the FInest App and Services store.

Deriving insight from historical/empirical event data

FInest enables users and application developers to create App and Services store applications that leverage the large amount of data that is accessible through the FInest platform. This data can be used to perform strategic planning activities, evaluate supplier/partner performance, identify recurring supply chain bottlenecks, discover cost and efficiency drivers, etc. It is one of the hopes of the FInest team that the large amount of data that is accessible

through the platform is used by domain partners to increase the efficiency and effectiveness of their services for their customers.

Re-using existing planning data

FInest provides and captures a huge amount of data that can be stored and utilized for empirical analysis for strategic planning. The data, once stored, can be reused for different planning scenarios and for further improving supply chain operations.

5.3 Resource Management

5.3.1 Resource allocation

Resource management is not in the scope of the current phase of FInest development. FInest will support certain actions via the TPM and ECM to assist in managing resources, however.

The identified functional requirements related to:

- Administering resources, and

- Providing resource information

of the transport and logistics domain must be provided by applications developed for, and hosted by, the App and Services store or through the integration of external applications.

Planning & re-planning (deviation)

The assignment of resources for planned and/or replanned activities must be performed by external applications and provided to the FInest platform as the current design of the platform and its modules does not perform this function.

5.3.2 Planning support

As mentioned above resource management is not in the scope of FInest. The information needed to support the TPM and BCM must be provided by external application or from applications developed for, and hosted by, the App and Services store.

5.4 Monitoring & Visibility

5.4.1 Process monitoring and forecast

Track progress of transport

The EPM module of FInest provides real-time event monitoring and predictive event notification based on rules established by end users. In addition, tracking and tracking, which is an application of event monitoring will be supported by the EPM. Customer or third party

developed applications will most likely be developed to create customized approaches to the issue of tracking and tracking goods. In addition, should customers have internally developed legacy track and trace systems, these systems can be integrated into the FInest platform and utilize the real-time event data supplied through the EPM to update the status of the shipments they are monitoring.

Providing real-time information

The BCM/EPM capture and provide event driven statuses and information updates in real time. This is one of the main features of the FInest platform enabling the concerned parties to react on short notice to issues or proactively replan their shipments.

Real-time forecasting

The EPM provides real-time event related information that enables the TPM /BCM to react immediately to deviations and suggest alternatives or make changes automatically if so configured. In addition, the predictive capabilities of the EPM allow the EPM, based on rules set by the end user, to identify trends and notify authorized parties of high probability future events that may have an impact on their shipments. The end user, thus notified, can take action to avoid potential shipment failures before they happen.

5.4.2 Event management

SLA /activity based setting of time stamp triggers

The ECM allows SLAs defined in contracts to be communicated to the EPM so that they can be configured as event triggers should events indicate that a deviation in plan will impact the SLA. The EPM can also be configured to predict when SLAs may be in jeopardy and notify end users as to an impending SLA problem. All events logged by the FInest platform are time stamped and stored for future reference and non-repudiation requirements.

Identify and determine events of interest

The TPM and ECM provide information to the EPM and BCM about SLAs, shipment plan milestones and other shipment parameters of interest (e.g., total allowable contract quantities). This information can be used to configure the EPM and BCM to monitor events during a shipment process and notify users and applications of events of interest.

Define and control conditions process related events

As noted above, the events that are configured in the EPM and BCM through information provided by the ECM and TPM can be used to configure controls and act as triggers to execute these controls in other applications if this is the execution configuration desired.

Monitor external events

The EPM can process information from any kind of source and provide this information to the other modules for planning, processing or monitoring purposes.

5.5 Conclusion of functional evaluation

The table that follows represents an overview of the domain requirements elaborated in D1.3, D2.3 (Haifa requirements) and the end-to -end scenario. The table includes a brief description of the technical solution as explained by the technical WPs 3, 5, 6, 7, and 8.

ID	Service requested from Finest	Corresponding Haifa requirement	FInest technical WP's explanation
A1	store order details	14, 15, 16	trade agreements are curently not in scope of Finesst. Future Apss might support these activities via BCM / collaboration objects and EPM . Event driven information & status to each stakeholder in real time
B1	send notification	1, 19	BCM +EPM event driven status und information update in real time
B2	send notification	1, 19	BCM +EPM event driven status und information update in real time
C1	raise demand on e-market place	1, 2, 5	ECM support demands on e-market place
C2	manage service parameters	1, 2, 5, 7	planned in ECM but not specified in details
C3	manage quotations	1, 2, 5	ECM support demands on e-market place
C4	settle agreement	1, 2, 5	planned in ECM but not specified in details
C5	notification to concerned parties	1, 2, 5	booking existing legacy systems / apps accessing booking features of legacy systems (TPM)/ legacy system need to be connected to Finest
C6	drop transport demand notification	1, 2, 5	not specified in Finest.Solution possible based on BCM/ECM front end in future
C7	manage order status	1, 2, 5	booking existing legacy systems / apps accessing booking features of legacy systems (TPM)/ legacy system need to be connected to Finest
C8	send service notification	1, 2, 5	BCM +EPM event driven status und information update in real time
C9	provide concerned data	1, 2, 5	BCM +EPM event driven status und information update in real time
D1	assign resources	4, 7, 9	specified how data have to be handled in TPM in future apps for dedicated resource management could be developed and implemented
D2	define date & location of service activities	4, 7	supported by TPM via app or import /export from legacy sysytems
E1	based on SLA set time stamps triggers on activities	4, 6	planned configurable event & related notifactions out the BCM/EPM
F1	capture real time event related data	3, 6, 10, 18, 20, 21	BCM +EPM event driven status und information update in real time
F2	proactive notifications on deviations	3, 20, 21	proactive event management by EPM including notification via BCM
F3	proactive replanning options	3	supports replanning via apps either new plan or alternatives to be confirmed by enduser / BCM update collaboration object in BCM according to new designed transport plan
G1	issue invoices / credit notes based agreements, SLA and milestone execution	7, 15	BCM +EPM event driven status und information update in real time of leagcy systrem / invoicing functionalities not in scope of Finest

Figure 9: Consolidated functional requirements *(own source, 2012)*

The table indicates that on a high level the FInest platform and the proposed core modules provide broad coverage of the domain requirements identified in prior deliverables. This broad coverage is encouraging as it means that, at least from a high level perspective, the design that has been developed for the FInest platform is in alignment with domain requirements and should be capable of handling the domain specific needs of transport and logistics organizations. However, high level requirements compatibility does not mean complete support of needs. To identify how closely the design maps to the identified needs requires a more detailed examination of the services proposed. This is the focus of the next section of this deliverable.

6 Business Assessment of designed technological solutions

The high level assessment of the FInest technical solution has been performed from several perspectives. This assessment has been performed to elaborate if, and how, FInest will cover or offer opportunities to improve the efficiency of transport and logistics operations. To perform this assessment a number of business requirements and technical design parameters had to be considered and investigated.

The approach of FInest in providing a public collaboration platform that contains generic functional elements, the ability to communicate and integrate with external ICT systems, as well as offering the possibility for ICT developers to create apps for specific operational demands opens a number of new business opportunities within the transport and logistics domain. The generic architecture of the FInest platform makes the platform potential useful not only for the transport and logistics domain, but for other domains as well.

Currently there are only documents available describing the way the different areas of the FInest service are planned to work individually, and how they interact with each other. Because no functional software exists at this time, the analysis that has been performed is only preliminary as differences between design and build can always arise. The true proof of whether the design lives up to its current appearance will occur when the platform and its modules are implemented in a test environment in Phase II of the project.

However, an assessment is required before moving to actual coding to ensure that at least from a paper perspective the design appears to meet domain requirements. This has been the purpose of the described assessment. The degree of the design to meet requiremetns, however, has not been described yet. A degree of coverage assessment was made by comparing detailed requirements with actual design documents to determine how close the proposed design functionality is to the actual detailed requirements. This analysis led to a qualitative "fit for purpose" grade that appears in the charts that follow. The scales used in the grading are as follows:

++   fully satisfies

+   covers the requirement

O   supported through FInest, but additional application necessary

-          supported to a limited extent, not in scope of this phase of design

--   not supported, not in scope

Category Requirement	Business need (from D1.1. D1.3. D2.3 and D3.2)	Relevance (end2end	Relevance (General UC	Support by FInest functions	Evaluation (--. -. o. +. ++)
Business Collaboration					
Business alignment	Self-presentation (introducing company profile)			FInest platform	++
	Service profile & advertising			FInest platform	++
	Market entry & partner selection (customers, suppliers, sub-contractors, …)			FInest platform	++
	Communication and coordination of tasks and events			FInest platform	++
E-marketplace	Self-presentation (introducing company profile)			ECM	++
	Service offering			ECM	++
	Market entry & partner selection (customers, suppliers, sub-contractors, …)			ECM	++
E-contracting	Providing offers and quotations for requested services	C1, C3, C6, C9, D2	1, 2, 4, 5, 7	BCM, ECM	++
	Negotiating quotes and offers			ECM	++
	Defining service levels (SLA) and agreeing on terms and conditions	C2, D2	1, 2, 4, 5, 7	BCM, EPM, ECM	++
	Managing orders (ICT solution)	A1, B2, C7	1, 2, 5, 14, 15, 16, 19	BCM, EPM, TPM, ECM	++
	Reserving and booking capacity	C5, D1	1, 2, 4, 5, 7, 9	BCM, TPM, ECM	++
	Closing legally binding contracts	C4	1, 2, 5	ECM	++
Administration of business partners	Providing an overview of partners, contracts, services, rates, SLAs, etc.	C2, D2, G1	1, 2, 4, 5, 7, 15	Finest platform, ECM	++
	Supporting planning and execution of transport orders			BCM, TPM	++
	Supporting partner selection (on the base of experience/service history)			BCM, ECM	++
	Providing correct information on time to the concerned parties (access to it) (e.g. send notifications)	B1, C5, C8, C9	1, 2, 5, 19	BCM, EPM, TPM	++
	Invoicing and accounting	G1	7, 15	BCM, EPM, TPM, ECM	o
Security and privacy	managing sensitive data/information (restricted accessibility & availability)			FInest platform	o
	determining underlying legislation (storage, processing)			FInest platform	o
Technical collaboration	providing an integration platform for existing ICT landscape in the transport and logistics domain			FInest platform	++
	enabling data integration (the use of various message/database standards)			(not in scope)	-
	converting messages/data into the resp. destination language			(not in scope)	-
	ensuring interactibility via compliance to platform standards ('single entrance/port' to the platform)			(not in scope)	-
	smart and easy modes of interacting and communicating	B2, F2	1, 3, 19, 20, 21	BCM, EPM	o

Figure 8: Business Assessment Overview 1 *(own source, 2012)*

Planning						
	Planning/Re-Planning	incorporate relevant external events into Planning/Re-Planning	D2, E1	4, 6, 7	BCM, EPM, TPM	++
		re-using existing planning data (and experiences) for re-planning transport orders	F3	3	BCM, EPM, TPM	++
		enable collaboration and communication with partners	B1, B2, C8, F2, G1	1, 2, 3, 5, 7, 15, 19, 20, 21	BCM, EPM, TPM, ECM	+
		align resource management with transport plans and business environment conditions	D1	4, 7, 9	BCM, TPM	+
		define events for meeting monitoring and visibility demand (milestones)	D2, E1	4, 6, 7	BCM, EPM, TPM	++
	Strategic planning	deriving insight from historical/empirical event data	E1, G1	4, 6, 7, 15	EPM, TPM	++
		re-using existing planning data (as well as empirical data and experiences) for strategic planning	G1	7, 15	BCM, EPM, TPM	++
Resource Management						
	Resource allocation	administrating resources (allocation, monitoring, optimization)	D1	4, 7, 9	(TPM)	--
		providing resource information for planning purposes	D1	4, 7, 9	BCM, TPM	+
		providing resource information for re-planning purposes (in case of deviations)	D1, F3	3, 4, 7, 9	BCM, TPM	+
	Planning support	increasing productivity (of staff and asset)			BCM, EPM, TPM	+
		maximizing resource utilization			BCM, EPM, TPM	+
		minimizing costs and investment in assets			BCM, EPM, TPM, ECM	+
Monitoring & Visibility						
	Progress monitoring and forecast	track progress of transport (and supply chain) process	E1, F1, F2	3, 4, 6, 10, 18, 20, 21	BCM, EPM, TPM	++
		providing real-time information (on flow of goods and information)	B1, C2, E1, F1, F2	1, 2, 3, 4, 5, 6, 7, 10, 18, 19, BCM, EPM, ECM		++
		real-time forecasting of events, conditions and developments (for resource allocation and (re-)planning)	E1, F1, F2	3, 4, 6, 10, 18, 20, 21	BCM, EPM, TPM	++
	Event management	identify and determine (process- and planning-relevant) events of interest	C8, D2, E1, F1, F2	1, 2, 3, 4, 5, 6, 7, 10, 18, 20, BCM, EPM, TPM		++
		define and control (desired) conditions of process-related events (milestones)	C8, E1, F1, F2	1, 2, 3, 4, 5, 6, 10, 18, 20, 2:BCM, EPM, TPM		++
		monitor external events (and initiate countermeasures proactively)	C8, E1, F1, F2, F3	1, 2, 3, 4, 5, 6, 10, 18, 20, 2:BCM, EPM, TPM		++

Figure 9: Business Assessment Overview 2 *(own source, 2012)*

6.1 Designed Technical solutions

In this section limitations of the current design are noted, risks associated with elements of the design discussed and gaps that must be filled if the FInest platform is to fully achieve it stated operational objectives are identified.

6.1.1 Business Collaboration Module

The BCM creates a collaboration object based on a business activity that is of interest to some user. The collaboration object combines information about the process itself with data about the execution of process steps to create a stateful object that can be used to track and manage progress of process execution.

This concept of combining process information and data in a single entity (collaboration object) is relatively new (cf. entity-centric modeling), and it has not been applied operational in a transport and logistics scenario. This makes using the entity centric approach for the core of the FInest platform a risky proposition. There are some points of concern in the use of this concept.

- The complex relationships among the parties involved in a shipment of goods, with multiple parties involved in horizontal as well as vertical relationships during a shipment, creates the need for the recursive generation of collaboration objects and their integration/management. While logically possible, this requirement for multiple levels of objects makes development and management of the technical components of the project a challenge.

- The complexity of supply chain processes, where multiple steps occur and in which items are merged, consolidated, de-consolidated, reverse shipped, etc., makes instantiating a transport plan extremely difficult. These complexities pose a challenge for the run time generation of lifecycles that have meaning in the collaboration objects.

- Based on the collaboration object concept, there could potentially be thousands of objects generated that are temporarily related to each other. This creates challenges for object management.

- Since there is no existing example of the collaboration object approach in use for the transport and logistics domain, the initial implementation of this concept in Phase II must demonstrate sufficient capability to gain acceptance by the domain if the vision of the FInest project is to be achieved.

Some other areas of concern about the proposed design being developed for the BCM are:

- With respect to the integration of data from external applications into the flow of information managed by the BCM, there is no detailed concept developed so far as to how this will work.

- The apps store concept and apps design rules are not available now. This is not in scope of the FInest project, but taking into account that FInest is not providing broad end user functionality by itself, apps developed for use from the app store are necessary to fulfill the domain requirements.

6.1.2 Event Processing Module

The EPM will provide event related data and offers the opportunity to trigger messages and predict potential failures. There are similar technological solutions (not including the predictive element, however) for other set ups in the market today (e.g., road traffic management systems). Considering the benefits that these similar systems provide, the successful implementation of the EPM should provide a large step forward for domain users. However, since there is no current production example of the particular approach being proposed in the FInest project, once more the proof will need to be seen in the actual implementation of the platform in Phase II if domain skeptics are to be convinced that the idea will work

6.1.3 Transport Planning Module

The TPM performs in a manner similar to current algorithm based planning tools. The benefit for the domain is in its direct linkage to the BCM and EPM. In addition, another advantage is its planned ability to pro-actively take action for replanning services based on real time data. The TPM, like other proposed services within the FInest project, has never been implemented in the design that is being proposed. The ability to instantiate TAPs and build TEPs from them has never been accomplished in a system with scale and scope requirements as large as in FInest. It remains a significant risk that the assemble process and automated transfer process may not be capable of scaling to the extent required for the concept to be commercially viable.

6.1.4 E-Contracting Module

There are already e-contracting tools and platforms in the market. Going beyond this current crop of tools, the ECM provides the additional service of being able to link to external marketplaces to identify potential partners and obtain competitive bids for services. Like the other modules within the FInest platform, the ECM must be able to provide information to the other FInest modules in a reliable and secure manner. This linkage is critical for the proper execution of the platform and another design item that can only be seen to work once the platform is built.

The e-contracting module can be directly linked to the operational level. The capability to define SLAs and connect the SLAs with the EPM and BCM is an innovative concept and can provide more transparency and control for execution activities. However, this linkage could pose problems due to the requirement that the transfer of SLA and other operation information must occur in an integrated manner with the transport plan and must be properly

configured through the EPM. These relationships, as noted previously, have not been realized yet and it awaits the actual development of services to see how well this integration works.

The concept of the e-contracting in public and open manner should enable end users to look for new business partners in markets where they currently have no presence or relationships. This capability will open new business opportunities for SMEs who have been hesitant to invest heavily in ICT infrastructure for finding and managing global activities because of risks and lack of funds. However, as has been noted, the inability to identify a security process to ensure privacy from governments following different regulatory policies, makes acceptance of the service for global activities a question mark. Such a solution must be found if the FInest service is to be broadly accepted by SMEs for doing international trade activities.

SummaryWhile numerous technological challenges exist because of the FInest platform's pushing of current technological boundaries, the benefits that could result from successfully overcoming these technical barriers warrant pushing the concept forward. The FInest team has developed sufficient detail in their designs to indicate that the development of the proposed technical solutions is possible. Prototyping of key elements of the solutions in the next six months should indicate where the real implementation problems may lie. However, actual testing of the solution, which will show the real proof of the design, will have to wait until Phase II of the project making this review of capabilities only a preliminary assessment.

6.2 Domain Requirements

The core areas of FInest concept are collaboration, event management, planning and e-contracting. Apart from the e-contracting service, which is close to an operational application, the other areas are considered to be technology advances and form the foundation of a future network of apps, legacy systems and third party ICT systems that could significantly advance computing approaches in the domain. In one respect, however, their advanced design can be seen as not fulfilling operational functionalities for the domain as the entire system assumes that other applications will be either used (legacy applications) or developed (app store applications) to fulfill specific domain needs. The expectations of the transport and logistics domain are for FInest to support current operations while improving those operations. As noted in the analysis of the design, most of the domain requirements are *supported,* but not operationally covered by FInest.

The current phase of FInest development does not provide final versions of end user front ends. This is not in the scope of the current project. However, the domain requirements primarily refer to front end functionalities and ICT systems as these are the tools that are used by operators today to perform their tasks. The evaluation of the end-to-end scenario indicates that FInest *might* be able to improve the efficiency of today's operation and close some of the current performance gaps.   But as indicated, the assessments show clearly that domain acceptance will depend on how the operational tools are integrated into the current technological approach.

In the current stage of the FInest project, the front end of the service is not described in detail. A concept for the app store and app development approach is missing (not in scope of the DoW), and integration of external ICT is not fully elaborated.

6.2.1 Collaboration

FInest is designed as a collaboration platform. Establishing and managing collaboration is a core module and functionality. The BCM incorporates a novel design that has not proven its capabilities. The advantages of this design go well beyond current approaches as it is considered to be much more flexible, supports much faster processing and will allow for real time information integration into decision making. All in all, successful development of the BCM will address a number of business issues all at once. The flexibility achieved through its use will enable users to react on short notice to deviations. The accurate information generated through its management of all events and data will support all other business processes and reduce the effort of manual updates, which are a major cost and quality factor today.

Virtual market places are available today. While their scope and audiences are limited, they do have a certain level of acceptance for particularly types of transaction related services. The FInest approach of providing a global village where everybody is able to contact and interact with everyone is far more ambitious, but will have a significant effect on the way how business models are created and established in the transport and logistics domain if successful. In addition, the FInest model could enable SMEs, who are currently disadvantaged when attempting to operate locally and act globally, to begin to expand their competitive capabilities well beyond where they are today.

The FInest features focused on enabling global collaboration in the domain are very innovative and they might initiate a change in the business philosophy of the transport and logistics domain as well as in users of transport and logistics services. Collaboration, supported by an ecosystem of apps and services from the App and Services store and delivered through a SaaS model, should allow the industry to move forward to efficiency and effectiveness improvements unattainable using current approaches to business. What will be required is the successful demonstration of the FInest concept in Phase II of the project.

6.2.2 Resource Management

Dedicated resource management tools are not in the scope of the current Finest project. FInest manages a significant amount of information while it is processing transport plans. Notifications for certain events can be customized for specific business cases. The benefit Finest is offering to the domain is the real time information that can be utilized to support other ICT solutions such as legacy systems, or the proposed apps which could manage resources. The FInest open ecosystem approach opens the opportunity for sophisticated resource planning and management tools to be developed base on their ability to process real-time inputs concerning shipments and their statuses.

6.2.3 Planning

Planning is one of the core modules in FInest. The TPM is designed to support initial transport plans as well as re-planning activities. The linkage of collaboration, contracting, event management and operation provides the opportunity to utilize complex plans. The ability of FInest to manage and store the real time data concerning a shipment provides the TPM with its ability to perform in line replanning services when deviations are noted. This capability lowers the impact of deviations and provides planners with their first real option of being able to transparently address problems without affecting customer schedules.

In order to realize the full potential of the platforms dynamic planning capabilities, apps are needed to enhance the basic services provided by the core modules.

6.2.4 Monitoring & Visibility

The transport and logistics domain today lacks transparency and accuracy of data. Today's tools in for monitoring transport operations are only partially real time. Manual input of data is very common.

FInest is a dramatic improvement over the current situation in that it is based on a model of real time data provided to anyone with a need in a highly secure and transparent manner.

7 Conclusion

FInest is a innovative concept in how to increase the capabilities and efficiency of the transport and logistics domain. The concept of creating an integrated platform as only a source of data (BCM/EPM/TPM) combined with domain specific market places and an open platform for developing applications and integrating with external ICT is beyond all services that are available in the market currently. It will be very interesting for the domain experiencing the benefits and opportunities in the experimentation environment planned for Phase II.

Should the expectation presented by the FInest project be fulfilled, the transportt and logistics domain is looking at significant change in its business models and remarkable operational improvements. The proposed platform, in theory, will be able to provide a dramatic increase in the traceability and scalability of business while minimizing risks for the domain actors.

The approach of combining a basic technical platform containing the basic functionalities needed for domain services, and putting an app shop and social network capabilities on top as one business concept will allow actors of all sizes and business focus to realize benefits.

For the future development of the platform concept it is recommended that the integration of legacy and external systems, and the development of the apps store, be raised to the highest priority. These are essential elements the FInest platform to fully meet domain business requirements, and they are necessary requirements for the acceptance of the FInest platform by other business domains.

While a thorough assessment of the FInest design has been made, this results of the assessment are simply paper based findings.   Even if the concept seems brilliant and appears to meet domain requirements, there is no true physical proof of its capabilities. This physical proof must be delivered if the skeptics within the transport and logistics domain are to accept the platform and change their way of doing business.

8 References

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