



NIMBLE Experimentation & Validation



D4.1

NIMBLE Platform User Experience – Validation Methodology

Project Acronym	NIMBLE		
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Editor	Diana Chronéer, Jeaneth Johansson, Michael Nilsson & Mari Runardotter		
Reviewers	Wernher Behrendt, Silvia Salvetti		
Contributors	DC, JJ, MN, MR, WB	ALL	
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Abstract

The NIMBLE project aims to perform research leading to the development of a cloud and IoT federated platform specifically targeted to supply chain relationships and logistics. Core capabilities will enable firms to register, publish machine-readable catalogues for products and services, search for suitable supply chain partners, negotiate contracts and supply logistics, and develop private and secure information exchange channels between firms, in a B2B only environment. The intention is to support a federation of such NIMBLE instances, all providing a set of core services, and each potentially specifically tailored to a different aspect (regional, sectorial, topical, etc.).

The main goal of this document is to present the methodology and validation plan for assessing the end-user experience (UX) of NIMBLE. Further deliverables in this work package deal with the user experience of

- a) buyers and suppliers,*
- b) logistics providers and organisations sharing manufacturing data,*
- c) platform managers.*
- d) a final deliverable will provide recommendations and additional requirements for the second development phase in which value added services will be included in the platform.*

NIMBLE in a Nutshell

NIMBLE is the collaboration Network for Industry, Manufacturing, Business and Logistics in Europe. It will develop the infrastructure for a cloud-based, Industry 4.0, Internet-of-Things-enabled B2B platform on which European manufacturing firms can register, publish machine-readable catalogues for products and services, search for suitable supply chain partners, negotiate contracts and supply logistics. Participating companies can establish private and secure B2B and M2M information exchange channels to optimise business workflows. The infrastructure is being developed as open source software under an Apache-type, permissive license. The governance model is a federation of platforms for multi-sided trade, with mandatory interoperation functions and optional added-value business functions that can be provided by third parties. This will foster the growth of a net-centric business ecosystem for sustainable innovation and fair competition as envisaged by the Digital Agenda 2020. Prospective NIMBLE providers can take the open source infrastructure and bundle it with sectorial, regional or functional added value services and launch a new platform in the federation. The project started in October 2016 and will last for 36 months.

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V1.0	22/05/2018	Final edits and submission (WB)

Acronyms

Table 1: Acronyms

Acronym	Meaning
B2B	Business to Business
NIMBLE	Collaboration Network for Industry, Manufacturing, Business and Logistics in Europe
PaaS	Platform as a Service
UX	User Experience

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1 Introduction

The overall objective in NIMBLE is to create a B2B platform that will improve the efficiency of supply chain creation and operations for SMEs. Among the services provided by the platform are publication of digital versions of product catalogues as well as what business services a firm is offering. Through NIMBLE, companies should be able to efficiently search and find required counterparts, initiate negotiation processes, and establish supply chain relationships, including the creation of private information exchange channels.

The rationale for the first round validation and evolution rests with the objectives as expressed in the NIMBLE project proposal, where the main objective is to give manufacturing SMEs in Europe a stable and sustainable ecosystem (NIMBLE_Proposal). As such, all European SMEs are regarded as potential future users of the NIMBLE platform, which implies that it is important to consider a wide variety of users in the user experience validation, in order to ensure the generic aspect of the platform. Also, WP 4 is supposed to gather data “strictly focused on end-user experience (UX)” (NIMBLE_Proposal, p.52).

1.1 Objective

The purpose of the Validation methodology and the first round validation and evolution of NIMBLE requires two parallel activities:

- *Functionality test*: the validation of the business services (practical/technical aspects), that is, a validation focusing on the business services developed so far
- *UX-test*: Obtaining UX feedback data from end-users.

1.2 Scope

Focus in the validation is as follows:

- *Functionality test*: The basic business service functionalities i.e. to register a company in the platform, publish products and services, making them discoverable, and participate in resulting supply chain engagements. During the project these basic functionalities will be enhanced with more advanced functionalities such as enabling the selective sharing of data among partners.
- *UX test*: UX data provides thorough insights in how the users perceive the NIMBLE platform and its business services. Hence, it answers to whether the users are satisfied with the business services, if these answers to their needs and expectations as well as how they feel about using the NIMBLE platform itself. It also covers their perceptions of the practical aspects such as utility, ease of use and efficiency of the system, i.e. the usability of the platform. UX is an area influenced and built on knowledge and experience of the user, the user's concerns, expectations, skills and abilities (Väänänen-Vainio-Mattila, Roto and Hassenzahl, 2008).

1.3 Overall Time Schedule

This schedule reflects the phase of data gathering based on internal end users with focus on functionality tests and UX tests.

Pre-phase: Development of 1) scripts for Functionality tests and 2) guidelines for UX-tests.

1. October – November 2017

Data gathering phase: December 2017 – May 2018, data gathering from internal end-users, divided into three releases of the NIMBLE services:

- Release 1: Covers D4.1 buyers, and D 4.2 suppliers point of view.
- Release 2: Covers D4.3 Data sharers and D4.4 Logistic suppliers point of view
- Release 3: Covers a final validation review of all services.
- D4.5 Analyses covering the management and governance of the NIMBLE.

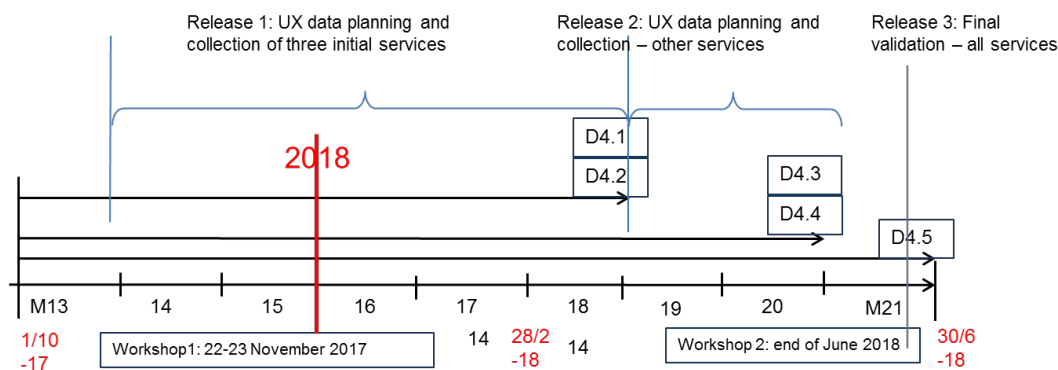


Figure 1: WP4 overall time schedule.

As the first deliverables D4.1 and D4.2 are due end of March 2018, the data collection was conducted in relation to the initial developed services: Registration, Publish, and Search, with the intention to cover the deliverables D4.2 and D4.4.

The deliverable D4.3 and 4.4 covers the services Negotiate, Execute and Monitor.

The deliverable D4.5 covers the governance and ownership of NIMBLE.

2 Validation Overview

2.1 Supply Chain Actors as End-Users

Supply chains (SC) are critical parts of the collaborations with several types of actors and hence possible end-users of NIMBLE.

A supply chain involves interactions between key actors in an organization's or a company's networks in which each organization creates and adds value and where individual organizations must interrelate and interact (Tatikonda & Stock, 2003). SCM represents a way of managing business and relationships with others, i.e. inter-company integration and coordination via information technology is one key for improved SC performance (Barut et al., 2002).

Studies also show that better information exchange and sharing should lead to stronger supplier performance and better SC relationships, promoting the ideation and exploitation of different forms of SC collaboration (Fawcett et al., 2011). In general, three major types of collaborative relationships are

specified: manufacturing-supplier collaboration; manufacturing-customer collaboration, and collaboration with third and fourth party logistics providers (Sahay, 2003).

In WP4, the three types of collaborative relationships encompass four user groups targeted as end-users to validate the NIMBLE platform:

- Buyers of supplies
- Suppliers
- Logistics service suppliers
- Data sharing partners

In addition, the NIMBLE project also explore, and report on a fifth theme, namely;

- NIMBLE Platform manager (a role on the side of the platform provider) (SRFG)

Initial in the time schedule, the two first end-user groups are targeted; the buyer and the supplier, and these are later on followed by the other target groups. In order to identify these end-users, the partners related to the four use cases (Whirlpool, Lindbäcks, Piacenza, Micuna) all have actors in their supply chain that consist of internal end-users of NIMBLE. Internal end-users: Different departments at the use case company: procurement (e.g. buyers of materials), sales (e.g. suppliers of goods/ products), manufacturing (e.g. use of some data in NIMBLE), logistics (buyers of logistics services), etc. In the validation process, these were targeted to validate and test NIMBLE's initial business services: register, publish, search, negotiate, B2B data sharing, execute, and monitor, see section 2.2.

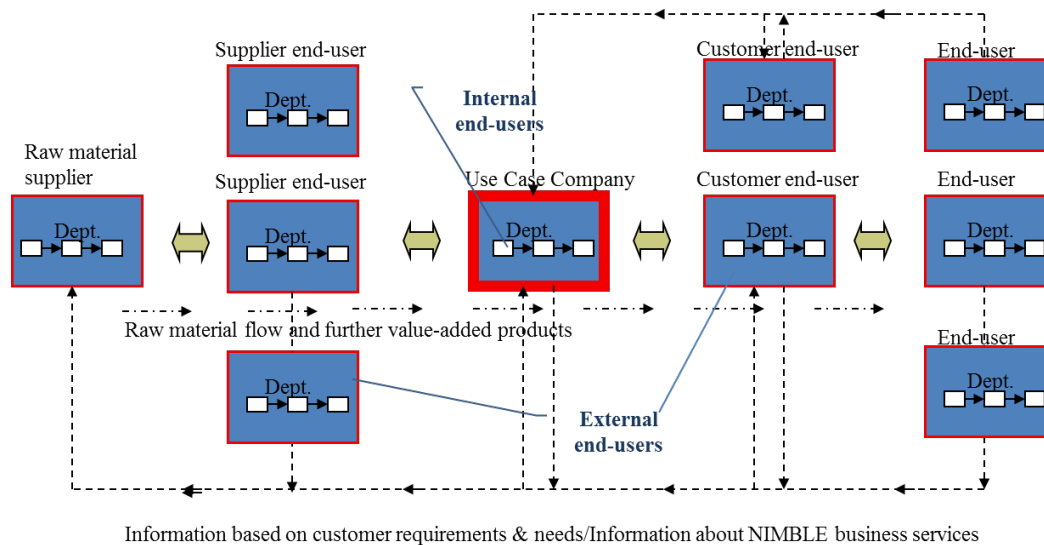


Figure 2. Supply Chain relationships.

It was essential in the validation process (phase 1 in the time schedule) to identify those internal possible end-users that work in different departments at the use case companies.

2.2 Validation re-arrangements

In WP4, the NIMBLE prototype system was to be validated and experimented with, by the main stakeholders of the system. However, we found that the validation process required some readjustments:

Firstly, the initial development process took four months longer than planned and secondly, we found that the originally envisaged split of validation tasks according to user roles had some weaknesses, too.

The validation tasks were originally organised along major user roles:

- Buyer
- Supplier
- Data sharer (M2M cooperation between companies)
- Logistics Service Provider
- Retailer

The role of *retailer* is not covered by any of the consortium partners and is also somewhat redundant in relation to the “Buyer” role.

At the same time, we gave no specific validation space to the role of *platform manager*, which is one of the most important stakeholder roles. Therefore, we decided to replace the retailer role with the platform manager role and this is being covered by the coordinator who is at present also running the prototype platform. In this way, the coordinator gets first-hand experience of the issues that arise for the platform manager.

We also adjusted the timing of the validation so that the first validation tasks are Buyer and Supplier as originally planned. This is then followed by the logistics service providers who are the logical link between buyers and suppliers.

The fourth task of validation will then be platform management – these first four tasks give us, in principle, completeness in terms of what the platform must minimally support. Last but not least, we will validate the functionality offered by the platform, for data exchange between companies in order to support “digital twin” scenarios and scenarios with tight integration of supply chains. For this, NIMBLE offers the possibility to define direct data channels down to M2M communication.

2.3 System Overview

The following specific NIMBLE business services was validated during Validation Release 1:

Register on the platform (Person | Company): by default external users can only do search on the public pages of the platform. For any further activities, at least the user has to be registered. For any products or catalogues to be published, a company needs to be registered with NIMBLE.

Publish (Product | Logistics Service | Catalogue | Configurator): once a company is registered, its legal representative or somebody who was given publishing rights by the legal representative, can publish products or services on the platform. Beyond descriptions of individual products and services it is also possible to upload whole catalogues, with the help of a dedicated uploading facility. We are at present investigating how NIMBLE can support the use of product configurators. A product configurator can be regarded as a type of dynamic catalogue that is capable of showing specific and valid variants of a product.

Search for (Product | Service | Company | Person-in-role | Configuration)

Users of the platform expect to be supported in doing business and therefore, NIMBLE's search facilities focus on the business tasks that the platform offers. These are finding products that are described via machine-readable catalogues; services such as logistics or any other relevant business service that can be connected via the openAPI; finding associated companies that offer a specific service or product; and finding company staff who perform specific tasks in their roles. If NIMBLE supports configurators then the search facilities should also be able to find specific configurations of a product, provided that configurator offers a (as yet to be defined) NIMBLE-compatible API.

Negotiate for (Product | Service | Contractual Terms) → Contract

The main purpose of NIMBLE is to facilitate the path from identifying partners for a supply chain, to actually performing business transactions of such a supply chain. Therefore, NIMBLE offers predefined business processes and most of these include the possibility of negotiating some aspects of the business transactions. These aspects could be features of the product or service, or terms of the contract and agreeing on them will lead to constructing a valid, machine-readable contract that will guide the execution of the business process itself.

Execute (Business-Process) according-to (Contract)

Provided that a user has the necessary rights, he or she will be able to start the execution of a business process with the help of the NIMBLE platform. This may be the purchase of some goods including the use of a specific delivery service or the use of some third party services that may be available on the platform.

Monitor (Business-Process) according-to (Platform data channels)

Provided that a user has the necessary rights, he or she will be able to subscribe to individual data channels that can be initiated between companies in order to exchange information.

These channels are always initiated by the data producer and can be subscribed to, by data consumer who needs to have the necessary credentials (activated by the producer) and the necessary rights on the consumer's side.

Specify B2B data sharing rules as part of Contractual Terms → Platform data channels

The NIMBLE security module will offer a policy specification language and part of that language is the ability to define purpose-specific data channels. The security module would then enforce the policy rules across the platform. The following is an example for specifying rights of a user to monitor a production facility (i.e. a machine or a specific sensor) from a supplier:

```
from date (StartDate) to date (EndDate) user(fred01) can_monitor  
(sensor(sense777) on machine(m222) from company (firm333) when  
machining_part(?MP_X) of order(order999)) is being produced.
```

(Note: this is planned to be available from NIMBLE R3 onwards).

Platform Manager Services

In addition, the following platform management services should be available for validation by a representative of the organisation that is responsible for the provision of the platform service.

Audit (Transactions) of-Company (Buyer, Supplier, 3rd Party)

The platform manager should be able to review transactions between parties for the purposes of security or compliance audits. The possible depth of insight must be specified by applicable law (e.g. GDPR in Europe) and by governance rules given by the platform.

Show platform dashboard (# of Companies, # of Transactions, Trading Volume, ...)

The platform manager should be able to view important metrics of the platform in order to do business assessments relating to the economic strength of the platform. Applicable law and governance rules of

the platform should ensure a fair balance of power between the platform owners and the platform users.

Show platform security dashboard (# of Incidents, Risk Volume, Threat Vectors, ...)

The platform's security officer should have access to a dashboard that shows the threat vectors which the platform is experiencing.

Manage user feedback (all user-facing functions should provide usability statistics and a back-channel to the development team)

The platform's customer support should have access to usability metrics gathered from the users of the platform, for the purpose of improving the user experience. The users should have a direct feedback-channel to the platform's customer support.

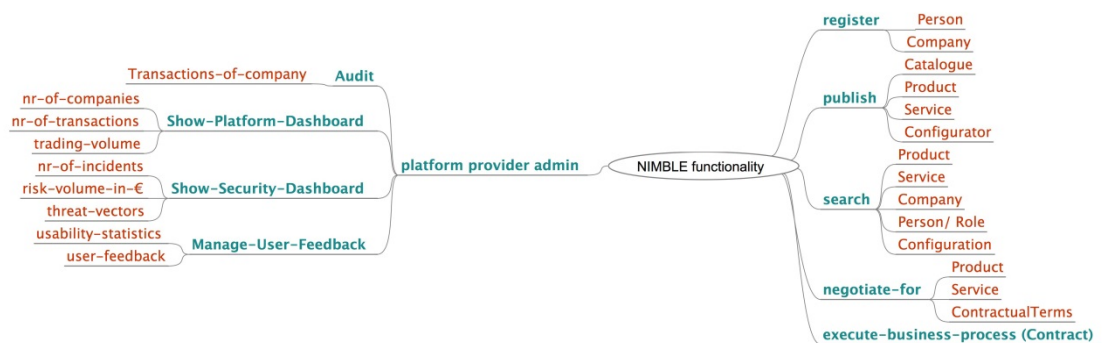


Figure 3. Mindmap of initial scope of validation.

Part of the business processes (Task 3.4) is also the exchange of operational data between business partners (Task 3.5) and the analysis of operational data through various data science tools (Task 3.6). The validation plan for these tasks will later be further detailed . Validation Round 1 focused on the fundamental capabilities outlined above.

2.4 Examples of detailed test scripts

Register on platform (Person | Company)

Example Company 1

Company_0001 ::= "testing: Belvoir Sawmill & Forest Products"

Company web site ::= <http://www.belvoirsawmill.co.uk/>

Catalogue ::= <http://www.belvoirsawmill.co.uk/products/>

Person_00001 ::= "Amanda Billingham"; legal representative of Company_0001; born 12.12.1984

Person_00002 ::= "Reginald Bull"; sales person in Company_0001; born 11.11.1987

Amanda registers herself as person and as a legal representative for "testing: Belvoir Sawmill & Forest Products"

She then registers as test case, the real existing sawmill Belvoir Sawmill & Forest Products

Amanda also registers the main sales representative, Reginald Bull as contact person for sales enquiries.

Example Company 2

Company_0002 ::= "testing: Touchwood Furniture UK"

company web site ::= <http://www.touchwood-uk.com/>

catalogue ::= http://www.touchwood-uk.com/dining_tables.html , http://www.touchwood-uk.com/dining_chairs.html , http://www.touchwood-uk.com/servers_and_side_tables.html

Person_00003 ::= "Priscilla Pringle"; legal representative of Company_0002; born 10.10.1980

Person_00004 ::= "Teddy Paddington"; purchaser of Company_0002; born 09.07.1975

Priscilla registers herself as person and as a legal representative for "testing: Touchwood Furniture UK"

She then registers as test case, the real existing furniture maker Touchwood Furniture from UK

Priscilla also registers the main purchaser of the firm, Teddy Paddington.

Search for (Product | Service | Company | Person-in-role | Configuration)

Concrete example:

FIND on NIMBLE, a supplier (s) such that s.service = logistics AND s.mode_of_transport = (truck | cargo) AND s.point_of_departure = Valencia AND s.point_of_delivery = Hamburg

General search pattern to be supported:

FIND on NIMBLE, a supplier (s) such that s.service = <AnyGoodsOrServices> AND s.<SupplierAttribute> = (<AttributeValue>) AND OR ...

Further Examples:

FIND on NIMBLE, a supplier of MDF boards where the glue is compliant with EU regulation XYZ and where the supplier is in Spain, Portugal or France.

Negotiate with that supplier the delivery of N boards per week, with dimensions x,y,z,

Examples of steps in the validation process are from a start of a service to the end, see figure 4.

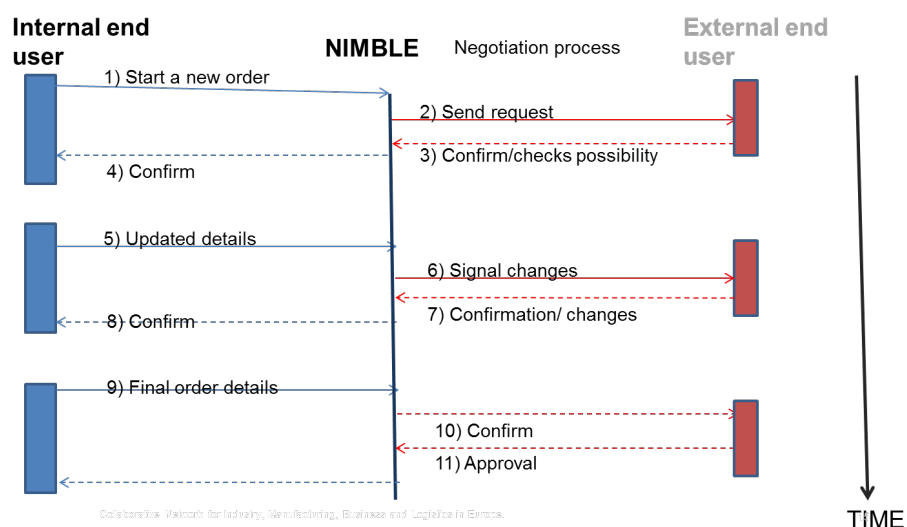


Figure 4. Description of steps between internal and external end-user groups in use of a business service.

Figure 5 visualizes and exemplifies some of the steps in the business service Negotiation that were validated.

2.5 End-user Experience Validation

In the validation, it is essential to validate the value of NIMBLE in collaboration with future end-users, both internal and external (see Figure 6). Therefore, user experience (UX) methods will be used in order to explore current and future value of NIMBLE's business services. Following areas will be part of the validation:

- Current developed business services that are found in the demo.
- Business services that are to be developed within the NIMBLE-project, but that are not yet in the demo.
- Future potential business processes for collaboration SMEs “wish-list”.

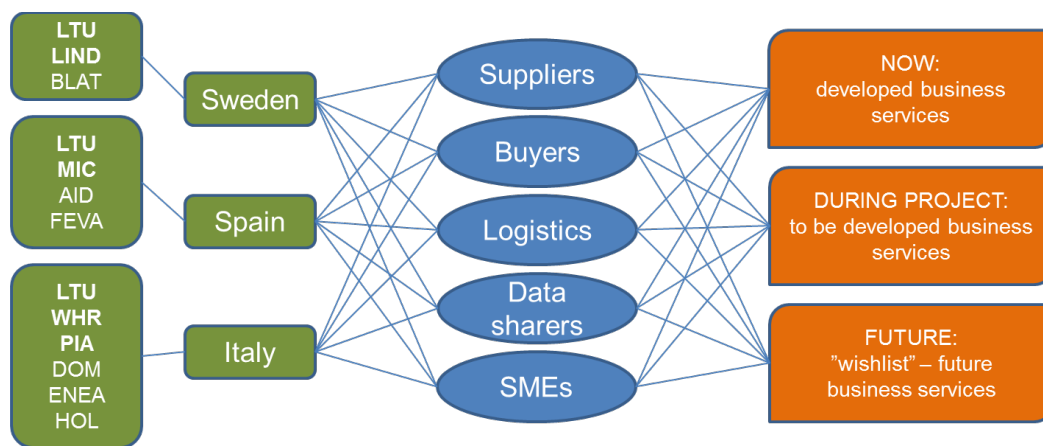


Figure 5. End-user Experience Validation.

The main objective of NIMBLE is to give manufacturing SMEs in Europe a stable and sustainable ecosystem. As such, all European SMEs are potential future users of the NIMBLE platform, which implies that it is important to consider a wide variety of users in the user experience validation, in order to ensure the generic aspect of the platform.

3 Validation Responsibilities

3.1 Validation working parties

Table 2. Validation working parties and responsibilities.

Organization	Name	Roles	E-mail
LTU	Michael Nilsson	WP Leader Lead T 4.1; 4.5	Michael.Nilsson@ltu.se
LIND	Lars Oscarsson	Case owner	lars.oscarsson@lindbacks.se
PIA	Alessandro Canepa	Case owner	Alessandro.Canepa@piacenza1733.it
MIC	Oscar Pérez	Case owner	operez@micuna.com
WHR	Pierluigi Petrali	Case owner	Pierluigi_Petrali@whirlpool.com
SRFG	Wernher Behrendt	Lead T4.3	wernher.behrendt@salzburgresearch.at
AID	Fernando Gigante	Lead T4.4	fgigante@aidimme.es
HOL	Eva Coscia, Ida Critelli		Eva.coscia@holonix.it,
DOM	Silvia Salvetti		ssalvetti@dobi.it
FEVA	Marcos Sabater	Lead T4.2	marcos@fevama.es
BLAT	John Meiling		john.meiling@podcomp.se
ENEA	Gianluca D'Agosta		Gianluca.dagosta@enea.it
INNOVA	Alessio Gugliotta	Lead WP8	a.gugliotta@innova-eu.ne

The effort allocated to each partner organisation is displayed in the table below.

Table 3. Effort allocated to partners.

Work package number			4			Lead beneficiary				LTU									
Work package title			Use Case Experimentation, First-Round Validation and Evolution																
Part. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
Short name of participant	SRFG	IBM	SRDC	UB	LTU	INN	WHR	LIND	PIA	MIC	AID	HOL	BAL	DOM	FEVA	BLAT	ENEA		
PMs	7	0	0	0	11	0	8	8	8	8	7	5	0	6	7	5	6		

3.2 Detailed Validation Schedule

WP4 is dependent on timely provision of usable prototype, and developed versions for validation, coming from WP3.

WP4 closes the first development cycle, however, the activity to validate the development of NIMBLE iteratively will continue throughout the project. Validation and re-design activities are strictly focused on the end-user experience (UX). We worked, and will work, together with relevant experts from the use case companies, from the viewpoint of the major roles that users may play. Thus, the following roles are identified: (i) as buyers of supplies, searching for products, negotiating terms and closing deals, (ii) as suppliers, getting catalogues online, negotiating terms and closing deals, (iii) as data sharing parties in a supply chain, invoking data sharing policies, and (iv) as logistics services suppliers ensuring on-time, efficient delivery (DOA).

We conducted four workshops, one for each case. Participating in the workshops were internal end users from the cases, facilitators from LTU, and developers. We learned that it is preferable that a developer participate at the workshop, in order to ensure fast feedback but also to facilitate the test of the platform *per se*. We used the following methodology:

- Before the actual workshop, the end users registered.
- During the workshop the end users tested and elaborated with the NIMBLE platform in order to report on their experiences with the platform. The end users were expected to make proposals for improvements.
- The new requirements were divided into fast-to-fix as opposed to those needing significant redesign, which provided the developers with various suggestions of what to be added to the NIMBLE platform. Hence, after the workshops the developers redesigned the current prototype, during a three-month re-design and re-development phase. WP4 closes by a second round of validation with the same structure, but now, the findings will be additional requirements for the development phase that followed in which value added services will be included in the platform.

This schedule reflects the phases of data gathering based on end users with focus on functionality tests and UX tests.

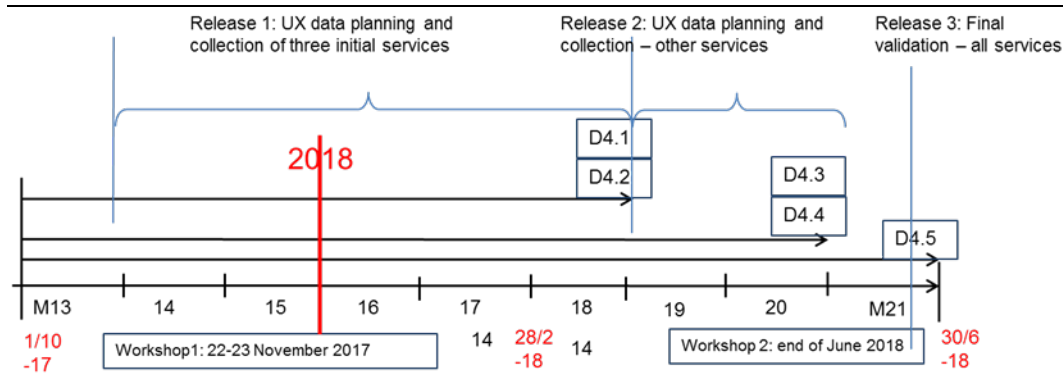


Figure 6. Time schedule.

Pre-phase:

The pre-phase established the pre-conditions for carrying out the data gathering phase in WP4.

It consisted of following activities:

2. Development of 1) scripts for Functionality tests and 2) guidelines for UX-tests. Deadline 30 November 2017
3. Workshop during NIMBLE project meeting, 22-23 November 2017. Elaboration of methodology, approach and data gathering methods for phase 1.
4. Those responsible for data gathering in each use case must be familiar with the NIMBLE platform themselves; hence, they were expected to try out the business services to be validated.

Data gathering phase:

The aim of this phase was to gather the use cases' internal end-users' view of NIMBLE and covered both functionality and UX. For efficiency, an intensive data-gathering period was recommended where data from all four internal target groups (buyers, suppliers, logistics, and data sharers) was gathered in December 2017 – May 2018. The following activities were carried out:

1. Identification and invitation to internal end-users from relevant departments (covering buyers for D4.1, suppliers for D 4.2, Logistic suppliers for D4.4, and Data sharers for D4.3). Deadline December 2017.
2. Data gathering for validation of Release 1, covering internal end-users acting as Buyers and Suppliers. Deadline February 2018,
3. Data gathering for validation of Release 2, covering Data sharers and Logistic suppliers point of view. Deadline April-May 2018,
4. Report results to the task leaders respectively.
 - D4.1 (Deliverable due 31 May.
 - D4.2 Deliverable due 31 May.
 - D4.3 Deliverable due 31 May.
 - D4.4 Deliverable due 31 May.

A workshop in June 2018 will gather all actors (Use Cases and Developers) with the purpose to validate Release 3 of the NIMBLE-services.

4 Methodology and Approach

4.1 UX Methodology

Business and collaboration models are highly influential on end-users activities, tasks and ways of working together hence, when designing business and collaboration models end-users play a critical role. It is for them the B2B platform should be usable and valuable, since it will become a vital part of their future situation. User involvement thus relates to social, ethical, and economic reasons, and is ultimately about user's rights to influence their own context (Simonsen & Robertson 2013). User involvement also contributes to design processes by generation of, often more creative, ideas and increased possibilities for innovation. For the NIMBLE B2B platform user involvement is critical and will contribute to:

- 1) an understanding of those who will buy and/or use the NIMBLE B2B platform,
- 2) insights in varying objectives, goals, needs and ways of thinking,
- 3) good foundations for decisions,
- 4) an increase of the probability of taking right design decisions,
- 5) speeding up the decision process for identification of initial requirements, and
- 6) preparing for better acceptance of the platform with its collaboration and business models.

In short, user involvement increases the probability of success while it simultaneously decreases the risk of failure. Therefore, our approach is coloured by theories from participatory design, interaction design, and user experience (UX), and the importance of user involvement have guided when selecting methods.

Below the methods used for identifying and gathering requirements for future business and collaboration models to be developed in NIMBLE are described. All in order to investigate according to the themes and nuances of usability, usability is broken down into principles (ISO 9241): Learnability, Flexibility, Robustness, Efficiency, Satisfaction, Understandability, Operability, Attractiveness, Usability compliance.

4.2 Methods for validation

The validation of NIMBLE business services involves internal end-users of the use cases. The validation process consisted of two phases, namely a pre-phase, and a data gathering phase during which the validation was carried out, see details below.

4.2.1 Pre-phase

The pre-phase established the pre-conditions for carrying out data gathering phase in WP4.

It consisted of the following activities:

5. Development of 1) scripts for Functionality tests and 2) guidelines for UX-tests. Deadline 30 November 2017
6. Workshop 1 during NIMBLE project meeting, 22-23 November 2017. Elaboration of methodology, approach and data gathering methods for phase 1 and 2.

7. Those responsible for data gathering in each use case were expected to try out the NIMBLE platform and the business services to be validated.

4.2.2 Data gathering phase – Internal end-user validation

The validation of the business services took place in December 2017- May 2018.

Validation process –What, How, Who do what?

The validation process consisted of following steps: Preparation, Set-up, Initiation, Performing, and Termination.

What was validated?

The following business services were validated:

1. Register on platform (Person | Company)
2. Publish (Catalogue | Product | Service | Configurator)
3. Search for (Product | Service | Company | Person-in-role | Configuration)
4. Negotiate for (Product | Service | Contractual Terms) ->Contract
5. Specify B2B data sharing rules as part of Contractual Terms ->Platform data channels
6. Execute (Business-Process) according-to (Contract)
7. Monitor (Business-Process) according-to (Platform data channels)

In addition, the following platform management services available for validation were:

- [1] Audit (Transactions) of-Company (Buyer, Supplier, 3rd Party)
- [2] Show platform dashboard (# of Companies, # of Transactions, Trading Volume, ...)
- [3] Show platform security dashboard (# of Incidents, Risk Volume, Threat Vectors, ...)
- [4] Manage user feedback (all user-facing functions should provide usability statistics and a back-channel to the development team)

Preparation

1. Identification of responsible person in the use case as a moderator.
2. Selection the service/services to be validated (1-7).
3. Read the guidelines related to the survey.
4. Identification, selection and invitation of internal end-users from relevant departments (covering buyers for D4.1, suppliers for D 4.2, Logistic suppliers for D4.4, and Data sharers for D4.3).
These are found in the department of e.g. sales, procurement, logistics. Suggested number that will test the services: 3 (one buyer of material, one supplier of material, one buyer of logistics).
5. Allocated time for the validation (decide date and time).

Setup

The setting for the validation at the use case company was prepared by arranging:

- A room.
- A computer.
- Access to the NIMBLE demo.

- Access to Appendix A and B (Questionnaire and Interview Guide)
- Prepare for documentation (preferable on computer)
- One moderator of the validation process (instructor) and preferable one person taking notes.

Initialization

The validation of the service started with informing the internal user (of the NIMBLE business service 1-7) of the purpose with the validation, what to be validated and how to fill in the survey consisting of selected areas.

The computer with the demo was accessible.

Performing the test

Data gathering from internal end-users:

1. The internal user started the business service and went through the steps, filled out the questionnaire (Appendix B) and it was preferred if the user “think aloud” so that notes could be taken of specific stops, thoughts, question raised etc.
2. Questions were asked according to interview guide (Appendix B).

Termination

An overall reflection was summarized by those participating, that encompassed the impressions of the function. This summary was written at the end of the session.

Results were reported to the task leaders respectively.

4.2.3 Validation Criteria

Describe the minimum function and performance criteria that must be met for the system to be accepted as “fit for use” by the user or sponsoring organization. Here are examples of the criteria that was tested by end-users.

When gathering the end-users view in the data gathering phase, it was of importance to separate between in what role they expressed what opinions. This was due to the reason that one end-user might fulfil several roles.

Functional and UX Criteria

Here different usability evaluation principles were listed and grouped in larger sets. The main functionality to test was if the tester was able to:

- register properly (easy-difficult, logic-not logic, etc.)
- search for a product or service (easy-difficult, logic-not logic, etc.)
- negotiate for a product or service to buy (easy-difficult, logic-not logic, etc.)
- establish what to buy and then to establish a contract (easy-difficult, logic-not logic, etc.).

Asking about usability is important in UX-methodology. Here are some examples that of common themes and nuances of usability, usability is broken down into principles (ISO 9241):

- Learnability: how easily can a new user learn to navigate the interface?
- Flexibility: how many ways can a user interact with the system?

- Robustness: how well are we supporting users when they face errors?
- Efficiency: how quickly can users perform tasks?
- Errors: how many errors do users make, and how quickly can they recover from errors?
- Satisfaction: do users enjoy using the interface, and are they pleased with the results?
- Understandability: how well can a user understand what they are seeing?
- Operability: how much control does the user have within the interface?
- Attractiveness: how visually appealing is the interface?
- Usability compliance: does the interface adhere to standards?

For the full questionnaire, see Appendix A.

Value creation criteria

As a second part of the validation, value added of the NIMBLE business services was investigated, considering the aspects of collaboration and business models. The data gathering consisted of interviews, see Appendix B.

As described in D1.2 (Requirements for Business Models and Collaboration Patterns in Supply Chains), the user journey was used as a method and guiding framework for the design of the business and collaboration models. More specifically this implies that the questions to be asked to internal and external end-users (SMEs) will focus on the end-users’;

- Context: Where are the users? What are the conditions under which they work? What
- User’s view on NIMBLE’s idea: What are their incentives to use the platform? What future situation do they want to reach? “What’s in it for me?”
- Business services (current): What are their views of NIMBLE’s current business services?
- Business services (wish list): What type of functionality are they expecting from the NIMBLE B2B platform? Which functions are desirable and which are less important?
- NIMBLE collaboration value: What will the value be using a B2B-platform like NIMBLE?
- Areas of improvement: Problem formulation? How can a B2B-platform support information exchange and collaboration in the supply chain?

For the complete interview guide, see Appendix B.

5 Validation Documents Required

The original plan was to divide up the validation work by business roles (buyer, supplier, retailer, logistics provider, data sharer).

It turned out that this was not really practical and would not give a coherent picture, but by contrast, would lead to duplication in the writing up of the validation results. In addition, the development of the core platform and the data channel component in particular, was significantly delayed and hence the timings of the deliverables could not be upheld.

Table 4. Deliverables – original structure.

Deliverables	Lead	Strongly involved
<i>D4.1 (M17) Platform User Experience from a Buyer's Point of View. A UX report.</i>	<i>LTU</i>	<i>use case partners: WHR, LIND, PIA, MIC</i>
<i>D4.2 (M18) Platform User Experience from a Supplier's Point of View. A UX report.</i>	<i>FEVA</i>	<i>use case partners: WHR, LIND, PIA, MIC, LTU</i>
<i>D4.3 (M19) Platform User Experience from a Data Sharer's Point of View. A UX report.</i>	<i>SRFG</i>	<i>use case partners: WHR, LIND, PIA, MIC, LTU;</i>
<i>D4.4 (M20) Platform User Experience from a Logistics Supplier's Point of View. A UX report.</i>	<i>AID</i>	<i>LTU</i>
<i>D4.5 (M21) Platform User Experience from a SME's Point of View. A UX report.</i>	<i>LTU</i>	

The coordinator therefore discussed the situation with the validation teams and subsequently decided to change the structure of the deliverables as shown in the table below:

Table 5. Deliverables – revised structure

Deliverables	Lead	Strongly involved
<i>D4.1 (M19) Validation Methodology</i>	<i>LTU</i>	<i>SRFG</i>
<i>D4.2 (M19) Platform User Experience from Buyers' and Suppliers' Point of View</i>	<i>FEVA</i>	<i>use case partners: WHR, LIND, PIA, MIC</i>
<i>D4.3 (M21) Platform User Experience from a Logistics and Data Sharing Point of View</i>	<i>AID</i>	<i>use case partners: WHR, LIND, PIA, MIC, LTU</i>
<i>D4.4 (M20) Platform User Experience from a Platform Manager's Point of View</i>	<i>SRFG</i>	<i>use case partners: WHR, LIND, PIA, MIC, LTU;</i>
<i>D4.5 (M21). Platform User Experience of NIMBLE – Recommendations and Issues.</i>	<i>LTU</i>	<i>WHR, LIND, PIA, MIC, AID</i>

The major changes are that we

- brought buyers, suppliers and retailers in to one UX perspective;
- introduced the platform manager's point of view as a new deliverable which was unfortunately missing in the original proposal,
- made the validation methodology explicit through D4.1 (Validation plan) and
- aggregated the validation findings as recommendations and issues in D4.5 to have a better instrument for steering development in the second half of the project, notably WP5.

6 Suggested future validation

As mentioned earlier, UX data provides in-depth insights in how the end users perceive the NIMBLE platform and its business services. The NIMBLE project will need this data to explore whether the users are satisfied with the business services, if these answer to their needs and expectations as well as how they feel about using the NIMBLE platform itself. It also covers their perceptions of the practical aspects such as utility, ease of use and efficiency of the system, i.e. the usability of the platform.

Moreover, targeting European manufacturing SMEs indicates that validation and evolution of initial business services should cover different user groups, in different manufacturing industries, as well as in different countries. This is crucial in order to ensure one of the NIMBLE project high-level objectives: ease-of-entry and ease-of-use (NIMBLE_Proposal, p. 6). The UX data is utterly important for future work with developing business models as well as collaboration models in the NIMBLE platform.

The external end-users are those identified in a B2B process that can provide valuable information about the specific use of NIMBLE business services. Some actors should be identified in the supply chain, where the relationship to the use case company is characterized as low risk.

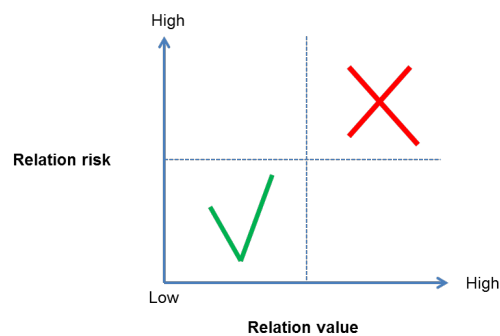


Figure 7. Type of relationship in focus.

The aim of this validation would be to gather the use cases' external end-users' (SMEs) view of NIMBLE concerning UX. The results would contribute to NIMBLE's collaboration and business model development.

1. Identify and invite external end-users from relevant SMEs (see Figure 7).
2. Preparation and training for interviews.
3. Data gathering from external end-users (SMEs).
4. Report results.
5. The findings could be taken on board as additional requirements for further development of the NIMBLE platform, in which value added services would be included in the platform.

External end-user validation

The validation of the business services in relation to external end-users (SMEs) would provide valuable feedback for future development. The validation process is suggested to be carried out as follows;

What, How, Who do what?

The validation process consists of following steps: Preparation, Set-up, Initiation, Performing, and Termination.

What will be validated?

The aim is to gather the use cases' external end-users' (SMEs) view of NIMBLE concerning UX. The results will contribute to NIMBLE's collaboration and business model development.

Preparation

6. Identify and invite external end-users from relevant SMEs.
7. Preparation and training for interviews.

Setup

The setting for the validation at the use case company must be prepared by arranging:

1. A room.
2. Access to Appendix B (Interview Guide)
3. Prepare for how to document (preferable on computer)
4. One moderator of the validation process (instructor) and preferable one person taking notes.

Initialization

The validation of the NIMBLE-platform and its value starts with informing the external end-user that they will be treated with confidentiality (no specific names and companies will be revealed or disclosed).

Inform of the NIMBLE business service 1-7, and the purpose with the validation (the services to be validated, and the themes of questions).

The computer with the demo is accessible (so that the demo can be shown).

Performing the interviews

Data gathering from external end-users (SMEs):

The interviewer goes through the interview guide (see Appendix B). It is of utter importance to have follow-up questions and to ask the informants to elaborate and motivate their answers.

Termination

Ask the informants of their overall impressions of the NIMBLE business services and their benefits. Also ask if they have anything to add.

Report results according to the theme areas in Appendix B.

Conduct an analysis covering SMEs view as external end-users.

The findings could be taken on board as additional requirements for further development in which value added services will be included in the platform, see p.15 for value creation criteria, and interview guide in Appendix B.

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Appendix A: NIMBLE Validation and Evolution – Questionnaires

This step of validation will focus on evaluating the early version of the core business services provided at the platform. Evaluations are based on the user experiences of the core businesses. In this trial the focus is to validate the core business services; register, publish, search for, and negotiate from the different roles held by the users, i.e. suppliers, buyers, logistics etc.

User's agreement to statements concerning usability and user experience
(5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)

Appendix A.1: Validation and Evolution #1 – Registration

Assessment statements of application usage

(5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)

No.								
1.	In which branch do you operate?							
2.	What role do you represent? (buyer, supplier, logistic supplier)							
THE REGISTRATION PROCESS								
No.	Statement to be assessed:	1	2	3	4	5	0	/
3.	The registration process is intuitive							
4.	The core service register responds quickly to my commands							
5.	The core service register starts quickly							
6.	How confident are you that you registration process is successfully fulfilled?							
7.	[Open question] Please reflect and share your experienced about the registration process. Feel free to suggest how we could solve this issue in the future. (please expand this section for the answers)							

THE FUNCTIONALITY REGISTER IN GENERAL**Learnability**

In the following section we want to gain insights into your view of the learnability of the offered service. Mark the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)

8.	The menu navigation is intuitive							
9.	The register content is intuitive							
10.	The register functions are intuitive							
11.	Realising where I am in the registration process is easy							
12.	I can easily and quickly understand the registration process							
13.	The registration process needs to be more self-explaining							
14.	I imagine that most people would learn to register very quickly							
15.	I found to register very awkward							
16.	I needed to learn a lot of things before I could get going with registration							

Ease of Use

In the following section we want to gain insights into your view of the ease of use of the offered service. Mark the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)

17.	The structure of the register functionality is understandable							
18.	The design and name of menus and buttons is easy to understand							
19.	I feel confident while registering on the platform							
20.	When I make a mistake registering on the platform, I recover easily and quickly							
21.	I can quickly find what I want in registration process							

22.	I thought there was too much inconsistency in the registration process							
23.	The main screen for registration is self-explaining							
24.	The registration process has some annoying features							
Perceived Usefulness								
In the following section we want to gain insights into your view of the perceived usefulness of the offered service. Marc the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)								
25.	Using NIMBLE in my job would enable me to do my tasks more quickly							
26.	I am pleased with the offerings of the system							
27.	I find the system useful in my job							
Robustness								
28.	When I make a mistake while registering, I find support easily and quickly							
Trust								
In the following section we want to gain insights into your view of the trust of the offered service. Marc the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)								
29.	I feel in control when registering							
30.	I feel confident while registering							
31.	[Open question] Please reflect and share your experience about the platform as a whole. (please expand this section for the answers)							

Appendix A.2: Validation and Evolution #1 – Publishing

Assessment statements of application usage

(5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)

No.								
1.	In which branch do you operate?							
2.	What role do you represent? (buyer, supplier, logistic supplier)							
THE PUBLISHING PROCESS								
No.	Statement to be assessed:	1	2	3	4	5	0	/
3.	The publish process is intuitive							
4.	The core service publish responds quickly to my commands							
5.	The core service publish starts quickly							
6.	How confident are you that you publishing process is successfully fulfilled?							
7.	[Open question] Please reflect and share your experienced about the publishing process. Feel free to suggest how we could solve this issue in the future. (please expand this section for the answers)							
THE FUNCTIONALITY PUBLISH IN GENERAL								
Learnability								
In the following section we want to gain insights into your view of the learnability of the offered service. Marc the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)								
8.	The menu navigation is intuitive							
9.	The publish content is intuitive							

10.	The publish functions are intuitive							
11.	Realising where I am in the publish process is easy							
12.	I can easily and quickly understand the publish process							
13.	The publish process needs to be more self-explaining							
14.	I imagine that most people would learn to publish very quickly							
15.	I found to publish very awkward							
16.	I needed to learn a lot of things before I could get going with publishing							
Ease of Use In the following section we want to gain insights into your view of the ease of use of the offered service. Mark the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)								
17.	The structure of the publish functionality is understandable							
18.	The design and name of menus and buttons is easy to understand							
19.	I feel confident while publishing on the platform							
20.	Using the publish service for the first time is easy							
21.	When I make a mistake publishing on the platform, I recover easily and quickly							
22.	I can quickly find what I want in the publish process							
23.	I think that I would like to use the publish service frequently							
24.	I thought there was too much inconsistency in publish process							
25.	The main screen for publish is self-explaining							
26.	The publish process has some annoying features							
Perceived Usefulness								

In the following section we want to gain insights into your view of the perceived usefulness of the offered service. Marc the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)

27.	Using NIMBLE in my job would enable me to do my tasks more quickly							
28.	I am pleased with the offerings of the system							
29.	I find the system useful in my job							
Robustness								
30.	When I make a mistake while publishing, I find support easily and quickly							

Trust

In the following section we want to gain insights into your view of the trust of the offered service. Marc the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)

31.	I feel in control when publishing							
32.	I feel confident while publishing							
33.	<p>[Open question] Please reflect and share your experience about the platform as a whole.</p> <p>(please expand this section for the answers)</p>							

Appendix A.3: Validation and Evolution #1 – Search

Assessment statements of application usage

(5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)

No.								
1.	In which branch do you operate?							
2.	What role do you represent? (buyer, supplier, logistic supplier)							
THE SEARCH PROCESS								
No.	Statement to be assessed:	1	2	3	4	5	0	/
3.	The search process is intuitive							
4.	The core service search responds quickly to my commands							
5.	The core service search starts quickly							
6.	How confident are you that your search result is adequate?							
7.	<p>[Open question] Please reflect and share your experience about the search process you can describe them here. Feel free to suggest how we could solve this issue in the future.</p> <p>(please expand this section for the answers)</p>							
THE FUNCTIONALITY SEARCH IN GENERAL								
Learnability								
In the following section we want to gain insights into your view of the learnability of the offered service. Mark the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)								
8.	The menu navigation is intuitive							
9.	The search content is intuitive							

10.	The search functions are intuitive							
11.	Realising where I am in the search process is easy							
12.	I can easily and quickly understand the search process							
13.	The search process needs more self-explaining							
14.	I imagine that most people would learn to search very quickly							
15.	I found to search very awkward							
16.	I needed to learn a lot of things before I could get going with search							

Ease of Use

In the following section we want to gain insights into your view of the ease of use of the offered service. Mark the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)

17.	The structure of the search functionality is understandable							
18.	The design and name of menus and buttons is easy to understand							
19.	I feel confident while searching on the platform							
20.	Using the search for the first time is easy							
21.	When I make a mistake searching, I recover easily and quickly							
22.	I can quickly find what I want in the search process							
23.	I think that I would like to use the search process frequently							
24.	I thought there was too much inconsistency in search process							
25.	The main screen for search is self-explaining							
26.	The search process has some annoying features							

Perceived Usefulness

<p>In the following section we want to gain insights into your view of the perceived usefulness of the offered service. Marc the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)</p>							
27.	Using NIMBLE in my job would enable me to do my tasks more quickly						
28.	I am pleased with the offerings of the system						
29.	I find the system useful in my job						
Robustness							
30.	When I make a mistake while searching, I find support easily and quickly						
<p>Trust</p> <p>In the following section we want to gain insights into your view of the trust of the offered service. Marc the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)</p>							
31.	I feel in control when searching						
32.	I feel confident while searching						
33.	<p>[Open question] Please reflect and share your experience about the platform as a whole.</p> <p>(please expand this section for the answers)</p>						

Appendix A.4: Validation and Evolution #1 – Negotiation

Assessment statements of application usage

(5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)

No.								
1.	In which branch do you operate?							
2.	What role do you represent? (buyer, supplier, logistic supplier)							
THE NEGOTIATION PROCESS								
No.	Statement to be assessed:	1	2	3	4	5	0	/
3.	The negotiate process is intuitive							
4.	The core service negotiate responds quickly to my commands							
5.	The core service negotiate starts quickly							
6.	How confident are you that you negotiation process is successfully fulfilled?							
7.	[Open question] Please reflect and share your experience about the negotiation process. Feel free to suggest how we could solve this issue in the future. (please expand this section for the answers)							
THE FUNCTIONALITY NEGOTIATE IN GENERAL								
Learnability								
In the following section we want to gain insights into your view of the learnability of the offered service. Mark the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)								
8.	The menu navigation is intuitive							
9.	The negotiate content is intuitive							
10.	The negotiate functions are intuitive							
11.	Realising where I am in the negotiating process is							

	easy								
12.	I can easily and quickly understand the negotiating process								
13.	The negotiating process needs be more self-explaining								
14.	I imagine that most people would learn to use negotiate very quickly								
15.	I found too negotiate very awkward								
16.	I needed to learn a lot of things before I could get going with negotiation								
Ease of Use In the following section we want to gain insights into your view of the ease of use of the offered service. Marc the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)									
17.	The structure of the negotiation functionality is understandable								
18.	The design and name of menus and buttons is easy to understand								
19.	I feel confident while negotiating on the platform								
20.	Using the negotiation service for the first time is easy								
21.	When I make a mistake negotiating on the platform, I recover easily and quickly								
22.	I can quickly find what I want in the negotiating process								
23.	I think that I would like to use the negotiation service frequently								
24.	I thought there was too much inconsistency in the negotiating process								
25.	The main screen for negotiation is self-explaining								
26.	The negotiation process has some annoying features								
Perceived Usefulness									

In the following section we want to gain insights into your view of the perceived usefulness of the offered service. Marc the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)

27.	Using NIMBLE in my job would enable me to do my tasks more quickly							
28.	I am pleased with the offerings of the system							
29.	I find the system useful in my job							
Robustness								
30.	When I make a mistake while negotiating, I find support easily and quickly							

Trust

In the following section we want to gain insights into your view of the trust of the offered service. Marc the alternative between (5 = agree absolutely, 4 = agree, 3 = undecided, 2 = disagree, 1 = disagree absolutely, 0 = I don't know, / = not applicable)

31.	I feel in control when negotiating							
32.	I feel confident while negotiating							
33.	<p>[Open question] Please reflect and share your experience about the platform as a whole.</p> <p>(please expand this section for the answers)</p>							

Appendix B: Guide for Structured Interviews of NIMBLE-Users

This step of validation focuses on evaluating the early version of the platform from a user experience perspective. The core business services are validated together with the NIMBLE-platform concepts as a whole. This survey captures the bridge between user experience and the experiences of needs and benefits expected from the platform in order to generate values by the platform. Of importance is to capture the end-users perceived needs and wants in terms of value in relation to business and collaboration models, to ensure NIMBLE's continuity as well as sustainability. (The survey serves as such as a bridge between WP 4 and WP8 as well.) Start by explaining the NIMBLE-platform and the NIMBLE idea. Then ask;

Context:

1. Where are the users? In which branch? What are the conditions under which they work? What does their business processes look like?

User's view on NIMBLE's idea:

2. What would/could motivate you to start using the NIMBLE B2B-platform?
3. What would/could prevent you from using the NIMBLE platform?

Business services – current:

4. If you would register on NIMBLE:
 - a. What information do you regard as reasonable to share?
 - b. Is there any information that you definitely not would share?
5. If you would publish on NIMBLE:
 - a. What would you like to publish?
 - b. In what format would you like to publish? (text, pictures)
6. What do you want to be able to search for? (Product | Service | Company | Person-in-role | Configuration)
7. What do you see as possible to negotiate for via a platform?

Business services – wish list:

8. What business processes would trigger your use of NIMBLE?
9. What business processes would you want to get support for in your supply chain?
10. In what ways do you collaborate with other companies/stakeholders?
11. Which of these could be performed in a collaboration platform? (Please give motivation)
12. Which collaboration activities would be most beneficial to perform via a platform such as NIMBLE? (Please give motivation)

NIMBLE collaboration value:

13. What do you regard to be most valuable – rank these (please give motivation):
 - a. Save time
 - b. Save money
 - c. Networking
 - d. Idea generation
 - e. Other (please suggest other values)

Areas of improvement:

14. Can you give an example of one of your business processes that is specific problematic today and that could be improved? If so, in what ways?
15. For to strengthen your business, what other kinds of services would you like to see? (Value-added services).
16. In what type of relations?
17. Other functions?
18. How can collaboration be strengthen with NIMBLE?
19. After the project ends, minimum criteria/ function on the platform that would make you use the platform.