



FInest – **F**uture **I**nternet enabled optimisation
of **t**ransport and logistics networks



D1.6

Business Opportunities and Applicability
Study

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Abstract

This report presents the sixth and final deliverable of Work Package 1 (WP1) “Domain Characterization and Requirements Analysis.” Deliverable 1.6 (D1.6), “Business Opportunities and Applicability Study,” is concerned with the investigation of business models, opportunities and the feasibility of adoption for the envisioned Future Internet enabled collaboration and integration platform for transport and logistics (the Finest Platform). Specifically, this report addresses Task 1.5 (T1.5) of the Finest DoW “Business Opportunities and Industrial Applicability Study.” The objectives of this task, which are addressed in this deliverable, are to investigate business models that are suitable for both the ICT industry as a solutions service provider and commercial partners as users of the Finest service. In addition, the applicability of the solution is reviewed in preparation for commercial adoption and ecosystem development.

This report provides an overview of the results of the work stream in WP1 as a background for the reader to understand how the business requirements for the Finest Platform have evolved. This overview includes:

- *The identification of the business needs, gaps and shortcomings (D1.1/D1.3)*
- *The analysis of the current transport and logistics ICT landscape (D1.4)*
- *The assessment of the technological solutions designed in the technical WPs (D1.5)*

Based on these reports, a strategy is elaborated on how a cloud based collaboration platform can be employed to address the needs of the transport and logistics domain and how such a strategy might be realized through commercialization and community building.

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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
SLA	Service Level Agreement
T&C	Terms & Conditions
T&L	Transport & Logistics
TIP	Transport Information Provider
TPM	Transport Planning Module
UI	User Interface
WP	Work package
Finest	Future Internet enabled Optimization of Transport and Logistics Networks
FI-PPP	Future Internet – Public Private Partnership
IATA	International Air Transport Association
C2K	Cargo 2000
RFID	Radio Frequency Identification
SLA	Service Level Agreement
CSP	Cloud Service Provider

1 Introduction

The objective of the Finest (Future Internet Enabled Optimization of transport and Logistics Business Networks) project is the development of a collaboration service based on Generic Enablers (GEs), developed through the FI PPP's FI WARE project, for the Transport and Logistics (T&L) domain. Modern transport and logistics operations are highly distributed inter-business activities that span multiple geographies and involve numerous business entities all focused on optimizing their individual operations with little consideration of how this narrow focus impacts the overall linked supply chain. The Finest collaboration service provides users with innovative visibility, event management, contracting and planning services that attempt to overcome the traditional parochial focus of supply chain participants thus leading to a truly collaborative end-to-end approach to supply chain management.

Work Package 1 (WP1) of the Finest project (Domain Characterization and Requirements Analysis) focuses on the identification of requirements for next generation, Future Internet (FI) based, ICT services for the transport and logistics domain. In addition, WP1 is responsible for the business evaluation of technical developments generated through work performed in the technical work packages of the Finest project. The final responsibility of WP1 is the development of potential business models for the Finest service that would allow the service to be commercially rolled out to provide benefit to the transport and logistics domain.

This report (D1.6 Business opportunities and applicability study) examines potential business models and opportunities for the commercialization of the Finest service. The analysis is based on a progressive set of business focused deliverables that have preceded this deliverable.

- D1.1, Initial report on the transport and logistics domain, described how business is currently transacted in the transport and logistics domain. D1.1 formed the foundation upon which project partners developed their understanding of the operations of modern transport and logistics companies.
- D1.2, Transport and logistics domain dictionary, has served as a repository for terms and concepts used in the transport and logistics domain. This dictionary has acted as resource for the project partners to refresh their knowledge concerning domain specific activities and vocabulary.
- D1.3, Business requirements for future transport and logistics ICT solutions, provided the business relevant requirements for developing the Finest service. In addition, this

deliverable has served as the reference against which the technical deliverables from the project have been continually evaluated to ensure their relevance to domain driven needs.

- D1.4, Analysis of ICT solutions employed in transport and logistics, surveyed the existing landscape of ICT solutions available to transport and logistics business users. This documentation of existing ICT services exposed the fact that, although many ICT solutions exist, they tend to be monolithic in design, costly to implement, require significant technical support, are limited in flexibility and generally expensive to operate.
- D1.5, Business assessment of technological solutions, examined the applicability of the technical developments of the Finest project against the original business requirements developed in D1.3. While this analysis found the core modules being developed within Finest to be in line with identified business requirements, findings also indicated that ecosystem partners as well as further extensions of the platform would be required if a commercially viable service were to be developed. These findings provided key inputs to the project’s phase II proposal for what has become known as the cSpace project. In addition, these findings have formed a key component in the evaluation of business models for the platform that appear in D1.6.

Delivery of the previous five deliverables within WP1 has fulfilled each of the project milestones described in the table that follows.

Milestone Description	Milestone No.	Delivery Month
Initial domain definition and business requirements analysis competed	MS1	M6
Preliminary ICT state-of-the-art analysis completed	MS2	M6
Detailed business requirements defined	MS14	M12
Final ICT state-of-the-art analysis competed	MS15	M12
Detailed business assessment of ICT solution completed	MS26	M18

With the delivery of this report milestone MS34, the last project milestone for WP1, is fulfilled.

The focus of this report, as mentioned previously, is to identify business models that are suitable for both the ICT industry as the provider of industrial strength services that can be developed on the basis of the project results and for commercial partners in the transport and logistics domain as the anticipated users of such services. With this focus in mind, Section 2 of the report provides a summary of the high level business requirements that were detailed in

FInest deliverable D1.3. These requirements have driven the domain analysis of technologies and potential solutions and inform all aspects of the final FInest platform vision (Figure 1).

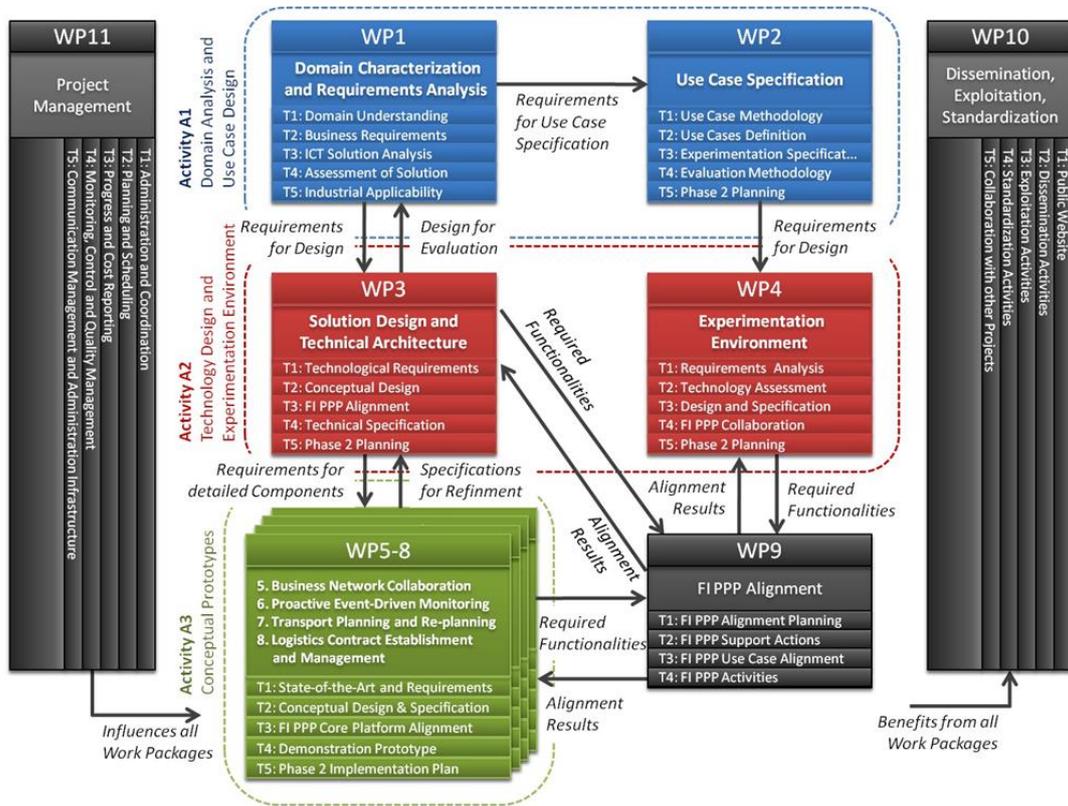


FIGURE 1: INTERRELATIONSHIP OF WORK PACKAGE 1 WITH OTHER FINEST WORK PACKAGES

Section 2 of the report also reviews the definition of cloud computing and positions the FInest platform within this definition. This section of the report continues with an overview of the FInest platform as developed under phase I of the FI PPP program. It should be noted that, while the platform developed under the FInest project is the focus of this section, this platform concept has been extensively extended in the phase II project called cSpace to address a number of findings developed while working on the FInest project. Section 3 of the report develops the business model for the FInest platform based on the fact that the FInest platform implements what is termed a multi-sided market platform. Section 4 discusses the applicability of the FInest platform for the transport and logistics domain. It should be noted that the FInest platform, as envisioned, is a general purpose platform that could be extended to other domains besides that of the transport and logistics industry. This is, in fact, what is proposed in the phase II effort called cSpace. However, the focus of the phase I project has been, and continues to be, on the application of the FInest platform to the transport and

logistics domain, and this is the focus of the applicability discussion in Section 4. Section 5 summarizes the deliverable and provides a short discussion on future directions that are to be pursued in the phase II follow on cSpace project.

2 Background

2.1 Business Requirements

The transport and logistics domain is a highly fragmented and complex domain composed of both in house and third party service providers. Services provided by these entities include the actual movement and storage of freight, cross border trading activities, insurance provisioning, management and design of networks, transport planning, last mile delivery, parcel and package shipment, port operations, and numerous other activities. Freight movements occur over land, on the sea, on inland waterways, on rail roads, in the air, and through pipelines. The fact that all goods that are consumed, either by intermediaries as raw materials or by final customers as finished products, are handled by logistics service providers of one kind or another means that this industry is a critical component of modern society. Figure 2 provides a stylized view of a “typical” international freight shipment.



FIGURE 2: SIMPLIFIED VIEW OF AN INTERNATIONAL FREIGHT SHIPMENT

Costs associated with the movement of goods are significant and can vary from over 20% of GDP in less advanced countries to less than 5% of GDP in advanced countries (Rantasila and Ojala, 2012). In addition, the performance of a country’s logistics sector can have a large impact on the overall performance of that country’s economy (Ojala et al., 2012). For these reasons alone the efficient operation of logistics should be of concern to all members of

society. However, one other impact of transport and logistics operations is of increasingly critical importance; greenhouse gas emissions.

The European Union estimates that transportation accounts for approximately 25% of total European Union greenhouse gas emissions (http://ec.europa.eu/clima/policies/transport/index_en.htm, accessed March 2013). These emissions have been increasing in absolute terms for the past twenty years and, unless substantive improvements are made in transport technologies and transport efficiency, emissions are projected to continue to increase into the foreseeable future.

The efficient operation of transport and logistics networks requires skilled operators as well as modern information systems. Unfortunately, current ICT systems are difficult to implement, costly to operate and provide limited support for inter-company collaboration. In analyzing the current ICT landscape for the T&L domain, and developing high level requirements for future ICT technologies, the Finest team observed eight high level areas of needs (Figure 3). These high level areas of needs are reviewed in the sections that follow.

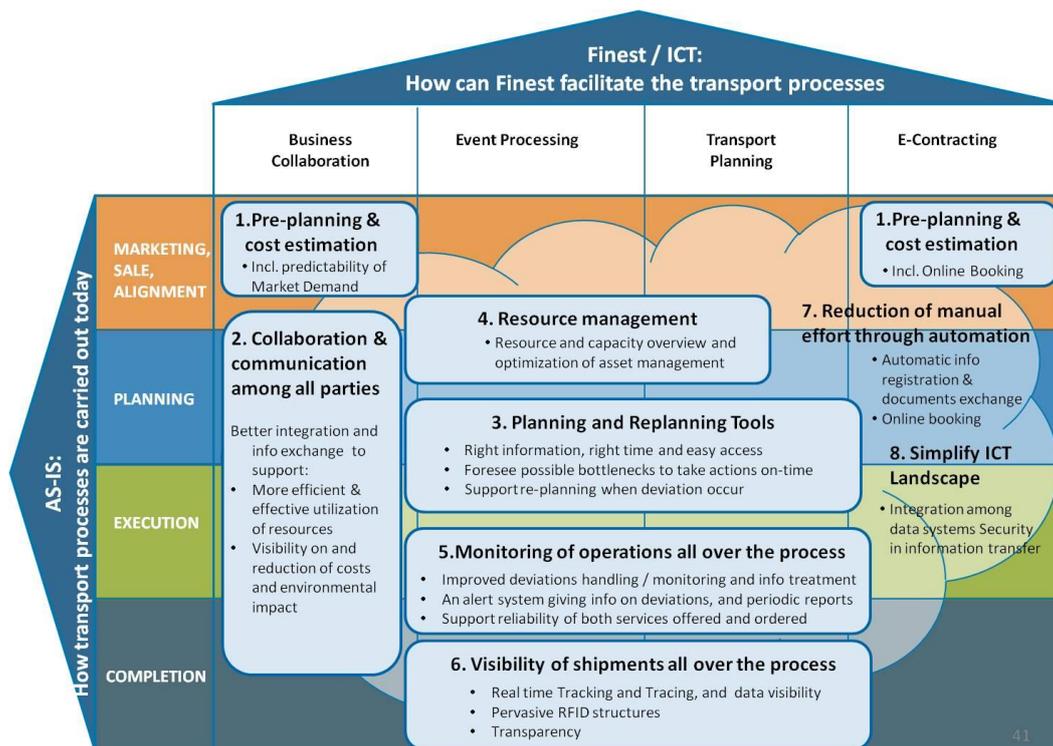


FIGURE 3: GENERIC REQUIREMENTS IDENTIFIED IN D1.1 ANALYSIS OF THE TL DOMAIN

2.1.1 Pre-planning and Cost Estimation

Logistics and transportation activities require significant up-front investment in planning and cost development to be delivered in an efficient manner. Shippers and logistics service providers interviewed during the development of the high level domain requirements for the Finest project indicated that without adequate pre-planning for the actual execution of a freight movement no guarantee of efficient operations could be made. Unfortunately, these same domain participants indicated that because of time pressures and the general reactive nature of the industry today (driven both by the unpredictability in customer demands as well as the inability of shippers to provide logistics service providers with accurate and timely shipment information), effective pre-planning of shipments was a gap in operations that would benefit from next generation ICT services.

2.1.2 Collaboration and Communications

Transport and logistics domain partners generally do not operate in an open and collaborative manner. This fact results from the highly competitive, cost and time driven nature of the transport and logistics business as well as the lack of ICT systems integration and cross organization/geography/mode standards. Difficulties with collaboration and communications create search related problems causing domain partners to close their networks to new potential partners due to risk and uncertainty in their ability to perform. Industry participants indicated that better communications and collaboration among organizations, facilitated by improved ICT, could resolve the search issue as well as improve inter-organizational coordination of actual shipment processes thus avoiding surprises and increasing efficiencies.

2.1.3 Planning and Re-planning

The planning of an actual shipment requires knowledge of transport company service levels, transport times, transport costs, handling requirements, paperwork requirements and a host of other factors (e.g., past performance of partners, customs services, vehicle capabilities, etc.). The complexities of a shipment make this process difficult to automate using current technologies so significant human intervention is required.

Once a shipment has been planned and execution has begun, deviations may occur that require re-planning of the shipment. Re-planning follows a process similar to the original plan, although expediting and other alternative transport options may be required in order to maintain delivery schedules. Manual input once more is the norm as automation is even more limited in the area of re-planning than in the original planning process.

Expectations by industry partners of the ability of future ICT to be able to handle the planning and re-planning processes were mixed. However, those individuals interviewed indicated that

this would be an important area where they would like to see support from future ICT developments.

2.1.4 Resource Management

When planning the execution of a shipment managers need to understand how much of any resource will be required for the shipment. Personnel, facilities, vehicles, material handling equipment, etc. all need to be factored into the shipment plan so that the actual shipment can be carried out and so that resources are used in the most efficient manner possible.

Underutilized vehicles, overworked personnel, inadequate or unavailable material handling equipment, etc. can all lead to inefficient logistics operations. Individuals interviewed for the project all indicated that future ICT services should take resources into account during planning so that the most efficient application of resources could be achieved.

2.1.5 Monitoring and Visibility

Shipment monitoring, tracking and tracing, event notification and alerting all are critical requirements identified by the domain experts interviewed for the project. Real time understanding of the status of a shipment, being notified pro-actively if a deviation has occurred and receiving information on potential deviations through predictive monitoring allow supply chain managers to manage the shipment of goods in as efficient a manner as is possible. Unfortunately, current approaches to shipment monitoring and event management are neither real time nor completely transparent. Many gaps in shipment visibility arise due to incompatible systems, lack of systems and manual data entry requirements. Experts interviewed for the project indicated that real time visibility, monitoring, and event handling across the entire supply chain were mandatory requirements for any future ICT service.

2.1.6 Reduction of Manual Inputs

As has been noted in several of the previous sections, current T&L domain ICT solutions require a significant amount of manual input and intervention. The manual nature of data collection and input leads to significant data quality problems and a lack of timeliness in reporting on shipment progress. In addition, efficient resource usage and shipment planning is not achieved as time pressures force planners and managers to use rules of thumb or limited search routines to perform their jobs. Individuals interviewed for the project all identified the significant amount of manual intervention in the planning and execution of a shipment of goods as a problem that should be addressed through future ICT service developments.

2.1.7 ICT Landscape Simplification

Technology has come to the supply chain in fits and starts. ICT solutions have been developed to attack particular problems without regard to the overall supply chain management process. This has led to a chaotic landscape of incompatible ICT solutions requiring significant technical

skills to maintain. In addition, since the ICT solutions have tended to be developed to solve particular problems, their architectures, data structures, communications and integration requirements, interfaces, etc. have not been developed in a standardized manner making integration and inter-system data sharing a difficult if not impossible task. Industry experts interviewed for the project all agree that any new ICT developments will need to be constructed with an eye towards industry standards and interoperability.

2.2 The Finest Platform

The Finest platform is a value added collaboration space designed as a “cloud” based service enabling actors operating in collaborative transport and logistics networks (e.g. businesses, authorities, public and private service providers) to find out about one another, determine what services others can provide, and to collaborate on developing and executing solutions to business needs that they might have in a seamless and easy manner. In order to allow for rapid development of high-quality ICT solutions at minimal costs, the Finest platform enables collaborators to meet, contract, establish, execute, and manage transport and logistics activities based on a unique set of Future Internet technologies. The Finest platform facilitates rapid construction of transport solutions to ensure that businesses can address issues or opportunities in “real time” without having to address the overhead and cost that has plagued transport activities based on existing technologies.

2.2.1 Cloud computing / Future Internet Technologies

Future Internet technologies, such as the Finest platform, being developed under the European Union’s Future Internet Public Private Partnership (FI PPP) program employ the “cloud computing” paradigm for operation. The United States Department of Commerce’s National Institute of Standards and Technology has developed a definition for this new paradigm that reads as follows:

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models (Mell and Grance, 2011).

The essential characteristics referred to in the definition are:

1. On demand self-service – the automated provisioning of computing capabilities,
2. Broad network access – services are accessible via any device from anywhere,

3. Resource pooling – resources are pooled in a “multi-tenant” manner to maximize the efficient utilization of assets,
4. Rapid elasticity – resources can be rapidly scaled based on demand, and
5. Measured service – resource utilization is actively monitored and charged based on usage.

The three service models refer to:

1. Infrastructure as a Service (IaaS) – physical infrastructure is provided to consumers as a service upon which they can deploy their software, data and applications,
2. Platform as a Service (PaaS) – software construction resources used by consumers to build, code, deploy and operate their applications, and
3. Software as a Service (SaaS) – applications in the classical sense hosted “on the cloud” and which can be accessed by the consumer via any device.

Finally, cloud services can be deployed via:

1. A private cloud – the infrastructure is controlled and operated for use by a single entity,
2. A community cloud – the infrastructure is controlled and operated for use by a single community of users,
3. A public cloud – the infrastructure is open for use by the general public, or
4. A hybrid cloud – the infrastructure is composed of two or more of the other deployment strategies.

Using the NIST definition of cloud computing, the Finest project is focused on the design of a SaaS service using generic enablers developed by the FI PPP FI WARE project as components of a PaaS service to create a two-sided platform for collaboration and execution for the transport and logistics domain.

2.2.2 Finest – A cloud based Transport and Logistics Collaboration Platform

The overall purpose of the Finest Platform is to enable the seamless and efficient collaboration of stakeholders involved in the planning, execution, and coordination of transport and logistics processes. For this, the platform consists of three main functional layers:

- the **Front-End** that serves as the main point of access for End-Users (i.e., business experts concerned with managing transport and logistics processes) and provides access to all available features, services, and apps,

- the **Core Modules** that provide re-usable functionalities to enable real-time business collaboration as well as general and domain-specific business functionalities that can be re-used to rapidly develop customized solutions at minimal costs, and
- the **Back-End** layer for integrating existing systems (e.g., legacy systems, standard business systems, and external services and systems) in order to allow for continued usage of existing IT landscapes and for exploiting emerging technologies for advanced business features (e.g. IoT-enablement).

2.2.2.1 The Front End

The Front-End that serves as the *main point of access for End-Users* and offers a novel ‘*all you need in 1 place*’ user experience, includes the following features:

- Customizable end-user cockpits,
- Social networking and collaboration features for business partners and communities, and support for seamless collaboration on specific business activities and transactions, and
- Access from anywhere via any device.

2.2.2.2 The Core Modules

The core layer of the Finest platform is composed of independent transport and logistics service modules integrated through the Business Collaboration Module. The independent service modules are “cloud based” applications that provide essential domain services for the shipment of goods. The initial set of core modules that are being developed for the Finest platform include the following:

- Business Collaboration Module (BCM) – the central module of the Finest platform that supports the inter-organizational collaboration between transport and logistics network partners and acts as integration service between these partners and the various cloud based components selected to manage the efficient flow of goods between the partners.
- E-Contracting Module (ECM) – this module 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 need this information for effective and efficient network operation.
- Event Processing Module (EPM) – this module provides end-to-end visibility of shipments through event driven monitoring across domains and transportation modality. The module is also responsible for SLA monitoring (based on data from the ECM), and triggers transport re-planning when needed.

- Transport Planning Module (TPM) – this module provides support for dynamic transport planning and re-planning activities, exploiting real time event data provided through the EPM. Plans are developed based on existing con-tracts and, where these contracts are absent or insufficient to achieve a particular shipment objectives, spot market contracts will be established through interactions with the ECM. Re-planning of shipments occurs when real time signals from the EPM indicate that a current transport plan cannot be achieved because of some event that has arisen in the shipment process.

2.2.2.3 The Back End

The back end layer of the Finest platform provides access to, and integration with, legacy systems, third party services and any Internet of Things (IoT) devices that may provide information during the goods transport lifecycle. Legacy system integration is facilitated by service-oriented technology, e.g., by exposing features of legacy systems as services, or by offering access to legacy systems via the “Software as a Service” delivery model.

Figure 4 provides an overview of how the Finest platform is structured and the relationship of the layers to one another.

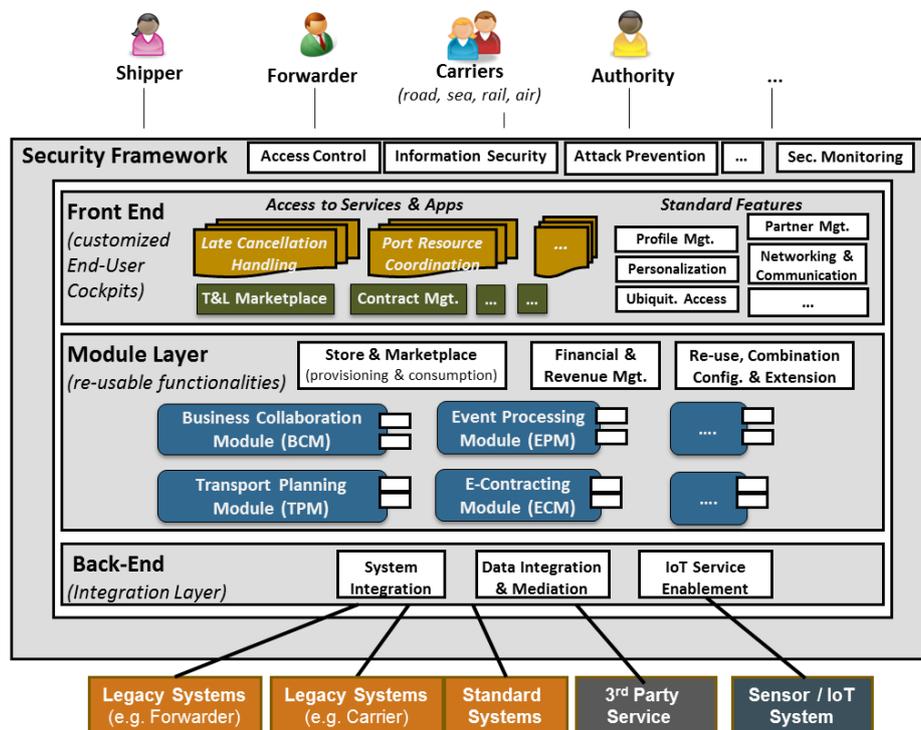


FIGURE 4: HIGH LEVEL VIEW OF THE FINEST PLATFORM

2.3 Addressing the Needs of the Domain

The FInest project has demonstrated, through a series of prototypes and demonstrators, that the platform concept that has informed the project does indeed address the needs of the domain. In the process of working on the design, missing components and services have been identified (e.g., an app store in which apps that address T&L execution beyond those developed in the FInest project) which will be addressed in the follow on phase II project called cSpace. However, as has been documented in FInest deliverable D1.5, the FInest platform concept forms a solid foundation for moving forward in addressing the eight high level domain business requirements mentioned previously. The FInest platform also forms a good basis for the development of a set of novel businesses that, based on the platform concept, could address issues in other business domains as well.

3 The Finest Business Model

The economic model that underlies the concept of the Finest platform is called a multi-sided market (Rochet and Tirole, 2003). Multi-sided markets bring together multiple groups of economic agents through the intermediation of a platform. The platform provides infrastructure and rules that facilitate group interactions and transactions with one another (Eisenmann et al., 2006). Multi-sided markets occur in many guises. Videogame platforms such as Sony’s Play Station or Microsoft’s X-Box, credit card services such as Visa or MasterCard, software platforms such as Microsoft’s Windows, portals, newspapers, and many other businesses act as multi-sided markets bringing together one set of users with another set.

Multi-sided markets are characterized by strong indirect network effects (called “cross-side” effects in some literature, see e.g., Eisenmann and Hagi, 2008 or Economides and Katsamaka, 2005). Indirect network effects arise through the virtuous cycle of adding potential customers on one side of the platform, which attracts potential suppliers on the other side of the platform, which attracts more potential customers on the other side, and so on. If a platform “owner” can begin this type of virtuous cycle they have the potential, barring missteps or aggressive early competition, to lock in the majority of a market and earn significant profits (Evans and Schmalensee, 2007).

The Finest platform is a multi-sided platform for the transport and logistics industry. One group, shippers, resides on one side of the platform while another group, logistics service providers, resides on the other side of the platform. The Finest platform provides match making and collaboration facilities to the shippers so that they can find and contract with suitable service providers to execute a shipment.

The Finest platform also provides “complements” to the match making, contracting and collaboration services available to the shippers and LSPs. These complements exist as features of the platform itself (i.e., security, shipment tracking and tracing, event management and logging, access from anywhere with any device, user configurable cockpits, etc.) and as third party extensions of platform functionality through applications residing in an app store (note that this functionality is referenced in the Finest architecture [see D3.4 of the Finest project], but is planned to be developed in the phase II cSpace project).

Setting prices on a multi-sided platform is a strategic issue. Pricing in a multi-sided platform market must align demand among the various groups using the platform. This may mean that prices for one group may differ substantially from the prices another group is charged. In fact,

if one group generates significantly more benefits for another group when using the platform, then the group generating the greater benefits may be given a lower price so that more of their type are attracted to the platform accelerating the virtuous cycle mentioned earlier (Parker and Van Alstyne, 2002).

The sections that follow build on the concept of Finest as a multi-sided platform market. The requirements of an implementable business model are first outlined. Following this, each element of the business model structure is discussed and a potential approach for the Finest platform in addressing the element is developed. The section ends with a summary of the business model that has been developed and a discussion of the implications of this model for commercialization of the Finest platform.

3.1 Business Model Structure

A business model describes how one proposes to create, deliver and capture value (Osterwalder and Pigneur, 2010). The model can be considered to be composed of several components that combine to address the needs of a business's stakeholders. Osterwalder and Pigneur, 2010 identify nine building blocks that a business model must contain to address the needs of its stakeholders. These nine building blocks are:

1. Customer segments – which customers will the business serve?
2. Value propositions – what bundle of products and services will be delivered to address specific customer needs?
3. Channels – how will the value propositions be delivered to customers?
4. Customer relationships – what type of relationship will the business have with each customer segment?
5. Revenue streams – how will revenue be generated from each customer segment and its value proposition?
6. Key resources – what “assets” will be required to deliver the value propositions to each customer segment?
7. Key activities – what activities will be critical to the delivery of the customer value propositions?
8. Key partnerships – what activities will be performed in house versus outside the business?
9. Cost structure – what type of cost structure will result from delivering the aforementioned components?

The following sections address each building block from the perspective of the Finest platform.

3.1.1 Customer Segments

The Finest platform is a multi-sided platform market. As such, it must serve multiple customer segments. In addition, since each customer segment will necessarily have supporting service providers or suppliers, the Finest platform will in fact support a rather broad ecosystem of shippers, logistics service providers, software development companies, infrastructure hosting companies, systems integrators, hardware manufacturers, facilities companies, consultants, etc. However, for the purposes of the Finest business model discussion, this paper will focus on those customer segments that directly employ the Finest platform as an intermediation service to transact their trading activities and from whom the platform makes money. In addition, a second set of customer segments will be discussed that could develop the Finest platform and manage it as a service. Discussion of this second segment set is necessary as the Finest platform must first be adopted and developed by some organization (or organizations) before it can be deployed to serve the transport and logistics market.

The primary customer segments that sit on the various sides of the Finest platform are:

- Shippers – the entities that have goods to ship and need to establish relationships with service providers to move their goods from an origination point to a destination point.
- Logistics Service Providers (LSPs) – the entities that provide logistics execution services for performing all or a part of a transport operation on behalf of a shipper. A LSP can be either an in house service provider or an external third party.
- Application developers – the entities that develop reusable applications (Apps) in conformance with the Finest platform’s app development requirements and that are hosted by the Finest platform in an “app store” like manner.

Note that an additional customer segment, that of advertisers, may also be addressed by the platform. This customer segment would consist of entities wishing to promote their products or services to the ecosystem of Finest platform users. This segment most likely would not be a large segment during the initial startup of the platform, but could become a significant source of income as the platform matures. Therefore, they will be discussed as a relevant primary customer segment along with the other segments.

3.1.1.1 Shippers

The customer segment “shipper” constitutes the buy side of the market for the Finest platform. Shippers may be the original goods manufacturer, an intermediary between the original manufacturer and end customers (e.g., a broker), or an end customer requiring transport of goods purchased in a location other than the end consumption location. These entities look to the Finest platform as a place to discover potential shipment execution

partners, contract for shipment, manage their shipments and pay for the shipment process. Shippers can act as “prime contractors” for their shipments managing all aspects of the contracting, shipping, clearance and payment processes or they can outsource all of these functions save for the ultimate payment process to a third party. Because of their role as demand generators for platform services, these are critical members of the Finest platform community.

3.1.1.2 Logistics Service Providers (LSPs)

LSPs constitute one of the primary supply side customer segments for the Finest platform. These entities provide the execution services demanded by a shipper when arranging for the shipment and/or storage of their products. LSPs may be third party entities or internal organizations providing logistics services to the shipper and utilizing the Finest platform to manage their execution activities.

Logistics Service Provider is a generic term covering a host of potential Finest platform partners. Freight forwarding companies, customs brokers, insurance brokers, warehousing companies, physical transport companies, customs agencies, port operations companies, etc. are all examples of LSPs. In addition, management companies, such as Fourth Party Logistics (4PLs) are also included in this customer segment. Each of these service providers can interact directly with the service buyer (the shipper) or be contracted and integrated into a supply chain via some third party entity hired by the shipper to manage their shipment process. As one of the supply side segments of the Finest platform, these entities are also critical members of the Finest platform community.

3.1.1.3 Application Developers

The Finest platform implements a collaboration service that provides match making, search, communications, integration, event handling and monitoring, and process execution services to platform members. Services such as contracting, planning, billing, customs clearance, etc., which require specialized applications for their execution on the platform must be selected and “mashed up” on the platform to form the customized supply chain operations for a particular shipper and their products. These specialized applications are selected from an “App Store” managed by the Finest platform where apps developed by third party application developers reside.

Application developers for the Finest platform provide the actual supply chain management functionality that a shipper and LSP need to execute a shipment. Without these apps a shipment cannot be made using the built in services of the Finest platform. The Finest platform, much like Apple’s iOS and app store model, provides a canvas that can be used to manage and control the unique shipment requirements of a shipper. It also provides LSPs with

the ability to manage the execution processes that they determine are necessary to achieve the shipper's objectives. However, the actual tools required for the shipment process must be selected and integrated using the Finest platform's "mash up" services from the app store. The apps that reside in the store are developed by application developers seeking to sell their unique service execution tools to shippers and/or service providers on an as needed basis. Since the Finest platform cannot deliver logistics execution services without these apps, the application developers are the third key platform customer segment.

3.1.1.4 Advertisers

As the Finest platform ecosystem grows, individual organizations will become interested in marketing their services directly to the three customer segments mentioned above. These organizations will seek to advertise their goods or services through the platform. Advertisers will supply these advertisements and pay for the opportunity to display their messages to demand side "eye balls." While this supply/demand model is complimentary to the primary role of the Finest platform, it will never the less be a critical element of how the platform "owner" will monetize the service. As such, advertisers are a key customer segment to which the platform manager/owner must market and as such is a key customer segment once the platform has commenced to develop its community of users.

3.1.1.5 Development, Deployment, Management Segments

The Finest platform does not exist at this time. During Phase II of the FI PPP a prototype of a functional platform will be developed and tested. However, even at the end of the second phase of the program actual commercialization of the platform will not have occurred. This means that critical customer segments of developers, deployment actors, platform managers, etc. must be attracted before any of the four customer segments mentioned above can be addressed by an operational Finest platform. While it is not the purpose of this document to exhaustively describe each of these customer segments, a short description of potential actors is necessary if this document is to be viewed as complete.

Without development the Finest platform is simply an interesting idea. To commercialize the concept and address the customer segments mentioned, the Finest platform must be built out and commercialized. To accomplish this task either existing software houses, internal ICT organizations at shippers or service providers, or a focused startup company will need to pick up the work being performed in Phases I and II of the FI PPP program and build out the Finest platform for commercial use. This customer segment will need to see value in the potential commercialization of the platform as their investment in development time and resources will be significant. The multi-sided market concept of the Finest platform has been used because of its demonstrated ability to generate revenue for developers (e.g., Apple, Google, Microsoft, Facebook, etc.). However, there is no guarantee that in the business-to-business (B2B) world

that the Finest platform addresses success like has occurred in the business-to-consumer (B2C) world will occur. This customer segment will require a significant amount of focused marketing, discussion, and luck to convince that the concepts envisioned for the Finest platform can be successfully commercialized.

While software development is required to create the Finest platform, management of the platform as an ongoing commercial entity is also required. Large software houses, shippers, LSPs, or focused ventures who develop the platform may not wish to operate the platform. If this is the case, commercial and/or non-profit (perhaps even governments) management companies will be required to pick up the platform, deploy it and then manage the community that is built around the platform. These entities will need to see that they can either make money from their operation of the platform or that through the platform they can bring benefits to their communities that are not available through other processes if they are to pick the software up and operationalize it. Marketing, discussion, and luck will once more be required to convince this potential customer segment that the Finest platform can benefit them and their communities.

While the discussion has focused on the streamlining of supply chain operations and those customer communities that benefit from such streamlining, civil society as a customer segment should not be forgotten. Society is the ultimate customer of all goods that are shipped around the world. It benefits when goods are shipped efficiently as both direct and indirect costs to society are reduced. Efficient shipment of goods, lower inventories in the supply chain, and better planning of shipments lowers overall costs to the consumer and reduces the environmental impacts of transport. These benefits should not be discounted and should be clearly communicated to consumer and governmental actors to gain their support, and thus indirect market influence in having shippers and LSPs use the Finest platform.

3.1.2 Value Propositions

The value that the Finest platform will generate for each customer segment differs. The value propositions envisioned for each segment is outlined as follows:

- Shippers – the community of shippers will be able to access a greater variety of LSPs than they have available today as a result of both the platform’s search capabilities and the fact that small service providers, who currently are often overlooked because of a lack of awareness on the part of the shipper, will be able to participate in a shipper’s process of assembling their supply chain. Shippers will also benefit through the customization of each supply chain built for their products as a result of the app assembly process. Only those applications required for the shipment will need to be assembled so overhead for use of services not required will be minimized. In addition,

payment for these applications will be based on a “per use” model so unnecessary licensing fees, etc. will not cause fixed costs that need to be amortized over the shipments. Transparency, event handling, pro-active event notification, rapid integration to backend systems, and service level monitoring will allow the shipper to optimize their shipment processes and reduce inventory levels throughout their supply chain. The cumulative benefit of these value propositions will be lower costs and better customer service for shippers.

- Logistics Service Providers – LSPs will benefit from having access to a greater number of shippers, unique software for the management of customized execution activities paid for on a “per use” basis rather than high cost customized software, automated contracting and service level management services, rapid integration to lower level IoT devices for real time tracking and tracing, predictive event management services to enable pro-active planning and replanning to avoid penalties, automated payment services, service provider ratings to ensure quality of service delivery when assembling teams of companies for a shipment, rapid integration to backend systems, marketplace access for competitively bidding on transport and storage, and opportunities to target market their capabilities to a community of qualified shippers and LSPs. These benefits should increase revenues, particularly for smaller players, and profits as shipments can be tightly managed so that unanticipated costs are minimized.
- Application Developers – app developers will benefit by having access to a large number of shippers and LSPs who, if their applications are selected for use, will push volume through their applications thus generating significant transaction revenue. In addition, app developers will be exposed to a set of novel challenges that have not been addressed previously by software developers and this should spur innovation as has been the case of Apple, Google, Microsoft and Facebook.
- Advertisers – advertisement companies will benefit through the number of ad views that arise when the platform community is large. By tying their payments to the number of “eye balls” viewing their advertisements these companies will generate increasing revenues as the number of platform members grows. Companies advertising on the platform will also benefit as their products or services increase in sales as a result of their advertising on the platform.
- Platform Development and/or Management Organizations – depending on the type of organization that develops and/or manages the platform various benefits will accrue. Software companies will be generate new revenue streams through licensing the platform software or actually operating platforms themselves. New ventures will benefit by building business models around the platform and generating revenues based on user fees, transaction fees and advertising fees. Internal operating groups

will benefit through increased revenues generated through improved customer service, greater access to competitive service providers or shippers (in house operation by LSPs), more customized shipment processes, and lower operating costs.

- Society – greater supply chain efficiency reduces environmental impacts and lowers costs to the end consumer. These benefits should encourage regulatory bodies and consumers to encourage utilization of platform concepts such as that embodied in Finest as positive social outcomes are generated using the services of the platform.

3.1.3 Channels

Getting the message out concerning the benefits of the Finest platform to all involved parties requires a number of different channels of communication to be employed. Awareness generation will leverage the community building processes currently being followed in the Phase I and Phase II FI PPP programs. These community building activities will provide the foundation for generating early interest in user communities. However, once the FI PPP program efforts end interested parties will need to be engaged by the entities picking up the Finest platform through follow on direct marketing, user group actions, and developer conferences.

3.1.3.1 Awareness Generation

Direct marketing through internal sales personnel, online website information, conference demonstrations and discussions, user group events, mailings (electronic and physical), sponsorship of events and other approaches are all appropriate mechanisms to generate awareness and move potential users from uninformed to interested. Marketing of the platform and its potential to shippers, LSPs and developers will consume almost as much resource as the development of the platform. Without awareness, however, it will be impossible to move to the next step in channel development, evaluation. A major focus of one of the work packages (WP500) of the follow on phase II cSpace project is directed to the task of awareness generation. The success of the work performed in this follow on project in the area of awareness generation will determine how likely commercialization of the concept will be.

3.1.3.2 Evaluation

Potential platform users that have been made aware of the Finest platform and its benefits need to move beyond the simple awareness generated through focused marketing to evaluate the potential benefits of the platform. Platform evaluation incentives will vary by user group. For LSPs, the platform management will need to provide free trial incentives to encourage the LSPs to try out the services offered by the platform in shipping products that they have contracted for through their traditional business processes. Feedback on how well the platform supports their requirements can be followed up aggressively to improve platform

services as well as to demonstrate to the trial LSPs their importance in forming how the platform develops.

LSPs will not use the platform if there are no useful applications in the app store. Encouraging third party app developers to develop applications will require a number of incentives. The platform organization will need to provide developers with SDKs, training, testing services and other support services so that the development process can be performed efficiently. In addition, monetary incentives may be required to jump start the development process. Finally, the platform organization may have to develop a set of initial apps for the app store both to gain early usage by LSPs and to show third party application developers how apps are to be constructed for the platform.

Shippers will most likely be the last primary user group to evaluate the platform. For a shipper to evaluate the platform they will need to know that there are a sufficient number of LSPs using the platform so that they can actually execute an end-to-end shipment and that there are appropriate apps in the app store for the customized supply chain operation to be managed. Shippers will also need to be educated on how they can find qualified LSPs, obtain bids for their shipments and contract with potential partners so that a shipment can occur. Finally, shippers will require incentives, such as the free use of apps, to obtain their agreement to evaluate the platform.

While advertisers are also users of the platform, their evaluation will only occur once a community of users has developed. They will need to understand who is using the platform, how many transactions are carried out over the platform and how many views of an ad they might expect. This commercial information will only be available once the platform has been in operation for a period of time. This means their evaluation will occur later in the development process, and only if the platform has enjoyed some success.

3.1.3.3 Purchase

Awareness and evaluation are only of value if they lead to actual revenue flows for the platform service provider. Once evaluations have occurred and a sufficiently large group of shippers, LSPs, application developers have bought into the platform, the “for free” aspect of the platform will need to change. The point in time when this change in platform operation occurs needs to be clearly communicated to each of the platform customer segments, and each segment needs to be continuously updated as to how the platform is progressing towards this operational change. The transparent movement of users into paying customers should be made painless through the use of automatic notifications, simple contracts, and easy “opt out” processes. Once the platform has begun charging for services, any new customer that passes through initial “free trials” should be immediately placed on the standard payment program so that all organizations are handled in a uniform manner.

3.1.3.4 Delivery

Service delivery will always occur through the cloud for the Finest platform. As a cloud based collaboration and execution service, the Finest platform will not perform physical execution services for its customers. These will be managed by the partners who decide to transact business using the Finest platform. Having said this, the Finest platform will need to report pertinent statistics to users to demonstrate the value that has been generated through its use. These statistics may show actual performance versus industry standard benchmarks, total usage numbers, numbers of partners using the platform, highest ranked apps, etc. Each of these statistics should not only focus on value created through the use of the platform, but should act to inform users about potential uses of the platform that they have not thought of. The platform should attempt, over time, to embed itself deeper into each customer segment that it serves.

3.1.3.5 Support

Customer service will be required for each customer segment. The platform will need to provide online support through live help and/or automated services, training for use of the platform by shippers and LSPs, developer training and events, newsletters with helpful suggestions and other tools to ensure that once partners have become involved in using the platform they are properly serviced and encouraged to continue to use it. Customer visits, user events and interest group organizations should also be developed to ensure that the platform service is viewed not as a simple transaction service, but as a key element for business benefits by its users.

3.1.4 Customer Relationships

Because the Finest platform business model addresses a complex set of business activities, the platform will need to provide personal assistance to those shippers, LSPs and developers using the platform. Personal assistance will be required during the setup process for both shippers and LSPs. Customer personnel will need to be shown how to configure the system for their use, connect to backend systems, link to IoT devices, setup security, customize the user interface, access apps, set up a shipment, etc. In addition, community members will need to be walked through how they need to setup their profiles so that they appear in searches and can communicate with their collaboration partners.

Developers will require personal assistance in learning how to develop for the platform's app store, how to certify their apps for use by platform partners, how to obtain feedback on their apps, how to update apps that are in use, how they will be paid for usage of their apps, etc. They will need to setup accounts with the platform that authorize them to use its services and post apps to the app store. They will also need support should problems arise in the use of their apps.

Beyond personal support, the platform will need to provide online and automated support for help related issues, simple tasks, reporting, performance management, and other repetitive or standardized customer facing processes.

As has been mentioned earlier, the platform service provider will also need to develop user communities, special interest groups, and developer groups as part of its collaboration service to facilitate the exchange of information between users. These user communities can also be sources of feedback to the platform service provider concerning additional features required, issues with platform performance or service, user abuses and other issues that could lead to improved platform performance and value.

3.1.5 Revenue Generation

Multi-sided platform markets, such as the Finest platform, generate revenue from users in two ways, fixed “access” fees and transaction fees. Fixed access fees are fixed fees paid irrespective of usage. A membership fee to a health club is an example of a fixed access fee. These types of fees are usually applied to users to cover basic operational costs and may or may not be sufficient to cover all costs of operation. Access fees can vary based on user type, access granted, services requested, etc.

Transaction fees are fees based on actual usage. Utilities charge users a transaction fee based on the amount of electricity used. Transaction fees can be variable based on volumes with lower volumes carrying higher fees than higher volumes to encourage users to use more of the service. Where resources are scarce, higher volumes may actually carry higher fees per transaction than lower volumes to discourage over use.

Besides these basic user fees, platforms can also generate revenue through advertising and the sale of software development kits. Advertising revenue can be thought of as a variable access fee as what the advertiser is buying is access to user “eye balls.” The more users that are on the platform the more the advertiser can be charged for this right of access.

The sale of SDKs for the development of software for the platform’s app store can also be thought of as an access fee. Without the SDK the developer cannot develop software that is compliant with app store requirements, at least not as economically as a developer who has purchased a SDK license. In effect, the sale of the SDK allows the developer to access in an economical manner the platform’s app store and to sell its apps in a profitable manner.

Multi-sided platform markets owe their unique position in the fields of economics and competition policy because of the way in which they distribute these fees to users (revenues for the platform are fees for the users). Standard economics indicates that, absent externalities, in a competitive market an organization will price its product or service at the

marginal cost of unit of good delivered (Lerner, 1934). Platform service providers do not necessarily follow this approach to pricing.

While a platform service provider is concerned about the profitability of the platform, they are not necessarily concerned about how profitable one side of the platform is versus the other side. As such, and in line with theories of network economics, the platform provider may discount or subsidize membership on one side of the platform to encourage membership on the other side. Members on the subsidized side of the platform bring large benefits to the members of the unsubsidized side and this allows the platform operator to charge the unsubsidized members fees in excess of the marginal cost of servicing them (Evans, 2003).

An “owner” of an instance of the Finest platform should be able to generate revenue from each of these potential revenue sources. While it is not clear when and to what extent the various prices should be set, the revenue streams are pretty clear. It is anticipated that LSPs will pay a membership fee to join the platform’s community. The revenue streams are outlined following.

1. It is anticipated that LSPs will pay a membership fee to join the platform. This fee may be waived for early adopters so that a critical mass of service providers can be created. However, over the long term the benefits of being a member to a fully functioning logistics and transport platform should exceed the costs of a membership fee and the fee should most likely be implemented.
2. At some point it may be possible to charge shippers for their use of the platform, although this is something that is not as clear as a fee for the LSPs. Shippers are critical for the attraction of both LSPs and app developers so that, while at some point it may be economically feasible to charge them membership fees, it may not be strategically feasible. However, a membership fee from shippers could certainly be a revenue stream for the platform if it were to be charged.
3. It should be possible to charge app developers for both the right to produce software for the platform’s app store and for the SDK required to build the apps. While the size of the fees charged should be closely examined so as not to discourage app development (in the early phases of platform startup it might even be wise to pay developers to develop apps for the platform), companies such as Apple and Microsoft have not had problems charging developers modest fees for these two revenue sources.
4. Advertisers could be required to pay a fee for displaying their advertisements in platform searches in a manner similar to the approach taken by Google for searches using its engine. More prominent displays of ads and more frequent displays could both be monetized at higher rates than lower displays and less prominence.

5. Transaction fees for all parties are feasible. However, the most likely transaction fee for usage of platform services would come from the volume of goods managed through the use of apps. Much like Apple requires of its app developers today, a percentage of revenue generated by an app owner could be required by the platform operator. App owners would charge the user of their app a fee based either on a flat rate price or a price based on actual volumes shipped using the app.

It would be feasible, but not necessarily strategically wise, to charge shippers a transaction fee based on the volume of goods that they shipped using platform services. Transaction fees on shippers would need to be examined to see if they discouraged membership and thus reduced the overall value of belonging to the platform.

In a similar manner, it would be feasible to charge LSPs a fee based on the volume of business they conduct on the platform. Once more, such a fee would need to be examined in an experimental manner to determine whether it would discourage membership of LSPs. However, this type of fee, more like a tax than a transaction fee per se, would most likely be implementable as long as it (along with a possible membership fee for the LSPs) did not result in the LSP feeling that doing business through the platform was more costly than doing business outside the platform.

Other parties to the platform will generate revenue in different ways. For example, should a large software house decide to develop the platform, but not want to operate it, they could license the software to third party operators. The fees generated from licenses, along with any professional services fees coming from the implementation of the platform would be revenue streams to the software company.

Consultants and systems integrators could, if required, generate professional service fees for performing backend integration services for platform members. Integration services could result from the need to connect legacy systems to the platform. IoT device integration with the platform could also generate integration fees.

Financial service providers could generate revenue by charging a fee for clearing payment transactions for shipment services or software usage executed on the platform. Other ecosystem partners could also generate revenues from participating in ancillary services for partners using the platform (e.g., IoT device manufacturers, RFID tag companies, standards bodies, regulatory bodies, etc.). These revenue streams, although required for the development and operation of a healthy ecosystem, are outside the scope of the Finest project and mentioned here only for purposes of completeness.

3.1.5.1 Revenue Generation Example

As this section of the report has tried to point out, it is difficult to identify the exact revenue generation model that leads to profits for a multi-sided platform market. However, in an attempt to examine some boundaries on such a model, the Finest team analyzed several ecosystem scenarios to see what size the market would have to become for an economically attractive outcome to occur. Figure 5 depicts one specific ecosystem model that the team used in its analysis.

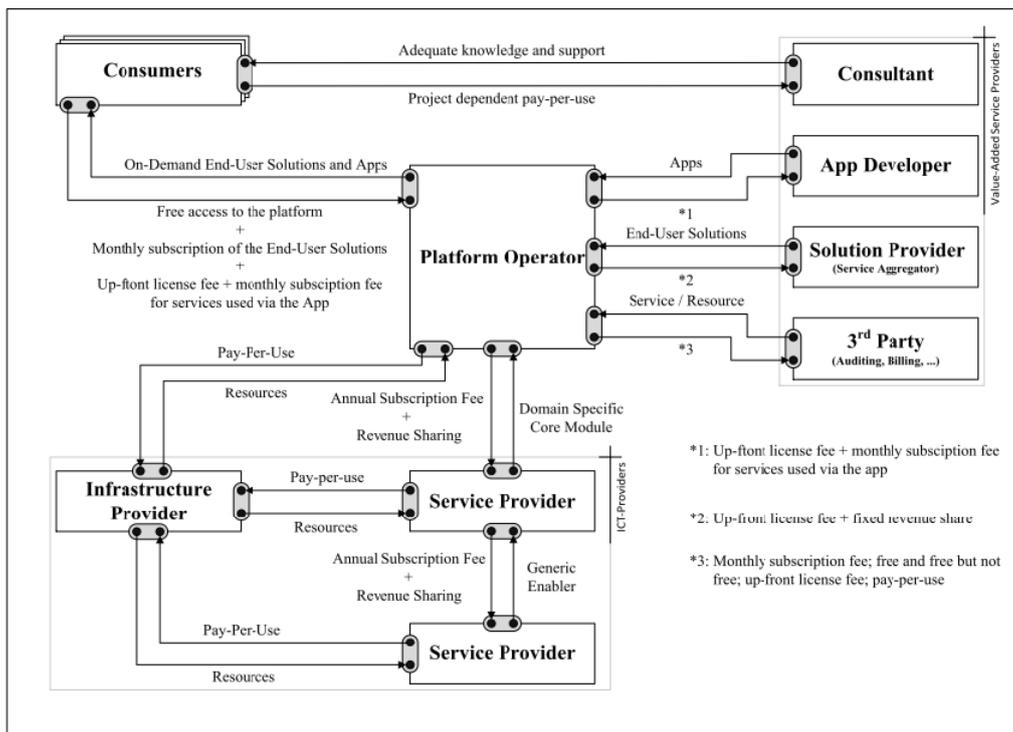


FIGURE 5: FINEST ECOSYSTEM REVENUE AND PROFIT GENERATION ECOSYSTEM MODEL

Simulations were conducted on various pricing and volume assumptions using the scenario depicted in Figure 5. These simulations examined costs to all platform operations partners (e.g., hosting companies, platform operators, etc.) and, based on the revenue model, generated profitability analyses based on volumes of users. These simulations indicate that a considerable number of users, along with a large attendant volume of shipments (transactions) carried out over the platform, will be required to make the platform and its ecosystem economically viable. In addition, these simulations indicate that profitability, as well as time to payback, differs between ecosystem partners (Figure 6).

- Considers 4 possible 'cSpace Apps' with concrete payment willingness by project partner
- End-User Diffusion adjusted to indicate amount of End-Users to be profitable in 3 years
- **at most an indication towards overall business model**

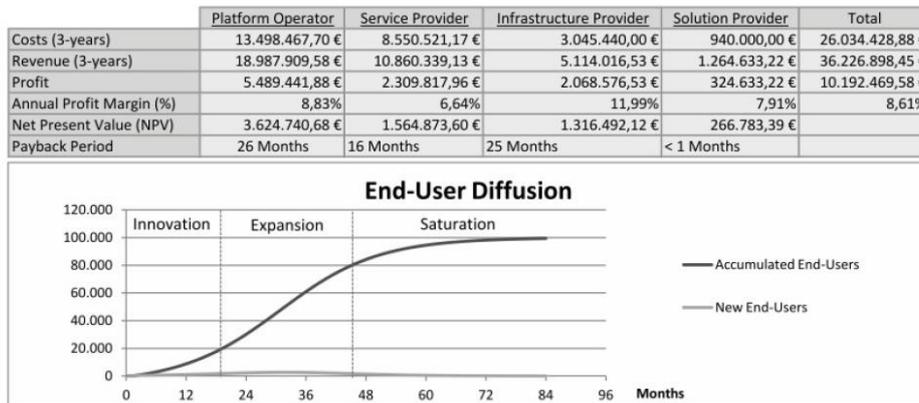


FIGURE 6: EXAMPLE DIFFUSION SIMULATION RESULTS FOR ONE PRICING SCENARIO FOR THE FINEST ECOSYSTEM

While the analyses that the Finest team has carried out indicate that a large population of end-users will be required to ensure the profitability of the ecosystem, this should not be a source of discouragement for the business model or a platform operator. The amount of freight that is moved on a daily basis, whether local or international, indicates that a population of shippers orders of magnitude larger than that required to generate acceptable paybacks for the ecosystem exists (over €100 billion is shipped internationally on a daily basis). The challenge will be for the platform operator to properly build their ecosystem so that these shippers can be enticed to become members. This will require innovative pricing, perhaps subsidizing certain sides of the multi-sided platform, aggressive marketing and long term staying power (the Finest simulations indicate that two to three year paybacks are the norm). As the business model indicates, these are all components that any platform operator will need to address if they are to make the Finest concept a commercial reality.

3.1.6 Key Resources

The singularly most important key resource for the successful implementation of the Finest platform is the platform itself. The platform must be sufficiently functional, secure, reliable, scalable, configurable, and easy to use for all parties to use its services. If the platform fails to deliver on any of these dimensions, users will find it less attractive and may not join its community because the startup costs for joining exceed the benefits of joining.

Another key resource of the platform is its app store. Without functional apps in the app store and an easy means of selecting and integrating them into a customized supply chain solution, no one will transact business over the platform. This also means that the app developers and

their organizations are also key resources as they are the actors who actually develop these apps for use on the platform.

The platform is a software application that will require maintenance and upgrades. The platform application developers, either internal to the Finest platform management organization or in external software houses, are a final key resource for the maintenance of the platform and its ongoing improvement.

While both LSPs and shippers are essential for the operation of the platform, these entities are not key resources. They are the customers who must be served by the key platform resources and from whom revenue will be generated if the value propositions discussed earlier are delivered.

3.1.7 Key Activities

The key platform activities that must be performed by the Finest platform team are the actual management of the platform's operations, provisioning of the various platform services so that they are always available when required, and the promotion of the platform to ensure that shippers, LSPs, application developers and, eventually, advertisers are attracted to the platform.

Another key activity of the platform is the continual enhancement of platform services. To accomplish this activity the platform must have access to developers, either internally or externally, who are continuously improving platform performance and enhancing its functionality.

3.1.8 Key Partnerships

The Finest platform has several key partners that are required for it to operate and deliver its service. First among these partners is the hosting partner that provides the cloud infrastructure services necessary to run the Finest platform. This partner will need to have the scale, reliability, security and quality of performance necessary for an international transport and logistics service platform such as the Finest platform.

International financial service providers are also key partners for the operation of the Finest platform. These service providers allow payments to be made to all participants in the shipment of a shipper's goods from one international destination to another. Without such services shippers and LSPs would need to go "off platform" to conduct this supply chain operation, something that would discourage them from joining the Finest community.

Ecosystem partners are the final key partners for the platform. Organizations supplying customers with IoT devices, performing integration services, developing applications,

consulting to customers in the use of the platform, and supporting the Finest concept are all key to the development of the Finest business model.

3.1.9 Cost Structure

The primary costs for the Finest platform are its operating, marketing, and development costs. Operating costs include its payments to its hosting service provider, customer support costs, maintenance costs, regulatory costs, and app testing costs. Marketing costs include shipper and LSP acquisition costs, developer acquisition costs, marketing events, user group events, advertising, and sales costs. Development costs include all costs associated with building new application functionality into the platform, upgrading SDKs, and any integration costs that are required for these activities.

3.2 Business Model Summary

The Finest platform is an example of a multi-sided platform market. As such it must manage the complex interaction between multiple customer segments who are interested in employing it for different purposes, but all with an eye toward improving their efficiency and making money. The business model that is required of any operator of such a platform is, therefore, quite complex compared to a simple one sided market business model. Using a framework developed by Osterwalder and Pigneur (Osterwalder and Pigneur, 2010), a set of nine building blocks have been described in the context of the Finest platform concept. These nine building blocks address the four main areas of business:

1. Customers;
2. Product offer;
3. Infrastructure requirements; and
4. Financial viability.

A summary of the business model thus developed appears in the Figure 7, which follows.

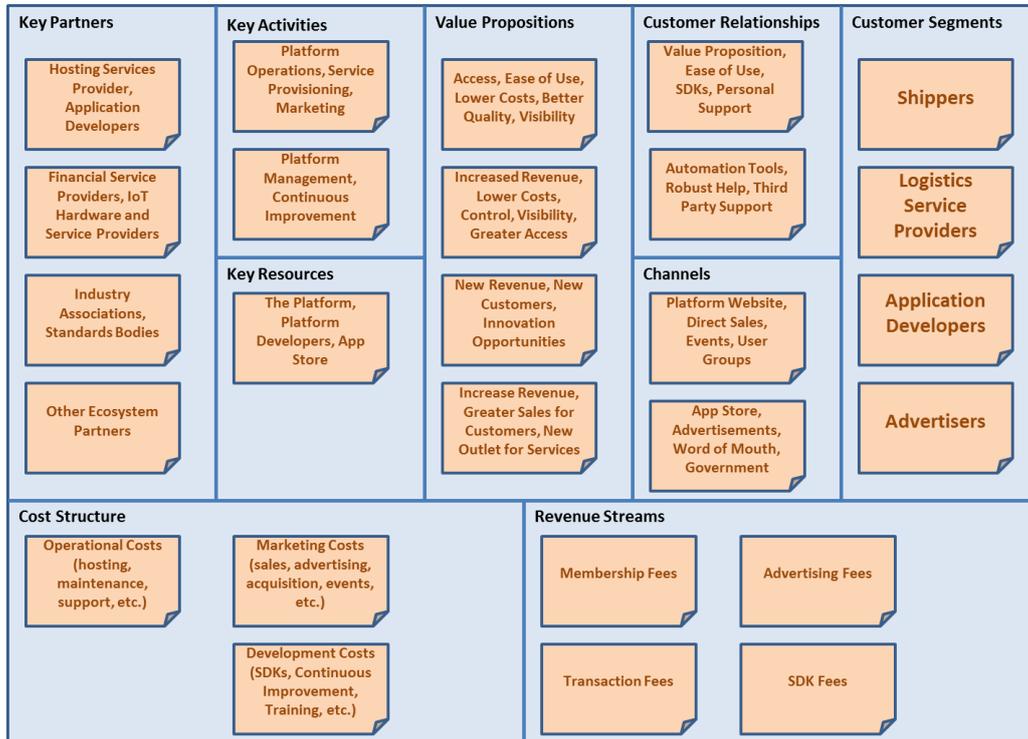


FIGURE 7: FINEST BUSINESS MODEL SUMMARY

This business model forms the foundation for any organization wishing to benefit from the commercialization of the Finest platform concept. In particular, the follow on project known as cSpace, which takes the original concepts developed in the phase I Finest project, extends them to address the gaps identified in the Finest project (see D1.5 for a discussion of these missing components), and demonstrates the multi-domain applicability of the Finest platform model, will utilize this business model to begin its efforts to form a community of interest for the platform.

The business model described differs from more traditional business models developed by organizations such as Ariba and GE Nexus that have attempted to implement more traditional two-sided market platforms. The business model that is discussed above leverages a robust ecosystem of developers and integrators to expand the reach and functionality of the services offered by the platform. The more traditional “butterfly” models employed by Ariba and GE Nexus limit access by external developers and employ a modified license and transaction fee construct that limits their ability to be extended in novel directions through unanticipated ecosystem initiatives. In fact, the business model employed for the Finest platform is closer to the models used in the B2C world of game developers (X-Box, PlayStation, etc.) than that of the more traditional B2B marketplaces that Ariba and GE Nexus represent. It will remain to be seen in the phase II and phase III follow on projects whether the adoption of this novel

business model for B2B applications results in the success that at this time appears to be reachable through the application of the model.

4 Applicability to the T&L Industry

The transportation and logistics domain has experienced an unprecedented level of growth over the past thirty years. Prior to 1980 the transportation industry consisted of a highly fragmented set of operators providing trucking, rail, warehousing, barge, and some international freight services. The non-captive logistics service providers in the industry were largely unsophisticated independent operators focused on local, regional or, at best, national services. The large and sophisticated international logistics companies that dominate today's global freight activities did not exist. The rapid growth of the industry is a direct consequence of growth in global trade.

Trade growth has been rapid over the past thirty years primarily because of trade liberalization, infrastructure investments, advances in information technologies and competition in first world countries (World Trade Organization, 2008). Trade today accounts for an ever increasing amount of the gross domestic product of all Western countries, exceeding 25% of GDP for the United States and 50% of GDP for Western Europe (OECD Trends in the Transport Sector, 2012).

The transport and logistics industry is facing a number of challenges that are a direct result of globalization and the rapid development of countries such as Brazil, Russia, India and China. These challenges can be broadly grouped into five areas. These grouping are:

- Costs – transportation and logistics is a highly competitive industry with margins for traditional services rarely exceeding 4% of turnover;
- Risks – increasing weather, geological, geo-political and supply uncertainties are creating significant problems as supply chains grow longer and more complex;
- Demographics – changing global demographics are driving companies to move into non-traditional markets where supply chain infrastructures are less mature and operating practices less advanced;
- Energy – length, speed and tonnage transported determine the energy consumption of supply operations. As supply chains have grown longer and more complex their demands for scarce energy resources has increased raising risks associated with energy price variations as well as availability;
- Environment – transport and logistics operations have a large impact on the environment because of CO₂ emissions from the combustion of fossil fuels and wastes

The challenges that the transport and logistics industry face demand changes in how shippers and logistics service providers operate and manage the global flow of goods and services. These changes must address the large inefficiencies that exist in global logistics operations so

that more streamlined flows of goods and services can yield all participants benefits. The FInest project has been an attempt to address the current state of inefficient supply chain operations through the application of Future Internet based technologies, a cloud computing approach to collaboration and execution management, and a novel ecosystem based business model. The applicability of this business model to the transport and logistics domain, as well as to the challenges it faces, is discussed in the sections below.

4.1 Transport and Logistics Domain Requirements

In Section 2.1 of this document eight high level business requirements were described that have driven the development of both the FInest platform technology and its business model. These requirements:

1. Pre-planning and cost estimating;
2. Collaboration and communication;
3. Planning and re-planning;
4. Resource management;
5. Monitoring;
6. Visibility,
7. Reduction of manual activities; and
8. Simplification of the ICT landscape,

serve as the basis for determining whether any ICT service or business model is applicable to the domain. In FInest deliverable D1.5 an assessment of the technological solution being developed in the FInest project was performed. That assessment examined how the FInest service would address these eight high level requirements, as well as a more granular breakdown of the requirements. The conclusion of that analysis was that the FInest platform by itself forms a firm foundation for building ICT solutions that address these high level requirements. However, by itself, the FInest platform does not address all of these requirements.

The business model developed in this deliverable demonstrates the true novelty of the FInest collaboration platform. This platform, as stated in deliverable D1.5, provides the foundation for the development of novel ICT solutions using an “all you need in one location” concept. The FInest ecosystem of app developers, integrators, and service providers, in concert with the services built into the FInest platform, form an extended solution set that does address all eight of these requirements, and more.

4.1.1 Pre-planning and Cost Estimating

The Finest platform provides a set of services that can be utilized to plan shipments and estimate costs. Using tools that app developers provide, such as cost modeling apps and planning apps similar to the TPM developed in the Finest project, scenarios of shipments can be built using the Finest platform itself. These scenarios can be simulated on the platform and a plan and costs developed that best fit a shipper's requirements. The Finest business model encourages the development of novel apps to perform these functions and it is expected that, like Google and Apple have found, developers will go beyond what has currently been conceived to generate truly creative apps to address this requirement. The Finest business model fully supports this requirement.

4.1.2 Collaboration and Communication

The fundamental purpose of the Finest platform is to operate as a collaboration and communications service for its members. The platform's frontend services of registration, communication, customization, and discovery provide its members with the collaboration services necessary in the world of commerce. The Finest platform's pro-active event management services also support the collaboration and communications function by providing alerts to platform users of events that are critical to their shipping processes as well as notification of collaborative business events based on profile settings, security, and partner agreements. The Finest platform and its business model fully support this requirement by design.

4.1.3 Planning and Re-planning

The Finest TPM is an example of how an app could be constructed to address the planning and re-planning requirements of a shipper or LSP. The Finest business model encourages app developers to build on this model and construct other approaches to address partner planning requirements. It is expected that, since this requirement is basic to the entire domain, that multiple apps with different and novel approaches to this requirement will be developed and that platform partners will benefit from this diversity. The Finest business model fully supports this requirement.

4.1.4 Resource Management

Effective and efficient resource management is a fundamental requirement of efficient operations. All domain partners must operate as lean and efficient entities if customer and societal objectives are to be met. While the Finest project has not directly addressed this requirement through the applications that it has developed, its business model facilitates the development of apps which will address the issue. App developers will be encouraged by the commercial opportunities that novel resource management apps can bring to them and, in a manner similar to what has been found in app developments for platforms such as the Android

operating system, many competing resource management apps will be developed. The Finest business model fully supports this requirement.

4.1.5 Monitoring and Visibility

These two business requirements are combined here as they are robustly addressed through the Finest platform's pro-active event processing module, the EPM. The Finest EPM approach goes well beyond traditional event monitoring and visibility tools, incorporating an agent based approach to prediction that, if enabled, allows users to not only track and trace their shipments, but pro-actively respond to predicted events that might have an impact on their shipment plans. The predictive approach that the Finest platform takes differentiates its services in this area and provides platform partners with the ability to operate at efficiency levels not available using current ICT solutions. The Finest business model also encourages app developers to take advantage of the predictive capabilities built into the platform to extend these services in new directions. The results of these extensions cannot be predicted (☺), but they are certain to generate novel solutions to problems that today are not available. The Finest business model fully supports these requirements.

4.1.6 Reduction of Manual Effort

One of the fundamental design concepts of both the Finest platform and its business model has been to automate as many manual tasks as possible. This has been done not with a desire to remove the human from any supply chain operations, but to leverage the truly unique value of the human mind while eliminating errors that result from the tedium of manual data entry and communications. The platform, its business model of a robust domain ecosystem, and the service concept of "all you need in one place" should ensure that the level of manual intervention seen in today's supply chain processes is significantly reduced. The Finest business model fully supports this requirement.

4.1.7 Simplification of the ICT Landscape

The Finest platform implements an "all you need in one place" model for the user of its services. While it is not expected that legacy systems, such as ERP systems, will be replaced by the Finest service, it is expected that the numerous customized ICT solutions that currently dot the landscape in the transport and logistics domain will be replaced by apps that reside in the Finest app store. This consolidation of functionality to the Finest ecosystem is a fundamental assumption that the Finest business model is built on. The Finest business model fully supports this requirement.

4.2 Challenges

4.2.1 Cost

Transport and logistics activities originate as a result of a shipper wishing to move goods from one location to another. As such, the demand for transport and logistics services are derived and the value created through their use arises only to the extent that the goods being moved increase in value through the movement process (i.e., the goods are valued more at the destination location than at the origination location). Because of their derived value proposition, transport and logistics companies continually face cost pressures when selling their services. These pressures, driven by competition amongst LSPs for shipper contracts and by shippers who face their own competitive environments, require all logistics service providers to focus on cost reduction as a strategic objective.

The Finest platform and its business model address the issue of costs for LSPs by providing a “pay for use” model for software use and a highly flexible execution service for the customized construction of end-to-end transport processes that address a shipper’s requirements in the most efficient manner possible. The platform also provides the LSP with a transparent and pro-active visibility and monitoring service that can be used to anticipate execution issues so that the LSP can take action before problems occur thus eliminating penalties that might apply for failing to meet contractual service levels.

While the full benefits of the Finest business model can only be achieved when a vibrant ecosystem of developers, LSPs, integrators, and shippers has developed, the platform concept holds significant promise for reducing overall shipment costs and thus addressing this domain challenge. The pay for use approach of the platform business model, the availability of configurable shipment execution applications, a single data source model, anticipatory event monitoring and management, and a robust community of LSPs that can be contracted “on demand” for execution of shipments all contribute to what general supply chain management models indicate are the most effective and efficient approaches to the movement of goods.

4.2.2 Risks

The Finest platform and business model have both been developed to be flexible and extensible. However, this does not ensure that the market will adopt either the technology or the business model that informs it. Issues related to the outsourcing of execution and operational activities to external Cloud Service Providers (CSPs) present risks to domain organizations. This section of this report describes a set of risks that will face any potential customer, shipper or LSP, that utilizes the Finest platform service. These risks will need to be addressed by both the Finest platform operator, as well as the domain partners using the service.

4.2.2.1 General Cloud Computing Risks

COSO (Committee of Sponsoring Organizations of the Treadway Commission) has identified a series of risks that anyone thinking about using a cloud service provider needs to address (Chen, Leung and Pili, 2012). These risks are:

- Lack of transparency – a CSP is unlikely to provide information on where data is stored, its security controls, its customer segregation process, or its resource allocation processes.
- Reliability and performance – a CSP will most likely have service level agreements with its customers. However, its ability to meet these service levels when extraordinary events, such as host connection failures or unexpected loads, occur is not guaranteed.
- Lock-in – outsourcing to a CSP means that an organization commits to a strategy of not investing internal resources in the services provided by the CSP. If the CSP's services do not live up to their promise, or the CSP goes out of business, an organization may find that it has locked itself into a service without recourse to other service providers (internal or external).
- Security and compliance - security and retention issues can arise with respect to complying with regulations and laws such as the *Sarbanes-Oxley Act of 2002 (SOX)*, the *Health Insurance Portability and Accountability Act of 1996 (HIPAA)*, and the various data privacy and protection regulations enacted in different countries. Examples of these data privacy and protection laws include the *USA PATRIOT Act*, the *EU Data Protection Directive*, *Malaysia's Personal Data Protection Act 2010*, and *India's IT Amendments Act*.
- Cyber-attacks – having a number of companies hosted in a single environment raises the attractiveness of the CSP to cyber criminals.
- Data leakage – multi-tenant operations where resources are shared raises the opportunity and risk of data leakage.
- Service provider viability – as with any outsourcing activity, outsourcing logistics operations services to a platform management company faces the risk that the management company will not have the financial resources to survive, may be acquired by another organization, or may change its strategy.

All of the cloud computing risks discussed here could cause domain partners to hesitate in accepting the Finest platform concept and business model. The Finest platform's design attempts to address as many of these risks as possible (e.g., security is built in, access controls are implemented, all transactions are monitored, etc.). Many of the risks highlighted here are,

however, not likely to be mitigated by technology or contractual clauses with the platform service provider. Consequently, mitigation solutions may need to be implemented outside of the immediate cloud solution provided by the platform.

4.2.2.2 Supply Chain Risks

While the cloud computing model employed by the Finest platform has certain inherent risks associated with it, the physical transport of goods is also risky. Natural disasters, such as tsunamis, volcanic eruptions, and severe weather can all disrupt supply chain operations. General shipment risks beyond nature include piracy, theft, damage due to handling, loss, environment related damage, and numerous other sources of loss. While the Finest platform provides services such as predictive event monitoring to address some of these risks, it cannot address each of them in a manner that will totally eliminate their impacts. However, by at least providing shippers and LSP execution partners to real time visibility to their shipments the platform does allow the supply chain partners to understand the status of their shipments and take action should a delay due to any of the numerous risk factors mentioned occur.

4.2.2.3 Commercial Risks

One final risk needs to be addressed before closing out this section on risks. This risk has to do with the commercial viability of the Finest platform. There are numerous examples of B2B marketplaces that have failed. Those B2B platforms that have had some success (e.g., Ariba, GE Nexus, GTX, etc.) have all had to modify their original business models to achieve the limited success that they currently enjoy. The issues that have been identified as causing the B2B marketplace model employed by these earlier Internet companies to fail have generally been driven by the “chicken and egg” problem (Caillaud and Julien, 2003). This problem arises from the nature of network economics. For a network based business model, such as the Finest platform’s business model, to work a critical mass of players on each side of the platform need to join the ecosystem. Getting the players to join has proven problematic as it requires the platform manager to subsidize one side of the platform while charging the other side for usage. If the pricing model is not appropriate for the target membership, membership levels fail to reach critical mass before financial resources are exhausted.

The chicken and egg problem will face any organization wishing to employ the Finest platform. Phasing, or staging, the various membership activities may help these organizations in addressing this problem (Eisenmann et al., 2006), but there is no guarantee that these organizations will be able to sustain their operations long enough to garner the critical membership mass to allow them to be commercially successful. Deep financial pockets and a commitment to the long term are necessary preconditions for the any platform service providers to be successful. This will also be the case for anyone pursuing the Finest platform business model.

4.3 Demographics

Demographic changes in the world are driving where goods are being consumed and produced. Historically, the western world has been both the source of production and consumption. Today, production has moved to rapidly developing countries such as China, India, and Brazil. Consumption has moved to these countries as well as to Africa, South America and the Middle East where young populations are growing rapidly. These movements of production and consumption create risks for supply chain actors in that the maturity of the logistics infrastructure in these emerging markets is less advanced than in more traditional western markets. In addition, business practices in many of these emerging markets create problems for western companies subject to compliance regulations.

The Finest platform provides shippers and LSPs with the means to address many of these country specific challenges through custom built apps that focus on the unique characteristics of individual markets. The platform's robust real time visibility and monitoring services also should help shippers and service providers in their efforts to ensure that the local logistics risks are mitigated. However, as in all risk related issues, human involvement will still be required to ensure that issues of compliance or poor infrastructure do not create problems for the platform partners. The platform can only assist in providing the information required to take action.

4.4 Energy

With the lengthening of supply chains exposure to energy price changes has increased financial risks causing many transport companies to lose money. As price volatility has increased these losses have also increased since competitive pressures, discussed earlier, have not allowed energy price increases to be fully passed on to shippers.

The Finest platform provides a means for shippers and LSPs to streamline their supply chain operations so as to operate as close to their maximum efficiency as possible. However, operational efficiency only reduces some of the supply chain's exposure to energy price volatility. Redesign of supply chains and rethinking sourcing decisions will have a far greater impact on this challenge than any efficiency gains that the use of the Finest platform can bring. The platform does, however, help by reducing inefficiency so its use by domain actors will provide these actors with some risk mitigation benefits for this risk.

4.5 Environment

Environmental concerns such as pollution, carbon emissions, noise, and congestion are driving logistics companies to become more conscious of the impact of their operations on society. The Finest platform can assist logistics service providers in improving their operational efficiency, thus reducing many of the negative externalities that arise due to the transport and storage of goods. More efficient city logistics operations, lower overall transport congestion through better planning, more integrated merge in transit and cross dock operations, less delays at ports or off/on loading points, better utilization of less harmful transport modes, etc. all can be achieved through the use of the services provided by the Finest platform and the ecosystem of service providers that are built up around it. In fact, one of the motivations for the development of the Finest platform was its potential to improve environmental impacts of the transport and logistics sector.

4.6 Applicability to the Domain

This section has focused on certain negative issues that will have an impact on the uptake by commercial entities of the Finest platform business model. While there certainly are challenges to commercializing the platform, the platform itself provides a novel vehicle for domain actors to address the external challenges that they are facing today. The platform also has the potential to overcome many of these challenges through its model of focused apps and an ecosystem of developers who are incented to develop these apps. By focusing app developers on specific micro related problems, unique solutions to problems that today must be addressed through manual intervention can be overcome. The Finest platform's general services also aid in this process by providing users with real time information on shipments, secure information access, predictive event management, and pay for use pricing. Taken together, the Finest platform and its ecosystem address in a far better way the challenges the domain faces (and will continue to face) than alternatives. It is definitely applicable to the domain's needs and requirements.

5 Conclusion

The Finest project has focused on developing a set of novel technologies, based on Future Internet technologies, to address a set of specific requirements for the transport and logistics domain. Work package 1 of the project has focused on defining the business requirements for the domain and ensuring that the technical solutions developed mapped to these requirements. In addition, through its examination of existing ICT solutions being used to manage business in the domain, the work package has provided guidance and insights to the technical development teams on some of the shortcomings of the existing approaches being employed to address the challenges the domain faces. With the delivery of this final deliverable, the work package has addressed the requirements set forth for it in the Finest DoW and delivered a comprehensive set of documents that should help in the phase II realization of the Finest vision.

The business model that has been developed in this final deliverable has been developed with the domain's business requirements in mind. The business model addresses each requirement and provides, through the novel ecosystem approach employed, opportunities to not only meet the specified requirement, but exceed the requirement through the creativity of apps developed by innovative ecosystem development partners.

The Finest business model opens up numerous opportunities for businesses in the transport and logistics domain to improve their operations and increase their business. The collaboration and integration capabilities of the platform allow all LSPs, whether large or small, to operate on an equal footing when bidding on shipper tendered shipment services. In addition, the app store concept employed in the business model opens opportunities for small ICT development companies to generate revenues through the rapid development and deployment of novel applications.

The Finest platform and ecosystem are not envisioned to replace legacy applications such as ERP, WMS, TMS and SCM tools. The platform is designed, however, to integrate with these systems to provide unique and novel solutions to shipment requirements while improving overall supply chain efficiency and effectiveness.

To conclude, Finest meets the requirements and demands of the transport and logistics domain and creates new business opportunities for domain participants, ICT developers, IoT hardware and service providers, systems integrators, hosting companies, software companies, and society. Its business model, based on the idea of an extensible platform and a robust ecosystem of developers and service providers, expands on B2C models such as those implemented by Apple, Google, and Microsoft, to create a truly novel B2B business model for

the benefit of the transport and logistics domain, as well as other domains that might wish to pursue a similar model.

The delivery of this document completes the work of Work Package 1 of the Finest project. It is hoped that the efforts of the partners who have contributed to all of this work package's deliverables will allow the partners in the phase II follow on project, cSpace, to develop the novel approach to conducting Future Internet business that is embodied in the Finest platform concept.

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