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INFORMATION SYSTEM DESIGN FOR WEB BASED LOGISTICS PLATFORM.

'TOOL GENERALIZATION', SPECIAL ASSIGNMENT REPORT.

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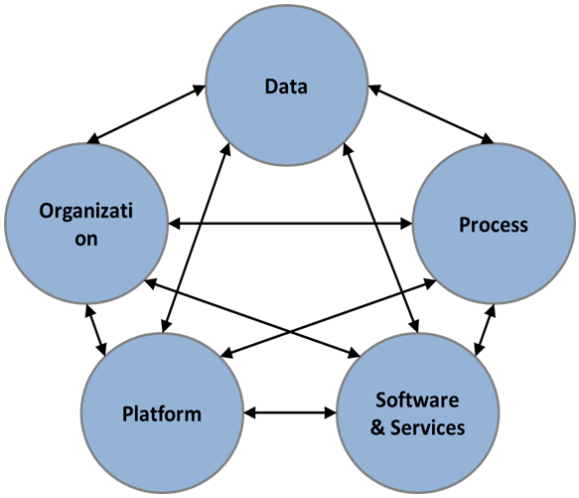

CONTENT.

INFORMATION SYSTEM DESIGN FOR WEB BASED LOGISTICS PLATFORM

INTRODUCTION

Global competition in the 21st century is forcing companies around the world to re-examine their logistics operations and systems with the objective of reducing costs and improving customer service. The role of the logistics function has become a key determinant of business performance in ensuring the smooth flow of materials, products and information throughout a company's supply chain (Sum et al. 2001). Communication plays an important role in integrating the activities along the logistics value chain. Information technologies such as electronic data interchange (EDI), the Internet and electronic commerce (e-commerce) have contributed greatly to improving communication with partners in the logistics chain (Gunasekaran et al. 2007). In particular, real-time information systems such as web-based logistics information systems help to improve logistics services. Hence, their development becomes essential for success in global operations (Hesse 2002, Aldin and Stahre 2003).

Logistics can be defined as an operational process that includes inputting, storing, transporting and distributing physical goods (Stratton 2001). E-logistics is an internet-enabled logistics value chain designed to offer competitive logistics services, including public warehousing, contract warehousing, transportation management, distribution management and freight consolidation (Hesse 2002).

Over the years, logistics has gradually developed from single-party logistics (self-managed) to third-party logistics (3PL) focusing on regional operations through the logistics network. The general problems that arise in corporate logistics include delayed and inaccurate information, incomplete services, slow and inefficient operations, and high product damage rates. This indicates the importance of accurate information exchange among different parties along the logistics value chain. Under such circumstances, the role of information technologies including the Internet, World Wide Web (WWW) and electronic data interchange (EDI) in providing web-based logistics information systems for improving logistics performance is significant (Ngai and Wat 2002).

Web-based logistics information systems have several advantages, as less human intervention is involved. This minimizes errors in the exchange of information, hence facilitating good decision-making (Leung et al. 2000, Delfman et al. 2002). The advantages include: real-time inventory information; single data entry to minimize human error as the data are input by the customers themselves with no need to re-enter the data; real-time online ordering functions; and multi-level password control so that different functions can have different access levels controlled by authorized people.

The key component in the setting-up of a web-based logistics platform is developing such information systems based on the suitable reference architectures. In this design project, an attempt has been made to design the information system and the specific reference architecture. The concept itself was provided by a reference service model for web-based logistic service platforms that offered services for the rail freight transportation business. Therefore, an ample attention in this project was paid to design this rail reference service model by taking into an account the best currently existing practices and current standard technologies for data exchange.

DESIGN PROJECT BACKGROUND

The main objective of the LMS Design project "Information system design for web based logistic platform" (hereafter, the project) was to develop a concept of a rail logistic service platform that integrated all main services and functions and served as a one-stop-shop for all parties in a logistic chain around the Port of Rotterdam.

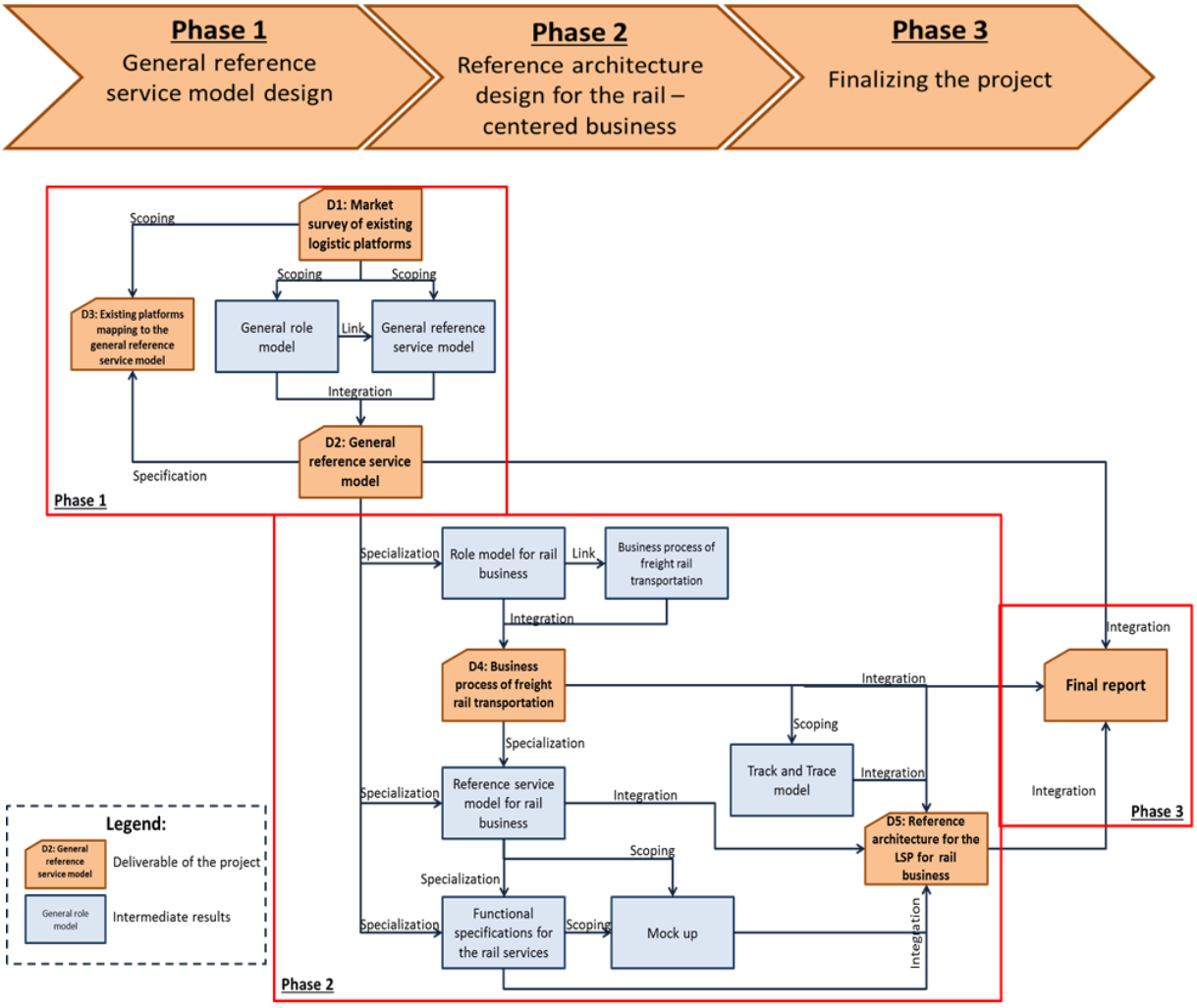

Figure 1. Phases (A) an the structure (B) of the project.

The described logistic service platform concept was based on the reference architecture and focused on a single hinterland transport modality: freight rail transportation services. The reference architecture design consisted of the number of design steps, the output of which were reference models with different levels of concreteness and details which focused on the specific characteristics of a rail logistic platform.

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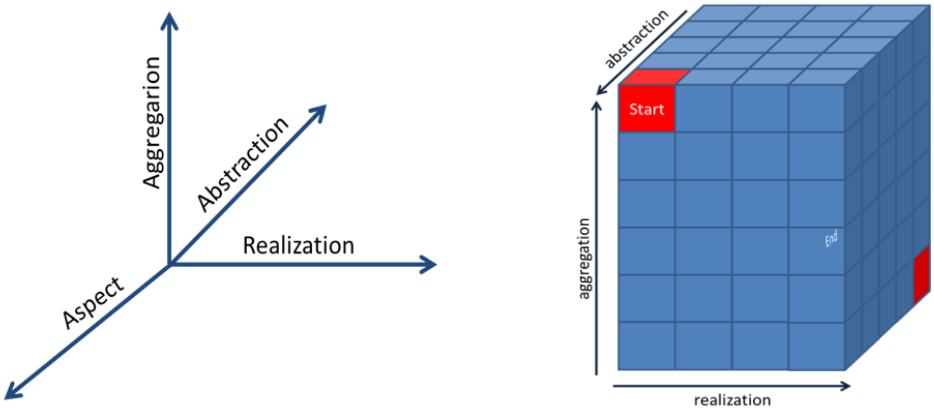

(A) (B)

Figure 2. Four-dimensional space (A) and the model transformation cube for the ISA model (B)

The four dimensional design space is used in this project which depicted in the Figure 2 [1]. According to it, on each design step, the model is analyzed in four perspectives: its view, e.g. what exactly it describes, aggregation level, e.g. how detailed it is, abstraction level, e.g. how concrete it is and technical level, e.g. how it is described. A significant attention is given to define these dimensions and their possible values. The reason of this is that each reference model should be explicitly described by these dimensions and if the quality of these data is low it would lead to incompleteness, incoherence and disconnection of models even though an architecture designer has carefully defined dimension values for each model and followed the design path. Moreover, when the dimensions values are clearly defined, it makes easier to identify the intended results the particular model should provided and to ensure that this model is complete and coherent and can be embedded in the reference architecture.

DESCRIPTION OF THE APPROACH

Logistic service systems, logistic tools, and logistic platforms most of the time have to be developed with a number of elements and aspects of the existing situation as given. Neglecting these givens in the design process may results in tedious repair processes and in overrunning of time and cost budgets. In the project, an approach has been used which allows the design team to systematically explore the available design space and to systematically specify the elements and aspects of the system such that implementation of the designed system in the given context is possible.

The approach distinguishes five aspects for the description of freight rail logistic platform reference architecture design, and three dimensions for different levels of detail at which elements and aspects of the system can be specified.

These five aspects are:

1) The data aspect, describing the organization of the data in the information system,
2) The process aspect, describing the business processes supported by the information system,
3) The software & services aspect, describing the structure of the software in the information system,
4) The platform aspect, describing the hardware platform in which the information system is implemented,
5) The organisation aspect, describing the different organizational positions serving and being served by the information system.

These aspects are tightly connected to each other, which means that choices made on one aspect can constrain or influence effectiveness of choice options on other aspects. Thus, design space is complex and the search through design space must be based on a process of careful investigating all options per aspect and careful checking the consequences on other aspects of a choice on one aspect, allowing for some iterations, but not too many since this would lead to time and cost overrun.

These three dimensions are:
1) The abstraction dimension
2) The realization dimension
3) The aggregation dimension

The abstraction dimension
On the abstraction dimension, it is specified how abstract or concrete an architecture description needs to be for the intended purpose and the intended target group of people. Under specification on this dimension may lead to uncertainty on the receiving side and interpretations that do not match with the intentions of the design team. Over specification on this dimension may lead to time and money spent on unnecessary activities and missed opportunities to realise the intended goals by mobilizing valuable of knowledge at the receiving side.

The approach distinguishes five levels of abstraction:
1) Business independent model
2) Business specific model (for example freight rail)
3) Business specific model for specific type of software system
4) Business specific model for specific type of software system in specific companies
5) Business specific model for specific type of software in specific companies, bought from specific vendors.

The realization dimension
On the realization dimension, it is specified at what implementation level the system should be specified. The approach distinguishes four levels:
1) At the business level, the goals to be achieved with the system are specified,
2) At the organizational level, it is specified how the organisational units are structured and interconnected to achieve the business goals,
3) At the architectural level, the architecture of the information system is specified,
4) At the technology level, the realization of the system in hardware and software is described.

The aggregation dimension
On the aggregation dimension, it is specified in what detail the components of the systems should be specified. Typically, description at various aggregation levels is needed for a useful description of the system to be designed. The aggregation dimension values should provide information about model details from business goals to services and means by which they can be performed. For the freight rail logistic service reference architecture, six aggregation levels are distinguished where the first two levels provide very aggregated information about customers and their business goals, then two levels that provide information about services and activities that enable realizing these goals, and finally two levels that provide information about how the services and activities are performed in terms of software.

1) Level one describes the parties which use the freight rail logistic platform,
2) Level two describes the complete set of services used by a party,
3) Level three describes the separate business services,
4) Level four describes the separate operations in a business service
5) Level five describes the software functions needed for a service operation,
6) Level six describes the software operation needed for a software function needed for a service operation.

GENERAL REFERENCE SERVICE MODEL

The general reference service model design phase required to develop a reference model for services offered by existing logistic platforms. In this phase, there are no specifications of modalities and/or businesses. The design was performed based on the analysis of the best practices existing nowadays. The general reference service model design phase includes following deliverables:

Market survey of existing logistic platforms (D1)

This report provides the overview of 30 logistic platforms [2].

Shippers and logistic service providers face an extremely dynamic freight transportation market with frequently changing schedules, fees and routes. To ensure that freight is transported according to the plan, they have to use the latest up-to-date information about freight transportation conditions, to agree about fees with carriers, to communicate about the routes to book and to be able to track and trace their freight in the real time. That is why it has been unavoidable to move freight transport services to Internet-based applications that allow performing all necessary logistic activities in the real time and nowadays a great number of companies offer high-performance web-based platforms to deliver abovementioned up-to-date information.

Methodology

In order to have a comprehensive overview of the market of platforms which provide logistic service in freight transportation, 20 logistic web-based platforms have been analyzed. The selection of these platforms has been based on previous research of Portbase. Moreover, this report includes analysis of logistic platforms which were selected in the top 100 logistics IT Providers & Market Research survey (according to annual logistics technology market research provided by Inbound Logistics, 2012). The focus wasn't just on global web-based platforms which provide full logistic services but also on local web-based market places which focus on the simple functionality such as direct match demand and supply of carrier and shipper.

To have an extended overview of platform services and offerings, all necessary data has been taken from particular official websites. For each examined platform obtained information was divided into several sections to come to a structured profile.

First, some general information is included such as the name of company, web address, physical address, date of foundation etc. Moreover, the network of customers and logistic service providers is analyzed. Each profile provides information on whether it is a local marketplace or whether it has transportation providers all over the world, number of customers using the platform and type of customers for whom it is designed (i.e. shippers, freight forwarders, road, air and/or truck operators). Next, attention is paid to the services a platform provides. In this section services that can be used on this platform are described in detail. Finally, the overall overview is given, advantages and disadvantages of the platform are discussed.

In general, there are two types of platforms: market places and complex logistic platforms. Market places provide B2B and B2C web based platforms the main purpose of which is to match demand and supply of transport and freight. It can be fully automated platforms which plan a trip, compare prices and quality of service, book and pay via platform. On the other hand, it can be platforms that provide only basic services such as search of carriers/shippers and provide their profile information. Contact, booking and payment should be done separately and directly between parties.

Another type of logistic platforms is complex B2B (also possible B2G, G2G) web based platforms which provide whole spectrum of logistic services where, frequently, information is stored and managed in the Cloud. These platforms mostly include not only transportation modules but also enable to use other logistic services such as inventory control of the stock, warehouse planning, supply chain management etc. Moreover, these platforms are integrated into customer's ERP system which allow system to system connection between parties which enable to optimize route planning, provide effective time slot management, offer effective costs management and fast documentation flow.

Reference model design for web-based logistic service platforms (D2)
In this report, the reference model of services offered by logistic platforms is designed.
This reference model does not take into account any specific modalities and/or businesses. It is based on the market survey performed in D1 and integrates the general reference service model and the role model of parties which use these services (hereinafter, general role model) [3]. It also aims to analyze the best practices of web based logistic platforms existing nowadays.

Methodology
The design process was started from the initial requirements definition and their detailed analysis. Moreover, these requirements were checked in terms of discrepancy between intentions of stakeholders and the application/design context of the intended reference model.

The intention of the reference model design was to go from the simple model design to more complex aggregated model. In order to do that, first, common services between the market places and the complex logistic platforms were analyzed. Then, basic services of market places were designed. And only after that, design was turned to the complex models designing.

Existing platforms mapping to the general reference service model (D3)
In order to ensure the coherence and completeness of the general reference model developed in D2, logistic platforms analyzed in D1 are mapped to this reference model [4].
In D1, the overview of the top thirty logistic platforms is given. D2 provides the analysis of these platforms in terms of four dimensions: number of services and number of unique services offered by a platform, level of customization, and level of integration with logistic chain. And finally, this report aims to map the existing web based platforms, which provide logistic services and are listed in D1 to the reference model and provide the list of available services for each platform.

Methodology

First, the level of details, on which each logistic platform is analyzed, and the aggregation level of the logistic platforms mapping is defined. Then, the approach of logistic platforms mapping on each aggregation level is discussed below.

Aggregation level for logistic platforms mapping

As it was discussed above, there is 1 + 5 level approach of reference model representation (Fig. 3):

0. Detached level, such as a customer role by which a service is called.
1. Business services module - set of services, which are combined due to their common usage or information they use/provide.
2. Business service - a single service which is used by a customer. It consists of the set of activities a customer can perform.
3. Service operation - a single service activity which a customer can perform using the particular service.
4. Service function - set of operations which are called by service operations, combined due to their usage or information they use/provide.
5. Function operations - a single activity which is called by the service operation.

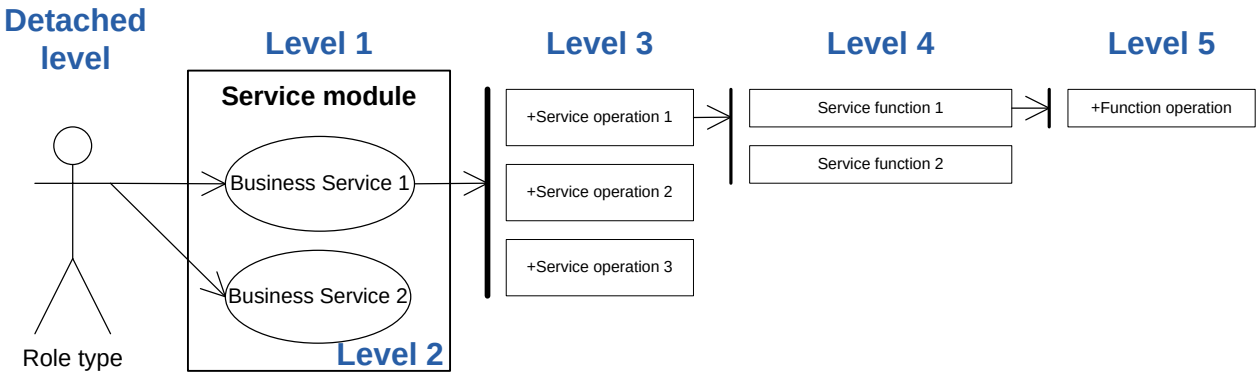

Figure 3. F the 1 + 5 level approach and the boundaries of the logistic platforms mapping.

The levels of service functions and their operations are out of the scope because these levels are quite specific for each platform. Moreover, according to the initial requirements and agreed aggregation level of the reference model, the reference model does not provide detailed analysis of service functions and their operations, and thus, the mapping of logistic platforms on these levels might not show the complete overview.

Platforms mapping approach

As mentioned above, there are two different types of platforms – market places and complex logistic platforms, which are analyzed separately. The results of each type of logistic platforms mapping are represented in the matrix form, where on the one side all platforms are listed and on the other side all available services are given (according to the reference model). In order to provide not only detailed service analysis, but also be able to see more general analysis on high aggregation level, there are two matrix representations:

1) 1 + 3 level: Service sets, services and service operations mapping. Here, the detailed analysis;

of each service and its operations available on the particular logistic platforms is provided. Furthermore, all services are grouped into service sets. For better readability, all levels are marked with different colours.

2) 1 + 2 level: Service sets and services mapping. Here, the overview of one aggregation level higher is provided. It analyzes services which are available on the particular platform without going into detailed operations description. Furthermore, all services are grouped into service sets. For the better readability, all levels are marked out with the different colours.

According to the market survey analysis [3], services do not necessarily include all operations which are listed in the reference model. In other terms, having the same service, one platform can have only basic list of operations this service includes while another platform can offer extended and more complicated operations. Thus, when two platforms have the same service it does not necessary mean that their quality is the same. Performing the logistic platforms mapping, it is essential to be able to represent this difference. There are different approaches to map services which platforms offer with the reference model. Below, some of these approaches are discussed.

1. To mark the service if at least one operation of this service is offered by the particular platform. This approach is quite simple for implementation and easy for understanding. However, it can be regarded only in the connection with the deeper levels of the reference model. Otherwise, in a case the platforms are analysed only on the second level of the reference model, platforms which have the same services but have different numbers of operations this services include are seen equally. Thus, using this approach, the mapping of the platforms on the second level of the reference model does not provide any information about quality of services and their attractiveness for the client.
2. To asset services according to the number of operations they include. It can provide the exact number of operations the service includes or percent of number of operations. In contrast to the previous approach, this method can be regarded separately from other levels and provide deep overview of services the platform offers. Moreover, this approach gives a possibility to compare different platforms in terms of services quality on the second level of the reference model. However, depending on the aspect the platforms are analysed by and purpose of the analysis, the importance of including particular operation to the service can vary. This approach doesn't show weight of each operation and thus the analysis cannot provide the complete overview of the platforms on the second level of the reference model.
3. To asset services according to the number of operations and their weight (importance). This approach can show quite deep overview of platforms and their services on the second level of the reference model. However, the weight of operation in the service can vary for different kinds of analysis. It depends on what exactly is important for current analysis, who performs this analysis and for what reason it is done. Thus, this approach cannot show the general overview of the platforms and can be applied only in more specific analysis where the exact aspect of the services is examined.

REFERENCE MODELS

A reference model is an abstract framework for understanding significant relationships among the entities of some environment [5]. A reference model consists of a minimal set of unifying concepts, axioms and relationships within a particular problem domain, and is independent of specific standards, technologies, implementations, or other concrete details. The concept and relationships defined by a reference model are intended to be the basis for describing reference architectures which will define more specific problems. A concrete architecture arises from a combination of

reference architecture, architectural patterns and reference models. In [6], the adapted view of relationships between reference models, architectural patterns, reference architectures, and concrete architectures is provided (Fig. 4).

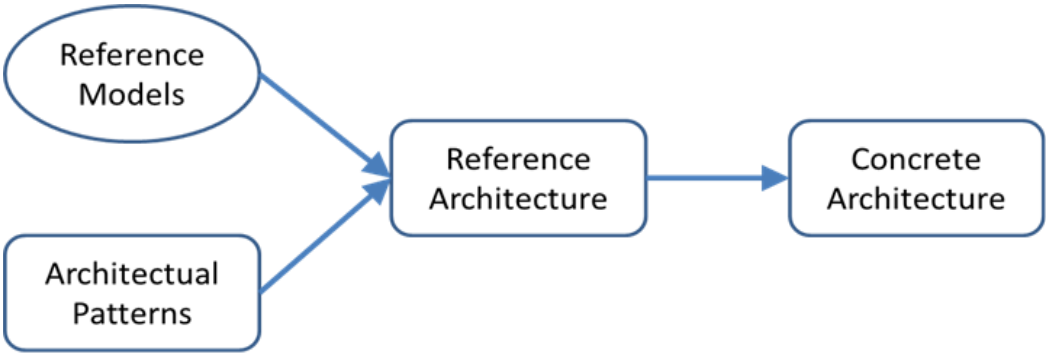

Figure 4. Adapted view of relationships between reference models, architectural patterns, reference architectures, and concrete architectures

To define goals and requirements of the reference model it is essential to use some logical construct and/or a framework which can guide the designer. The most common framework was provided by Zachman [7, 8].
According to his work, there are two main principles of an architecture which should be taken into account:

- There is a set of architectural representations which provide different perspectives of the different participants;
- The same product can be described, for different purpose, in different ways, resulting in different types of description.

Thus, the following main questions should be considered: what, how, where, who, when and why.
Applying these questions to the particular reference model, they can be formulated as following:

- Why is it defined?
- What is content of reference model?
- How should it be represented?
- Where can it be implemented?
- Who will use it?
- When is it described?

As a result, the main initial requirements of the reference model can be defined.
An example is given in the Table 1.

Question	Requirements
Why?	1. The reference model should be a blueprint that contains the best practices of the existing platforms in order to obtain a complete overview of the today's market offer. 2. The main goal of the reference model is to provide the complete list of logistic platforms services and functions and to show relations between them.
What?	1. The main focus of the reference model is a transportation module of the logistic platforms. However, it should regard also documentation and billing services. 2. The reference model should be focused on both automated and non automated services. 3. The reference model should provide the complete list of logistic platforms services and functions and to show relations between them. 1. The reference model should be based on the market survey. However, it should take into account only the leading platforms practices.
How?	1. The reference model should be a blueprint that contains the best practices of the existing platforms. 2. The reference model should be user friendly, easy to use with clear explanations and pictures. 3. It should provide detailed list of services, functions and their relationships.
Where?	1. The reference model should be a communication tool between business and developers.
Who?	1. The main stakeholders for whom the reference model is designed is any initiators or developers.
When?	1. The reference model should be based on the practices of the already existing logistic platforms.

Table 1. The example of reference model's Initial requirements.

Role model

Before designing the reference models, roles which are involved into the platform's activities should be discussed. According to the Market Survey, there are two main roles involved: Logistic service client, who requires freight transportation and Logistic service provider who offers transport service. However, the different types of customers can play these roles. Although services which are offered by any platform are not distinguished by the customer type, the reference model requirements claim to provide the Organizational aspect of the model in terms of actors involved in the platform activities.

DESIGN PROCESS

According to Figure 1, Phase 1 starts with the market survey provided by D1. The input data for this survey are the previous research of Portbase and Inbound logistic research of top 100 logistic IT providers. The main focus in the market survey is paid to the overview of all services these logistic service platforms offer and type of customers who use these services.

Based on the market survey the reference service model and the role model are designed. First, types of customers are analysed. Since, the intended reference architecture does not pay attention to the specific services and/or modalities the role model remains on the highly abstract level where only general roles are regarded such as logistic service client (LSC) and logistic service provider (LSP).

The reference model of services provided by logistic service platforms is designed based on the developed role model and the market survey provided by D1. It provides the complete list of existing services structured according to the 1 + 5 levels model [3].

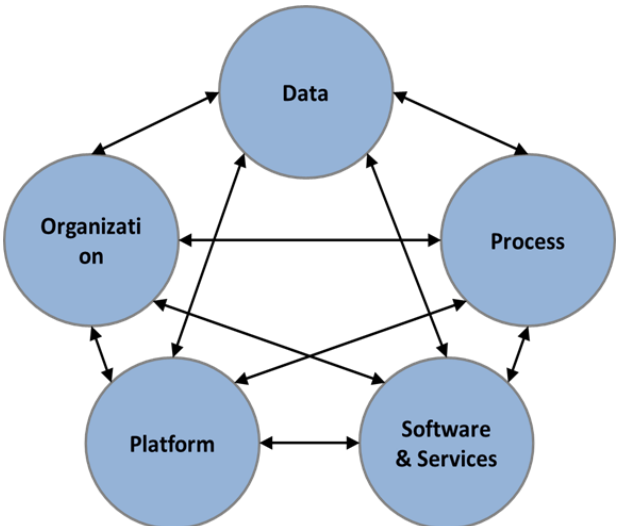

Figure 5. Modernized variation on Truyen's framework.

According to Truen's framework (Fig. 5) [1], the final reference model designed in D2 covers the organizational and the service aspects of the reference architecture.

The abstraction level of the reference model remains on the high level since specific modalities and/or businesses are disregarded. However, the analysis of existing services is highly detailed since they are regarded on six aggregation levels according to the 1 + 5 levels model. Moreover, since the model provides the structural representation of services and their connections between each other the realization of this model moves to the architectural level of the realization dimension.

To ensure the coherence, applicability and completeness of the designed reference model the existing logistic service platforms mapping to the reference model has been performed on the last sub phase of Phase 1. Each logistic platform described in D1 has been analyzed in terms of the reference service model. Services which are offered by the particular platform have been mapped to services provided by the reference model. First, it has helped to prove the completeness of the model since any service offered by a logistic service platform provided in D1 should be included in the reference model. Moreover, it has enabled to range the logistic service platforms according to number of services they offer comparing with the complete list of services provided by the reference model. The results of this analysis can be found in D3.

APPLICATION OF THE GENERAL SERVICE MODEL IN THE SPECIFIC BUSINESS AND/OR MODALITY

The main goal of the application process is to provide the concept of a logistic service platform for the specific business (hereinafter, the specific logistic platform) which includes the complete list of logistic services, the overview of the business process of the defined transportation type and the parties that are involved in this process, information exchange between these parties and the visualization of the intended specific logistic platform.

To do that, the process is divided into four phases where on each phase the reference architecture is analysed either from different points of view or on different realization dimension levels (Fig. 6). The detailed description of these phases is provided below.

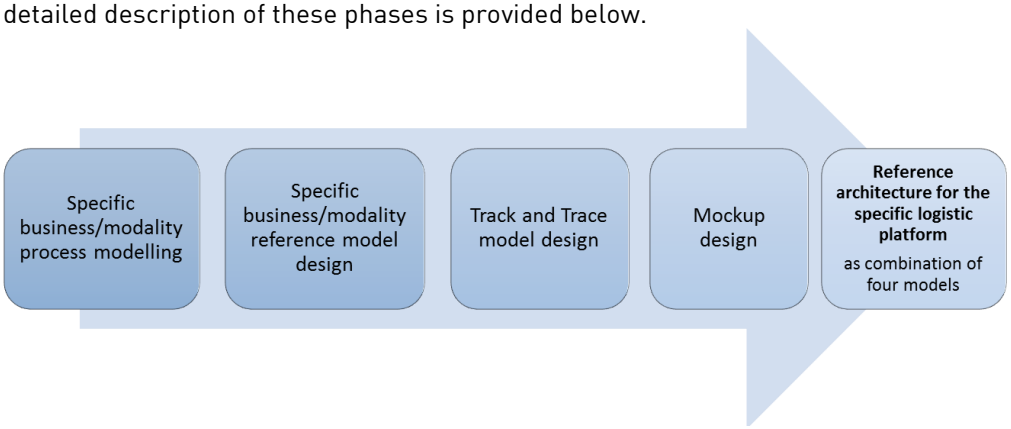

Figure 6. Phases of the reference architecture design for the specific logistic platform.

The reference architecture for the specific logistic platform starts with business process modelling for that business. It describes the transportation process and the parties involved in this process.

Based on the modeled business process and the general reference model, the reference model for services provided by specific logistic platform is designed.

On the third phase, information exchange between parties involved in the specific transportation business is considered. Next, the Track and Trace model is designed where the main focus of this model is paid to tracking the performance of underlying planning process of the specific transportation type.

Finally, the visualization of the intended specific logistic platform is provided. It is done by developing an interface of the platform for different parties involved in that business.

Specific business process modeling

The main objective of the business process modeling is to provide the complete overview of all activities performed in the particular transportation business. In the further research, this business process supports a decision making upon choosing services which should be implemented on a specific logistic platform. Thus, the matter of importance in the business process modeling is to understand specific features and needs of that transportation business. Moreover, the business process models are designed to be appropriate for any logistic service providers and logistic service clients. These models are highly concrete for the specific transportation business but without taking into consideration specific companies and their software.

The business process is decomposed from high to more detailed aggregation levels according to the pyramid model shown on Figure 7. It starts with business process modeling on the detached aggregation level where types of interactions between parties are defined. Then, based on these models, business process is designed on the first aggregation level, where for each interaction type the set of processes is defined. On the second aggregation level, these processes are divided into sub processes. And finally, on the third aggregation level, the sequence of sub process steps within each sub process is regarded.

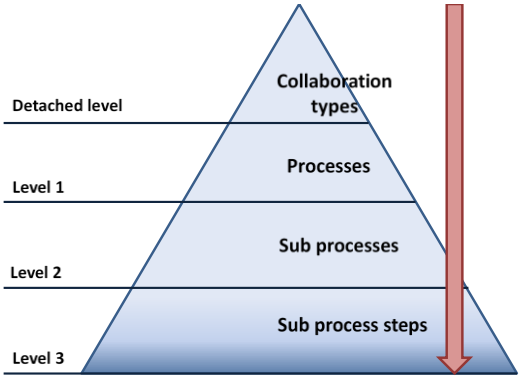

Figure 7. Pyramid model

Furthermore, since on the detached level types of interactions between parties involved to the specific transportation business is distinguishing, it is important to analyse these parties first. It is achieved by the design of a role model for the given transportation business.

Reference service model design for the specific transportation business

According to Figure 8, the main objective of the second phase is to design the reference service model for a logistic service platform which is highly concrete for the specific transportation business. The result of this design should be the complete list of services specified for that transportation business.

This design is based on the general reference service model and the specific transportation business process. The general reference model is a highly abstract model without any specifications of modalities and/or businesses. On the other hand, the specific business process is highly concrete for that transportation business. Thus, the specific reference model design is performed by concretizing the general reference service model for the particular transportation business. This is done by mapping the transportation business process to the general reference service model. Mapping in this sense means defining services/set of services which are described in the general reference model with help of which the particular business process step can be performed. Furthermore, the detached aggregation level of the specific reference model can be represented by the role model.

For the general reference model, the input data based on which the reference model is designed has been taken from the market survey where the description of all existing services which are offered by logistic service platforms could be found.

Track and Trace model design

As it is shown on Figure 8, the third phase of the reference architecture design for a specific logistic service platform is a Track and Trace model design. The Track and Trace model is regarded in terms

of information exchange about statuses of transportation performance and notification about any changes during the underlying planning activities. Since there are a lot of parties which are involved in the transportation and all of them need up to date information, this service seems to be significant and help parties to track the performance of their partners and based on it to optimize their own performance. Since the main focus a Track and Trace model is paid to information exchange between parties, it means that the Track & Trace model provides the data point of view of Truyen's framework. Moreover, since it is important to understand which parties should provide the up to date information and for which parties this information can be useful, the link between organizational point of view and the data aspect should be considered. Furthermore, since the information occurs in different moments of time and can be available only after it occurs in the logistic service platform the process aspect should be also taken into account. Thus, the design of the Track and Trace model focuses on the links between Data, Process and Organization aspects.

The design of the Track and Trace model is based on the specific business process which is taken as an input data to this model. On the detached aggregation level, the parties involved into information exchange are regarded. Moreover, on the detached and first aggregation levels, the analysis is performed in terms of interactions between processes. It would help to understand the business processes connections and the information exchange between these processes. On the second aggregation level, the entities about which the information exchange is performed are distinguished. On the third aggregation level the information exchange about depicted entities is analysed. Moreover, this analysis cannot be regarded separately from the business process since it is important to know on what process stage information occurs and when it is required.

Mock up design

The main stakeholders of reference architecture for a specific logistic service platform are managers. This type of professionals is highly practical and rather result oriented then process oriented. Thus, it is important to visualize the intended specific logistic service platform in order to demonstrate the reference architecture applicability for different stakeholders and to provide an explanation how it can be implemented in the future. To visualize reference architecture for a specific logistic service platform, different approaches can be used such as a mock up design, an example of the specific modality process, an architecture sketch, etc.

SUMMARY

The main objective of the LMS Design project "Information system design for web based logistic platform" was to develop a concept of a rail logistic service platform that integrated all main services and functions and served as a one-stop-shop for all parties in a logistic chain around the Port of Rotterdam.

This report discusses a generic form development of the designed rail reference service model and evaluate a possibility of its application in different specific logistic environments.

The reference architecture for the specific logistic platform starts with business process modelling for that business. It describes the transportation process and the parties involved in this process.

Based on the modelled business process and the general reference model, the reference model for services provided by specific logistic platform is designed.

On the third phase, information exchange between parties involved in the specific transportation business is considered. Next, the Track and Trace model is designed where the main focus of this model is paid to tracking the performance of underlying planning process of the specific transportation type.

Finally, the visualization of the intended specific logistic platform is provided. It is done by developing an interface of the platform for different parties involved in that business.

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