D8.13 – Final Project Business Plan

Year 3

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Table of contents

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1 Executive Summary

The present document reports on the outcome of all WP8 activities (in particular Task 8.7) aimed at developing a sustainable business plan for the NIMBLE platform. It is an evolution of the previous version of the business plan document (D8.12) and it capitalizes on the main analysis and findings reported in D8.15 (Exploitation report) and further activities in WP8, including an update/revision of the NIMBLE value propositions and additional analysis of the 4 project business cases based.

The NIMBLE project is developing a novel, cloud based and easily accessible digital platform that facilitates the establishing of dynamic supply networks for the identified stakeholders in future collaborative manufacturing sectors.

The resulting NIMBLE Platform can create value according to the following main business drivers.

- provide users with sets of easy to use and access, cheap and standardized tools and processes.
- allow users to create and harness mutual synergy from each other promoting business and information transactions
- as more Users are participating to the platform, the resulting synergistic benefits amplify and grow disproportionately.
- NIMBLE can handle both Informational Supply Chain Platforms and commercial channel Platforms. Informational Supply Chain Platforms are foundational sets of technologies and processes promoting the access to commercially relevant channels.

Moreover, the NIMBLE innovation potential is enhanced by the following competitive factors:

- *Opportunity*; i.e. the market context where NIMBLE operates (trends, drivers, customers' expectations) is very favorable: the Industry 4.0 driver is pushing the organizational and technological change in traditional manufacturing SMEs operating in non high-tech sectors;
- *Value added*; i.e. ability of the NIMBLE solution to address the existing unmet needs.
- *Competitive landscape*; i.e. lack of existing/potential competitors with similar targets.
- *Unique selling points*; i.e. the main factors that will make NIMBLE solution to be effectively launched in the market.

The analysis on the last developments of the NIMBLE platform confirmed the assumption made in D8.11:

> *As a main differentiation, NIMBLE will develop a solution that can bridge between horizontal B2B marketplace and novel Industry 4.0 technologies. In this, NIMBLE aims to develop a next-generation digital platforms for the manufacturing sectors. This strategic exploitation could be deployed either by focusing initially on one sector (e.g. Wood with the Furniture Manufacturing Platform) or licensing out the platform to a variety of vertical manufacturing sectors.*

In terms of special features of the platform, we can highlight:

> *The possibility to deploy federated platform instances is a real distinct value of NIMBLE. The federated approach allows a sectorial, regional specialization approach for growing (bottom-up approach) and, at the same time, it can support governance with a clear sectoral leadership or the involvement of intermediaries as orchestrators/rulers of their ecosystems for the other verticals. This is a clear alternative to existing monopolistic approaches of existing digital platforms.*

The permissive open source approach and the standards (taxonomies/ontologies) are its core. It will attract providers and/or SMEs that want to be providers and aiming at :

- *benefiting from a ready-to-use solution;*
- *facilitating in using and customize it as they wish;*
- *enjoying the possibility to interoperate with other platforms/solutions using the same standards.*

Based on these elements, key exploitation success factors will be related to the market ecosystem selection and the identification of the business leadership. The take-up of the specific digital platform is fostered by increasing the ecosystem of players involved in using that platform. The NIMBLE Platform exploitation leaders will build on the market opportunity to develop services/applications with significant economic and societal value.

To this end, NIMBLE aims to:

- *provide attractive, easy to use services first; in particular enabling to:*
  - *find a suitable supply chain partner for a product*
  - *involve logistic service providers' firms*
  - *facilitate the negotiation of terms*
  - *facilitate the reach of consensus during a contract negotiation*
  - *carry out and monitor the transaction deployment*
- *reduce entry hurdles for multi-side actors, including:*
  - *self-serve on-boarding*
  - *incentive for network effects*
- *offering a win-win value proposition for participant*
- *enacting pro-active governance to keep the ecosystem of actors in balance*

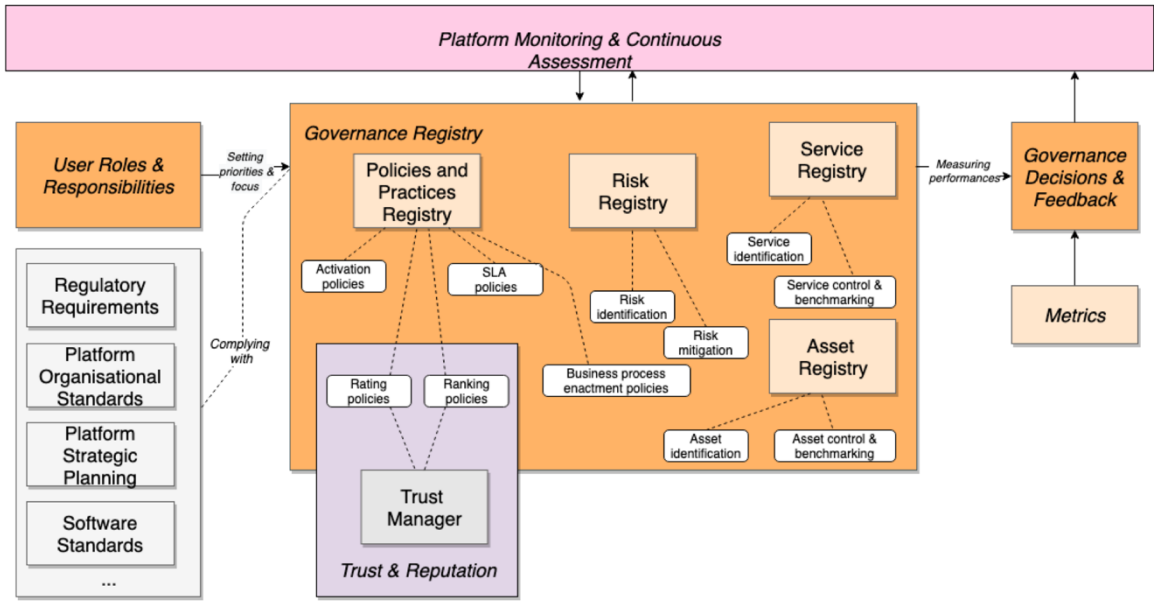
NIMBLE exploitation routes could be following a number of alternative approaches depending on the commercial and organisational leadership of the partner(s) which are likely to invest in the Platform to exploit the quality of the business idea and the economic and non-economic returns. In this view, the possible exploitation alternatives are based on the actual leadership takeover and on the vertical vs general focus.

Specifically, the possible options at this stage could be summarized as followed:

1. Licensing out the whole NIMBLE platform as an Open Source and:
   a. A single partner (internal/external) will take the business leadership, deploy a new NIMBLE platform instance and license out to SMEs in **various vertical industries.**
   b. A single partner (internal/external) will take the business leadership, deploy a new NIMBLE platform instance and license out to SMEs in a specific vertical, as AIDIMME and FEVAMA are currently already pursuing for the **Wood sector** (WP10)**.**
   c. A single partner (internal/external) will take the business leadership and will create **one dedicated European Company** for driving and coordinating the commercialization of the NIMBLE platform.
2. The Consortium as a whole promotes a NIMBLE Federated Platform
   a. Consortium leadership and licensing out to diverse distributors for profit;
   b. Creation of an **European Association** (non profit) promoting free/open use.

Consortium partners agreed that the first option (with the different sub-options) is the main exploitation route, although further investigations will be performed to check how to guarantee a federate approach and the relative governance across multiple NIMBLE platform instantiations.

The consortium has investigated the high-level architecture of a governance framework for a federation of platforms as planned for NIMBLE.



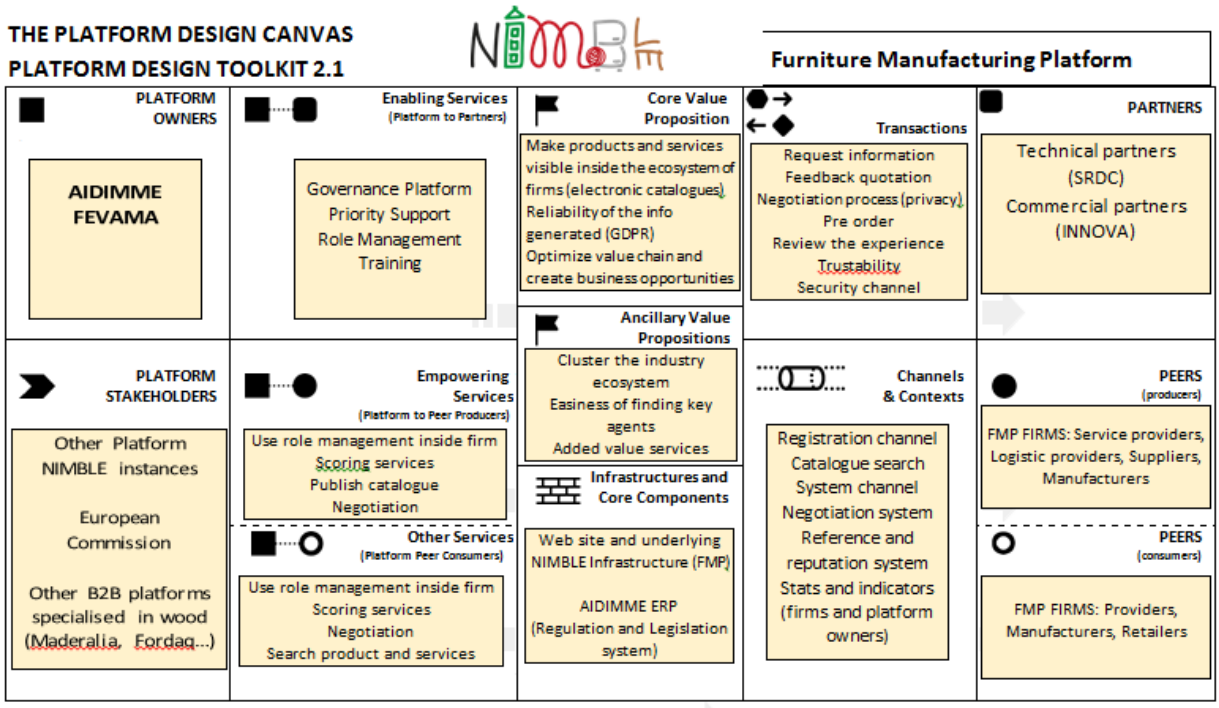
Looking at governance from an organisational point of view, three basic approaches are possible: "strong" governance, peer group governance and "loose" governance. The NIMBLE project consortium has pitched the platform technology in such a way that all governance models are possible. The reason for this is that no subset of the consortium is even remotely capable of establishing any of the "strong" or "peer" governance models. The franchising model (strong governance) would require large investments and a long term strategy at global level, and the peer governance model cannot be decided at a stage in the development when there is only one platform instance in the position of becoming a business entity, although this in itself is already a huge success for the project. For example, it would be highly desirable for a peer governance model to remain compatible and interoperable at the level of product taxonomies and ontologies. However, the owners of the Furniture Manufacturing Platform have decided to bank exclusively on their sectorial ontology rather than the broader eClass taxonomy which would be a much better basis from the perspective of a working platform federation, albeit at the price of requiring more mapping between sectorial and overall taxonomy.

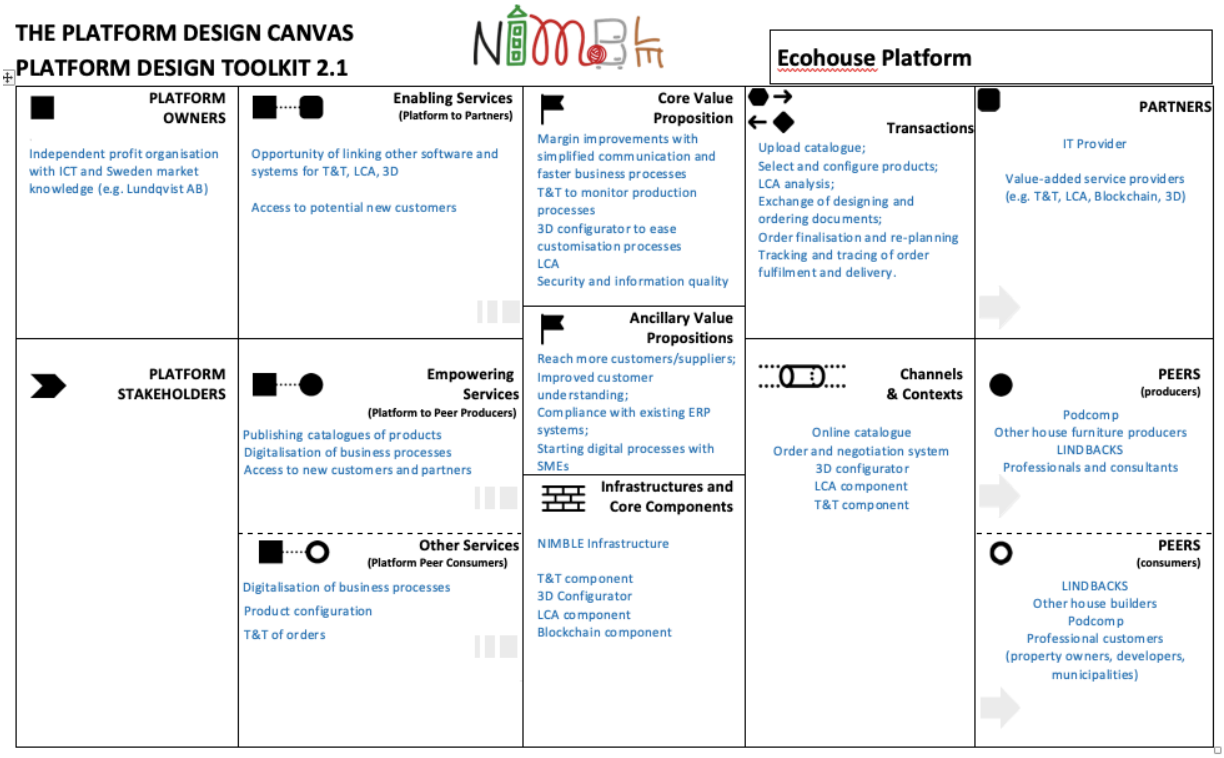
It is therefore much more likely that the "loose governance" model will be the only feasible form of collaboration between any platform instances that will come out from the NIMBLE project. In fact, such a model foresees no established governing body, but only a minimal code of conduct and a set of guidelines for best practice of running a NIMBLE based platform.

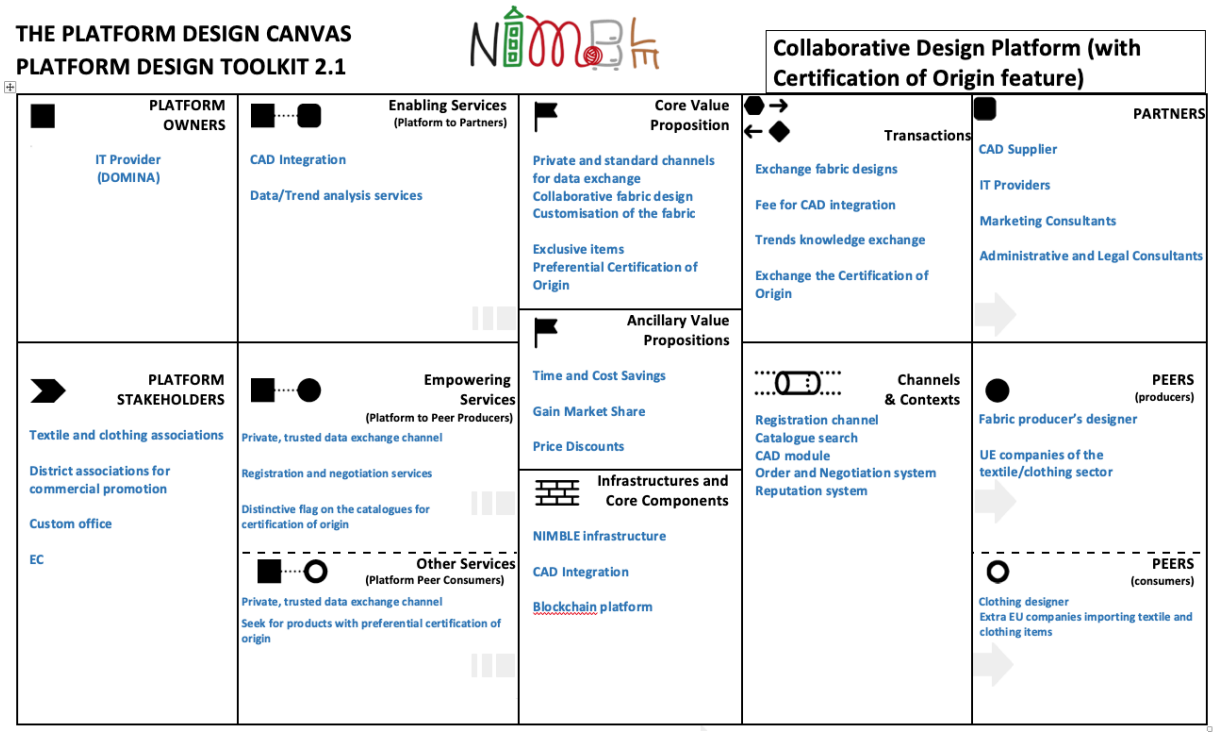
Based on all of that, no joint business plan for commercial exploitation of the NIMBLE platform will be developed. Instead, to ensure the actual take-up of an effective NIMBLE platform exploitation, INNOVA proposed to the project use case partners the possibility to develop

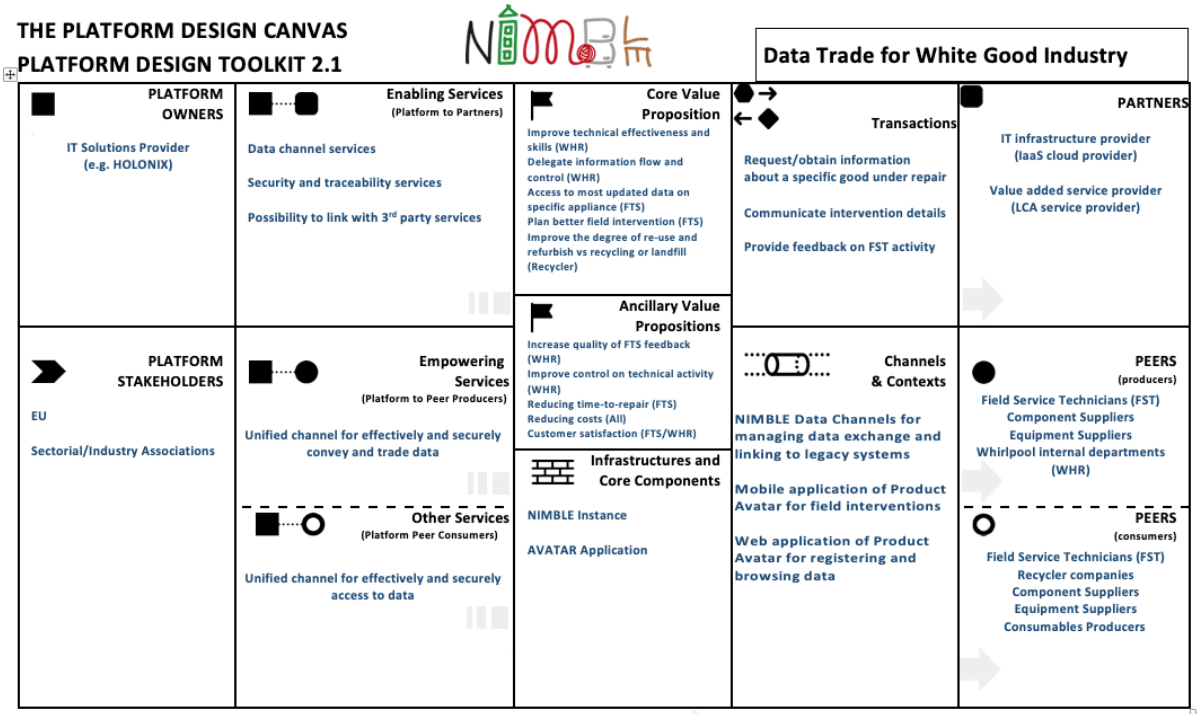
their own digital platform strategy, based on the open source NIMBLE solutions. The methodology for defining the platform strategy is based on an existing toolkit, named Digital Platform Toolkit, which has been also introduced in D8.10 as part of the NIMBLE Platform launch manual.

As reported in D8.12, the project partners developed 4 distinct platform strategies that are summarized in the following Platform Design Canvas.









These business analyses have in fact been the starting points for the development of addition business analysis (market analysis, value sharing dynamics, revenue models and financial analysis and routes to market) that are reported in the present document.

Finally, it is worth to highlight that the resulting 4 business cases have different maturity levels, but for all of them the next steps include additional technical and business development activities to actually reach the market and become viable.

2 Introduction

The present document reports the outcomes of WP8 activities and specifically those related to Task 8.7 and the development a sustainable business plan for the NIMBLE platform.

As stated in the previous versions of this document (D8.11 and D8.12), this deliverable has been conceived as a live document that will be continuously updated and refined throughout the project, where the final version is the present release.

Therefore, many contents presented in D8.12 are here reported too (because still valid), while new results emerged from the last year's activities have been integrated in the document structure. Specifically:

- In Section 3.4, we report the approach agreed by the consortium on how the federate approach of NIMBLE could be assessed/sustained after the end of the project with a lean structure that may link the different created peers
- In Section 6, we revised and extended the work related to the definition of the platform strategies for the 4 NIMBLE use cases. This lead to the definition of more comprehensive business cases, now including a plan for a possible commercialization of the achieved results.

The resulting document is structured as follows: Section 3 provides an overview of the developed NIMBLE platform and its assets; Section 4 reports the emerging innovation potential; Section 5 defines the exploitation strategy for the whole platform as agreed with all partners; and finally, Section 6 introduces the devised business plans of the 4 project use cases.

3 NIMBLE Platform

The NIMBLE project is developing and validating a novel cloud-based, and easy-accessible platform that will facilitate the establishing of dynamic supply networks for many classes of stakeholders in future collaborative manufacturing.

Specifically, the resulting platform will be a *manufacturing B2B service delivery framework*, which at the same time will be *interoperable*, *smart* (proactive), *open* (extensible/adaptable), *trustworthy and secure*.

The NIMBLE deployment will open up possibilities to exploit the cloud infrastructure using SaaS and PaaS paradigms for platform providers to form a *federation* of NIMBLE platforms and give different sectors or regions a platform for B2C, B2B and manufacturing collaboration that can be customized for them.

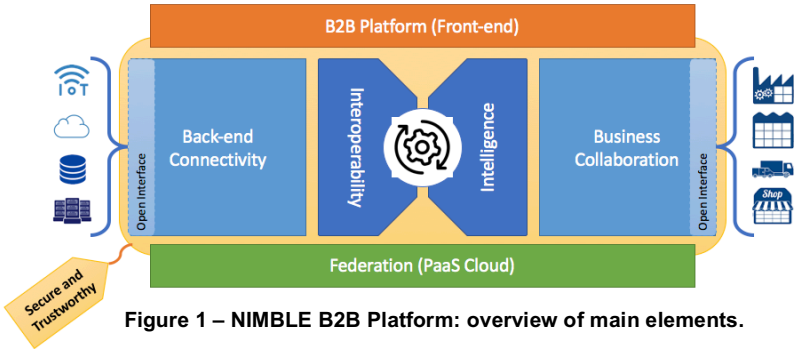


Figure 1 – NIMBLE B2B Platform: overview of main elements.

Moreover, developers may interact with the platform by using a **comprehensive API set**, giving them the possibility to extend the core services of the platform with valued added services and new tools for platform customers. The API set will mainly include access to back-end capabilities, but also business collaboration and federation interaction will be made possible via APIs as well. Specifically, external value-added services can be linked to the platform and, thus, enable revenues for 3rd party service providers too.

3.1 Envisioned platform sides and roles

Overall, NIMBLE is a multi-sided - i.e. bringing together vendor and buyer communities -, federated – i.e. linking local and/or sectorial verticals -, open – i.e. open source - digital platform and thus the following main roles and interaction can be taken into consideration:

Platform orchestrator(s): the manager of the platform driving the strategic and operational framework, stakeholder interactions and the architecture of the platform and the resulting ecosystem. In view of a *federated approach*, we may expect multiple platform orchestrators, each focusing on dedicated industrial region, cluster or branch.

Therefore, we can also expect the role of **Platform operator**: the actual NIMBLE service provider, hosting the platform and enabling multiple orchestrators to run their businesses independently and, if relevant, linking among them (e.g. multi-tenancy, PaaS approach).

It is worth to highlight that given the Consortium decision to focus on a permissive open source approach and, thus, the possibility for any organization to start a new business based on a new NIMBLE Platform instance, the roles of platform orchestrators and operator can be merged into one unique role that from now on we define as **Platform Owner**.

Platform infrastructure supplier(s): the technical infrastructure providers (communication, IT, software, systems integration, and developers) who build, manage, monitor and deploy the underlying technology of the platform. They can or cannot correspond to the platform operator and generally there could be many of them, each focusing on different technical aspects.

Moreover, in view of an *open platform*, we can also expect the role of **Platform tool and service developers**: technical organisations that are interested in the creation of added-value tools and applications to be added to the platform (e.g. starting from the platform core services/APIs).

Platform end-users: i.e. manufacturing companies – in particular SMEs, but also OEM (Original Equipment Manufacturers), large manufacturers, service providers - connecting to the platform to seek (consumers) or offer (producers) services or products.

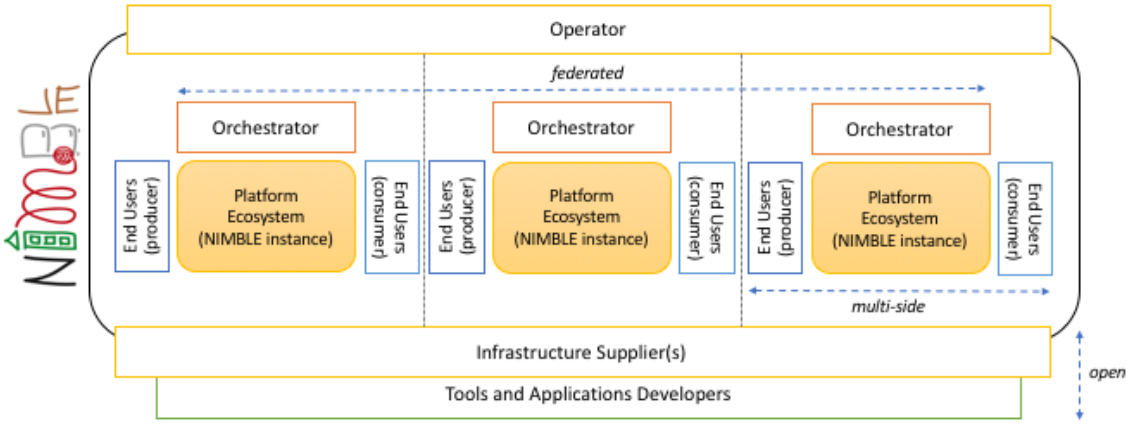


Figure 2 - Platform ecosystem(s) roles and interactions

3.2 Target User Groups

As introduced in the previous section, the platform enables NIMBLE stakeholders to take very different roles across the ecosystem and any one actor can play multiple roles within a platform ecosystem – or even different roles across multiple ecosystems simultaneously.

In the previous versions of the deliverable (in particular D8.11), we have reported a comprehensive analysis of the different, relevant target groups for NIMBLE, including:

1. Manufacturing supply network stakeholders;
2. Manufacturing B2B service providers and intermediaries;
3. Digital platform and infrastructure providers;
4. Technology and Service Providers.

At this stage, based on the last exploitation and business development activities and decisions, we can report that the **actual primary target groups for the platform exploitation** are the target groups 2) and 3), since they have the interests and motivations of becoming - or extending their current role of – Platform Owners (or Orchestrators). They will be then in charge of identifying the specific Platform End Users (target group 1) and Supporting Partners (target group 4) for their specific platform.

In this view, we just report below the tables with the expectations and the segmentation of those two target groups. The full description is available in D8.11.

Manufacturing B2B service providers and intermediaries

Table 1 - Manufacturing B2B service providers and intermediaries expectations

Needs/Expectations	Current Behaviour
Scout and engage valuable business organizations and support them properly.	Advertise and market the provided services; Visit fairs and exhibition; Participate in workshops; Access to networking websites for professionals.
Increase the number of members that join their	Create their network/ecosystem website;

network/ecosystem, including customers/members located in geographically distant areas (i.e. not only local firms).	Participate in sectorial fairs and exhibitions, workshops; Advertise and market the network/ecosystem activities through newsletters, campaigns, etc. Access to networking websites for professionals.
Facilitate the exchange of information among customers/members.	Use emails, chats, audio and video call applications and teleconference applications; Use communication platforms; Arrange dedicated physical events.
Perform matchmaking among customers/members to create new business opportunities for them.	Seek and read customers/members' profiles and brochures in order to find possible connections; Use emails, chats, audio and video call applications and teleconference applications to enable the meeting among selected organizations; Organize ad-hoc workshops and events.
Statistical analysis of activities/sectors at a micro (local) and macro (global) levels of the network/ecosystem.	Consult the online databases of the statistics offices and use their online statistical tools; Download data from the online databases of the statistics offices and analyse them; Interviews for customers/members for collecting local data.
Disseminate material, suggestions, strategic guidelines, training and best practices.	Publish on specialised journals, newspapers, magazines, websites; Promote and organize workshops.

Table 2 - Manufacturing B2B service providers and intermediaries segmentation

Segment	Description	NIMBLE priority
Private B2B service and platform providers, such as: http://holz.fordaq.com/ http://www.mercateo.it/ https://www.3dhubs.com/ https://www.tradegecko.com/	Their aim is to support their customers in expanding their business, by linking them to possible partner and/or develop a supply chain for them. They can be vertical (sector-specific) or horizontal. Some of them already developed a web platform for browsing organizations or, in some advanced cases, matchmaking requests with offers and added-value services. They are funded by their customers.	As private entities, they can have resources to invest in order to make more advanced and appealing their offerings with NIMBLE solutions. Therefore, this can be a **key segment** for the project. According to their dimension, they could be interested to be an orchestrator or the operator.
Industry trade associations and corporations	Their aim is to offer promotion, internationalization and business opportunities to their members. They are vertical on a specific industry sector. Usually, they are national association, but they have regional/local units that are quite autonomous. They also have EU level representatives. They are quite traditional in terms of business service offering (i.e. not using advanced ICT solutions), although the innovation level could change from region to region (e.g. North Europe countries could be more advanced on their offering). They are funded by their members.	Similarly to the previous segment, they can have budget to invest in innovative solutions, but it should be demonstrated a clear benefit for their members. In some cases, the investments should be approved by the respective management boards. In any case, we can user them as a mean to promote NIMBLE to their members. Therefore, we can consider this as a **very relevant segment**, although the actual engagement with them could be quite slow and elaborated.
National, Regional and Local	They are the public funded agen-	One key element of recent

innovation and business development agencies	cies that aim to create awareness, facilitate the development and in some cases implement the EU and National policies about business development. Usually they are horizontal on many sectors (although there could be some sector-specific units).	policies is the digitalization of SMEs, therefore they can be very interested to enhance their offering with some of the NIMBLE services. In any case, they can act as NIMBLE promoter. Therefore, we can consider this as a **relevant segment**, although, given that they are public funded, the actual budget availability can be different from region to region (depending on the National funding directives and investments).
Technology-specific (SMEs) communities and cluster	In this segment, we can consider all initiatives/networks that links different companies (in particular SMEs) that share a common industry sector or an area (e.g. technology parks). Differently to industry associations and corporations, they are less structured and usually don't have large budget to manage. Their main objective is simply to link and share information among members. In some cases, they are funded by the members (usually the fee is quite low).	Given their budget limitations, they can mainly act as promoter of the NIMBLE solutions. Therefore, we can consider them as a **good segment**.

Digital platform and infrastructure providers

Table 3 - Platform and infrastructure providers expectations

Needs/Expectations	Motivations
Reduce the cost for complement/extend their current platform/cloud offering. Abstract underlying technology complexities (e.g. IoT, data heterogeneity, standardization, etc.).	Software companies are not willing to start new developments or technologies, without a clear opportunity/demand, such as a paying customer. However, this approach usually leads to private, ad-hoc solutions with limited opportunity to be re-used. Ready to use, advanced solutions, based on mainstream technologies, can attract software companies that are willing to enter a new market.
Revenue sharing in the marketplace.	Hosting a dynamic business ecosystem is not only a way of ensuring a higher demand of services and resources for a platform provider. The one-stop shop mechanism provided in marketplaces will attract service providers to develop and deploy applications in the platform. A revenue sharing mechanism could help platform providers to retain a part of the incomes generated by the different stakeholders in the value network. This additional revenue streams may represent an important source of revenues for the platform
Platform extensibility / adaptability. .	The available market of digital platforms is highly dynamic, and there will be always customers requiring different/additional features. This calls for the provisioning of easily adaptable and extensible technologies, as well as the possibility to involve third parties' technology/service providers.

Scalability on demand.	In the digital platform era, this is a pre-requisite. Platform providers aim to target the global market, but with a gradual, incremental approach. First phases will focus on early adopters to test the effectiveness and viability of the platform, then there will be a fast (as fast as possible) growth of the user base.
Control and monitoring of deployed solutions	Trustworthy platforms should guarantee precise levels of service operations, e.g. including availability, security and privacy, traceability. Therefore adequate control and monitoring mechanisms need to be available.

Table 4 - Platform and infrastructure providers segmentation

Segment	Description	NIMBLE priority
System Integrator	They aim at developing vertical solutions; i.e. customised solution for a customer or domain specific systems, such as ERP, Supply Chain Management, IoT and Industry 4.0 systems. Systems may range from limited data collection and analysis to comprehensive end-to-end application solutions. As a dimension, system integrators range from SMEs to Large Enterprises. Larger enterprises such as SAP, IBM, Oracle, etc. have been first movers in this space as they have the most to gain from automating existing complex manual processes. However, their solutions are currently mainly direct to large companies, leveraging their prior vertical applications.	System Integrators can enforce their market position (or enter the market) by e.g. creating and then providing advanced B2B platforms, based on the innovative NIMBLE capabilities. Therefore, they are a **key segment** for NIMBLE. In particular, SME system integrators could be largely benefit of ready-to-user NIMBLE solutions.
Cloud Platform Provider	They offer computing resources for enabling cloud solution. They can be categorized as service providers (e.g. cloud manufacturing solutions) or infrastructure providers (e.g. AWS EC2).	Although it is not likely that IaaS and SaaS providers will transform their service stack into PaaS services, many of the current cloud providers are starting to complement their offering with PaaS capabilities. NIMBLE can be an opportunity for them to make this change. Therefore, they are a **very relevant segment.**
Network Operator	The network operators offer the capacity of a communication network to transfer data within a company and between linked companies in the supply chain. They can also act as system integrators and cloud platform providers. But this platform must be clearly open to third parties, in order to provide alternative solutions using the specific telecommunications infrastructure.	Similarly to large system integrators and cloud platform providers, the engagement of network operator could be difficult. Therefore, we should consider this as **a good segment**, since the opportunity to involve a network operator will be limited.

3.3 Exploitable assets

An overall technical description of the NIMBLE architecture and the available core services, configuration and customization possibilities has been reported in D8.10 NIMBLE Platform Launch Manual. In the following, we simply list the main assets, as they have been reported in D8.15, that are at the basis of the NIMBLE unique, innovative offering.

Specifically, the first three assets are the actual product package that will be distributed as part of the open source NIMBLE exploitation strategy. The remaining assets are the main components of the NIMBLE platform that could be also exploited separately to the whole platform.

Table 5 – NIMBLE main assets

Asset	Description
Platform Package	
The NIMBLE Platform	Complete, ready-to-use cloud platform including built-in core and some exemplary advanced services. Multiple releases of the platform have created[1] and the source code of the composing modules/services is available on GitHub[2].
Platform launch kit	Platform instance launch guides, tutorials, NIMBLE-specific configuration of cloud infrastructure and composing modules/services[3].
Developers (3rd parties) facilities	Open APIs and the associated documentation for interfacing with the NIMBLE platform through REST services[4].
Core Services	
Front-end Service	This service provides the web-based graphical user interface. Each request from the user is delegated to other services (e.g. registration requests are delegated to the Identity Service).
Identity Service	Identities on the platform are administered by this service, which plays a vital role in terms of security. This service communicates with the Identity & Access Management stated in the microservice infrastructure above. Identities are defined as entities, which perform certain actions on the platform (i.e. users, companies and autonomous agents).
Catalog Service	Stores products / services persistently and manages the underlying ontology.
Business Process Service	Functionalities for collaborative execution of modelled business processes are provides by this service.
Indexing Service	Search and indexing are based on this microservice.
Trust Service	Trust rating for companies are computed and manged by this microservice.
Use case-specific tools/services	
Product Configurator	Tool for fast product configuration, according to multiple variables.
Product Avatar	Third party support for product lifecycle management
Product EOL Tool	Specific products can be donated to NGOs and charitable organizations to give them a second life
Product Manufacturing Specifications according to National Legislation & Regulation Service	Service to find documents about normative, legislation, patents and sectorial reports based on relevant parameters in order to support SMEs to enter new markets or new products according to national specific requirements

[1] https://www.nimble-project.org/docs/platform-releases/

[2] https://github.com/nimble-platform

[3] https://www.nimble-project.org/docs/

[4] https://www.nimble-project.org/docs/development-documentation/

3.4 Federated Approach

As introduced in the previous section, a NIMBLE provider (platform owner) can take the open source infrastructure and bundle it with sectorial, regional or functional added value services and launch a new platform instance. Such specializations may take place at the industry level, namely adding specific capabilities for a specific industry, or at a regional level for addressing specific requirements of a specific country or geographical region.

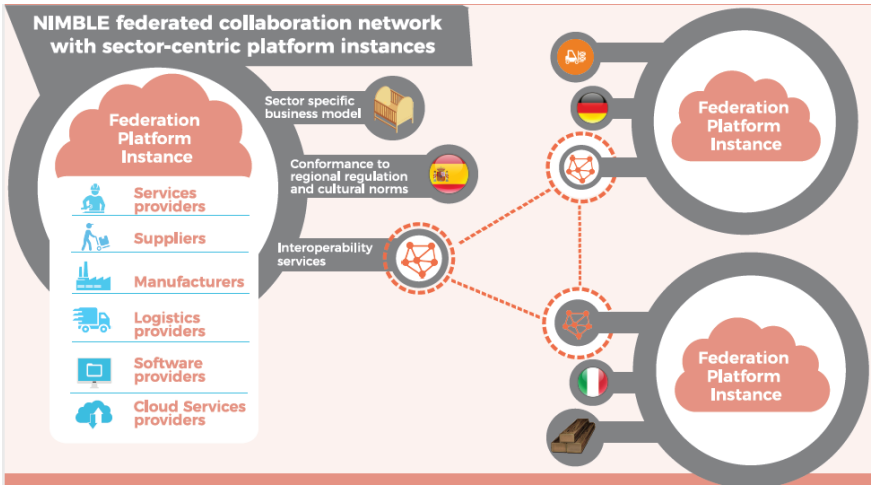


Figure 3 – The federated vision of the NIMBLE platform

In fact, one of the key, distinctive features of NIMBLE is to enable a federation of NIMBLE instances, such that end-users belonging to different NIMBLE instances may engage in B2B operations. NIMBLE aspires to a federated yet interoperable eco-system of platforms that provide B2B connectivity. Such a common, yet federated infrastructure that opens the door for multiple platform providers, with a diverse set of platform instances that still can collaborate.

In WP4, use case partners elicited the following main functional requirements to be included in the implementation of the NIMBLE federated approach:

- The ability to discover and find additional NIMBLE instances to collaborate with.
- The ability to invoke the core services provided by one NIMBLE instance by end-users of another NIMBLE instance, for example to search for a specific product across various NIMBLE instances.
- The ability of each end user to select whether a service, catalogue, or product is exposed outside the scope of its local NIMBLE instance.
- The ability of an end-user to decide whether an action on his behalf would be local or federated. For example, conduct a search operation only on the local instance or in all instances available via the federation.
- The ability of the administrator or governing body of a NIMBLE instance to decide with which other instances to federate.

Following such requirements, it has been devised and implemented the federation architecture depicted in Figure 2. Briefly - full technical details about the architecture and the main elements are reported in *D5.1 - Advanced Platform Infrastructure* - the main elements of the federation architecture are the Federation Core Service and the federation Delegate. The Federation Core Services are placed outside of all participating NIMBLE instances and contain general management support for the federation. The Federation Delegate is placed at the edge of each NIMBLE instance representing that instance in the federation.

The federation core services allow the delegates of different instances to discover and find each other and engage in secure communication and safe transactions. The federation core services use as building blocks components that exist in a NIMBLE instance; for example, the identity service and elements of the security mechanisms are reused, and therefore allow the delegates to perform role-based access control on other delegates seeking to invoke local services.

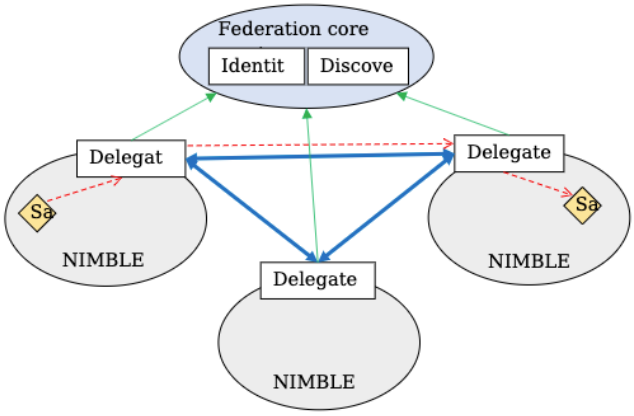


Figure 4 - Federation high level view

The Federation Creation Flows

In order to create a federation of NIMBLE instances, one of the involved platform will play the role of federation manager (administrator) and will deploy the federation core services: identity and discovery. It will then provide the address of the federation core services API to the other NIMBLE instance administrators.

A NIMBLE instance manager submits an enrolment request to the federation core, and the request is evaluated by the federation governing body or automatically. The administrator generates identity or identities for the delegates that represent the instance. The administrator then deploys the delegate, providing it with the address of the federation core API, and proper credentials. The delegate connects to the discovery service, and from this point on it is discoverable as a delegate of the respective instance. Conversely, it can discover the delegates of other instances.

From now one, the users of the linked instances will be able to search outside its instance for a certain type of service/product and obtain the basic information. And, the user can drill down to obtain more information on specific products or services, by clicking on the item of interest in the front-end. Finally, users from two distinct instances can also execute a shared business process.

All the federated activities have been designed with security and flexibility in mind.

4 Innovation Potential

The innovation potential of the NIMBLE platform has been previously analyzed as part of D8.11 and D8.15. In the following, we will simply report the identified main findings.

Specifically, to assess the innovation potential of NIMBLE, we referred to the following main aspects:

- *Opportunity*; i.e. the market context where NIMBLE operates (trends, drivers, customers' expectations) which it is very favorable: the Industry 4.0 driver is pushing the organiza-

tional and technological change in traditional manufacturing SMEs, particularly those operating in non high-tech sectors.

- *Value added*; i.e. ability of the NIMBLE solution to address the existing unmet needs on a sectoral/regional basis. Among the identified distinct values (integration, intelligence, frictionless, enhanced B2B platform, trustworthy, open source and standards, federated approach to accommodate sectorial/regional-specific requirements), the following one have been assessed with use case partners as the most relevant ones:

Table 6 - NIMBLE main distinct values

Integration	NIMBLE capabilities make it possible to combine traditional batch-based transfers with modern event-based protocols including large-volume IoT scenarios: supply chains can combine legacy with modern interfaces available, as well as easily connect across protocols with systems, applications, technologies, partners, and more.
Frictionless	To pull the participants to the platform it must provide tools to facilitate valuable interactions, which of course, reduces friction and transaction costs among the participants. These tools involve modelling of the collaborative supply network workflows, sharing visibility of real time/batch data, execution of these workflows, monitoring of these workflows and events tracking, adaptation of the workflows when required.
Enhanced B2B Platform	Building upon the first three values above, companies can create and operate their supply networks at speed, enabling information exchange between different parties based on their specific needs. The resulting supply network is also able to scale. Beyond plugging in different partners and suppliers as needed, companies can scale down their operations to target niche markets/segments/customers, and/or target newer markets.
Trustworthy	NIMBLE offering includes opportune security and privacy mechanisms for data sharing - selecting which level of privacy has to be applied - reputation, data provenance and an holistic approach for trust-driven product/service selection.
Open source and Standards	All key components of NIMBLE are open source with Apache 2.0 licence and based on existing, well known technology frameworks and standards, which is the best approach for attracting platform providers / IT service providers interested to quickly build commercial solutions in the manufacturing sectors.
Federated	This is a key aspect for really realizing a EU-wide platform by following a bottom-up approach. Distinct platform owners, focusing on specific sectors/regions can team-up in order to prosper together. This clearly clashed with US and China based market approaches (monolitics), but it currently fits better the EU landscape, characterized by many, distinct sectorial associations; language/cultural barriers; limited private, investments available to boost the initiative.

- *Competitive landscape*; to demonstrate the actual, novel positioning and offering of NIMBLE, we performed an analysis of the identified, main classes of potential competitors: Smart Manufacturing Digital Platforms, B2B Marketplaces and Industry Directories, B2B Platform Enablers. Among the three identified classes, the last one is the class of competitors that offers solutions that most overlap with NIMBLE's objective: i.e. enabling third parties (platform providers) to develop their B2B digital platforms, enabling frictionless interaction with their business customers. However:
    - The focus of these solutions is mainly for retailers and traders that sell/distribute their specific products, and not for organizations aiming to create an open B2B marketplace. NIMBLE can support both scenarios.
    - NIMBLE includes more advanced technology solutions for e.g. back-end integration, product description/matchmaking, security and trust.

    - All NIMBLE solutions are open source and, thus, can be easily adopted and extended/customized by third parties aiming to become platform owners.
- *Unique selling points*; i.e. the main factors that will make NIMBLE solution to be effectively launched in the market place. Specifically, the federated approach is a real distinct value of NIMBLE. It will allow a sectorial, regional specialization approach for growing (bottom-up approach) and, at the same time, it will sup-port governance with a clear involvement of intermediaries as orchestrators/rulers of their ecosystems. This is a clear alternative to existing monopolistic approached of existing digital platforms. Moreover, the permissive open source approach and the standards (taxonomies/ontologies) at its core. It will attract providers and/or SME that want to be providers and that they:
    - can benefit of a ready-to-use solution;
    - will be facilitated in using and customize it as they wish;
    - will have the possibility to interoperate with other platforms/solutions using the same standards.
- Based on these elements, key exploitation success factors will be related to the market ecosystem selection and the identification of the business leadership. The take-up of the specific digital platform is fostered by increasing the ecosystem of players involved in using that platform. The NIMBLE Platform exploitation leaders will build the market opportunity to develop services/applications with significant economic and societal value. To this end, NIMBLE aims to:
    - providing attractive, easy to use services first; in particular enabling to:
        - find a supply chain partner for a product;
        - involve logistic firm;
        - negotiate terms and agree on a contract;
        - do transaction and monitor them via the platform
    - having low entry hurdles for multi-side actors, including:
        - self-serve on-boarding;
        - incentive for network effects;
    - offering a clear value proposition for each side;
    - enacting pro-active governance to keep the ecosystem of actors in balance.

5 NIMBLE Platform Exploitation Strategy

In the medium term the NIMBLE Platform can span **diverse industries** because NIMBLE provides for potential, new platform owners a ready-to-use baseline platform. In addition, it offers for third party solution providers and developers a common set of software APIs to extend the platform in many directions. Likewise, the NIMBLE platform with its sets of common digital technology-powered processes can also increasingly generate value by adding products and services in mutually synergistic ways in **one specific industry vertical**.

As shown in the previous section, this flexibility is a key competitive advantage of NIMBLE. Therefore, the proposed NIMBLE exploitation alternatives are based on the decision regarding the vertical focus vs the general focus. Specifically, the following possible options have been identified:

- Licensing out the whole NIMBLE platform as an Open Source and:
    a. A single partner (internal/external) will take the business leadership, deploy a new NIMBLE platform instance and license out to SMEs in **various vertical industries.**

b. A single partner (internal/external) will take the business leadership, deploy a new NIMBLE platform instance and license out to SMEs in a specific vertical, as AIDIMME and FEVAMA are currently already pursuing for the **Wood sector** (WP10).
c. A single partner (internal/external) will take the business leadership and will create **one dedicated European Company** for driving and coordinating the commercialization of the NIMBLE platform.

- The Consortium as a whole promotes a NIMBLE Federated Platform
  a. Consortium leadership and licensing out to diverse distributors for profit;
  b. Creation of an **European Association** (non profit) promoting free/open use.

The key exploitation point was to decide which ownership and sourcing model to apply. This will also then tie into the asset operation and distribution model that we will look at in the value creation and output steps.

Consortium partners agreed that the first option (with the different sub-options) is the main exploitation route, although further investigations will be performed to check how to guarantee a federate approach and the relative governance across multiple NIMBLE platform instantiations.

Following from that, it was decided that we will not develop a business plan for the joint commercial exploitation of the NIMBLE platform. Instead, the model/strategy to exploit the NIMBLE platform can be based on two main key elements:

1. **Identify a business leadership for launching new platform instances**: it is important to identify the **leadership** in managing and building the platform for others in the eco-system or ensure a fast follow.
2. **Deploy a lean structure for NIMBLE governance**: NIMBLE services will be provided by "**peers**" (the new platform owners). This frees the platform from typical employment entitlements and burdens.

Therefore, about the actual business modeling, the sectoral / vertical Industry platform alternatives will be based on the leadership (platform owner) decision. To this end, in D8.10 we devised a methodology based on the Ecosystem Canvas Platform Design Toolkit[5] for a potential platform owner to design its platform strategy by exploiting the NIMBLE infrastructure as a technology baseline. The methodology has been validated with the involvement of project use cases and first results reported in D8.12. Next Section 6 will report on further elaborations of such business cases.

Note that sections 5.1 and 5.2 bare based on a paper written in the context of the eFactory project [20]. The issues discussed apply equally to NIMBLE and its capability for federation.

5.1 State of the Art in Platform Governance Research

The topic of Internet platform governance has already attracted a good number of researchers to study the social, economic and technological mechanisms at play and to point out where such platforms may lead to market failures, to distortions in the balance of power, or – in the best case – to a mutually beneficial innovation for all those participating in it.

[5] https://platformdesigntoolkit.com/

Tiwana et al. in [3] describe the following three aspects of governance design: decision rights, control and ownership; Mukhopadhyay and Bouwman in [1] emphasize the role of the following five aspects of governance design:

- *ecosystem design* – based on the following four dimensions: leadership structure (e.g. a single platform leader or multiple leaders jointly creating a platform [7]); membership openness (e.g. closed, open or controlled access mechanism); tiering structure (i.e. different levels of membership can reduce coordination complexity [8] and motivates complementors to make a higher contribution [9]); and decision rights sharing (e.g. a decentralized decision making increases trust among platform participants, leverages complementor's knowledge of a specific domain and enhances the perceived fairness and credibility of the decision process [10]).
- *ecosystem coordination mechanisms* - based on shared values, and implicit or explicit rules for value exchange [11]. Some examples of coordination mechanisms include: self-regulations, which appeared to be more effective than formal controls [4,5]; "governance at arm's length" that suggests a standardized ecosystem coordination [6], or "dyadic governance" for collaborating with important complementors [6, 12].
- *ecosystem value co-creation* – based on: effective complementary resource integration; increased interaction among the partners; proper definition of the roles in the ecosystem [11]; increased application market competition to boost the variety of outputs; exclusive agreement with key complementors; leveraging boundary resources (Application Programming Interfaces (APIs), Software Development Kits (SDK), technical documentation) to prevent application development that is not compatible with the vision of the platform leaders [13].
- *ecosystem value appropriation* – based on transparent/ fair revenue sharing which positively impacts complementors' intention to stay with the platform ecosystem [14], risks mitigation, building reputation mechanisms [10, 3, 8, 13].
- *ecosystem architectural principles* – based on the degree of modularity, openness and richness of interfaces.

We have decided to use this conceptual model for the design of a federated governance model for NIMBLE platform instances.

5.2 NIMBLE Federated Governance

We are looking for a governance model for a federation of interoperating digital platforms, and to hide the complexity of decision making attributable to different actors in the platform ecosystem. The decision making layers address platform owners, platform technology support, users, legal, regulatory, marketing and other business model-related activities. Figure 1 illustrates the scope of governance mechanisms in federated platforms such as NIMBLE or eFactory: the ownership is shared among the project consortium and some Foundation (e.g. eFF) that will take care of the ecosystem once the funded innovation project has come to an end; software development governance is addressed using the architecture/IT governance mechanisms; data governance addresses the decisions related to the data and here, we consider the proposed nineteen data governance factors as defined in [15]; etc.

Regulations of interest for the platform ecosystem include: EU Network and Information Security (NIS) Directive [16], national cybersecurity strategies [17], Technical Guidelines for the implementation of minimum security measures for Digital Service Providers (DSP) by ENISA [18], incident notification for DSPs in the context of the NIS Directive by ENISA [19], GDPR, ISO/IEC NP 24392, Information technology --- Security techniques – Security reference

model for Industrial Internet Platform (IIP), Ethical Trading Initiative (ETI) for addressing business ethics, etc.

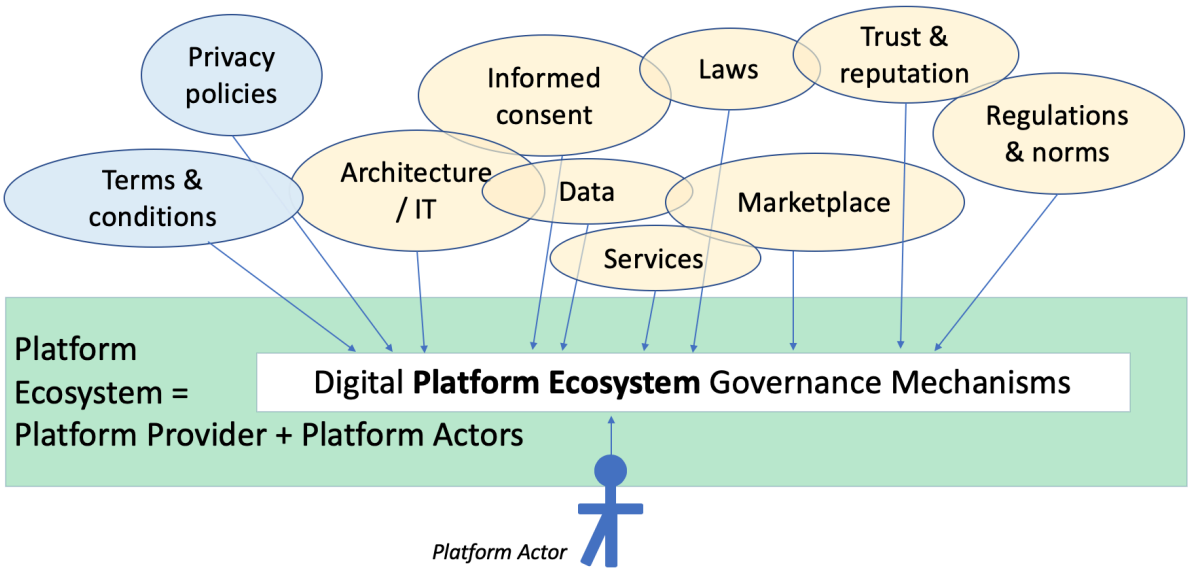


Figure 5 The scope of digital platform ecosystem governance factors

For the sake of further structuring of platform ecosystem governance factors identified in Figure 1, we map these factors to the five aspects of governance design presented in [1]. Figure 2 provides mapping details, e.g. mapping of "Ecosystem Design" from [1] to *Terms & Conditions* and *Privacy Policies*; "Ecosystem Architectural Principles" to *Architecture/IT policies*; "Ecosystem Value Co-Creation" to *Data policies* and *Service policies*; etc.

This Governance Framework (GF) is holistic by its nature, incorporating platform organizational standards, strategic planning, business rules and norms of behaviour within the ecosystem, software standards, regulatory requirements, etc. which need to be continuously monitored and assessed.

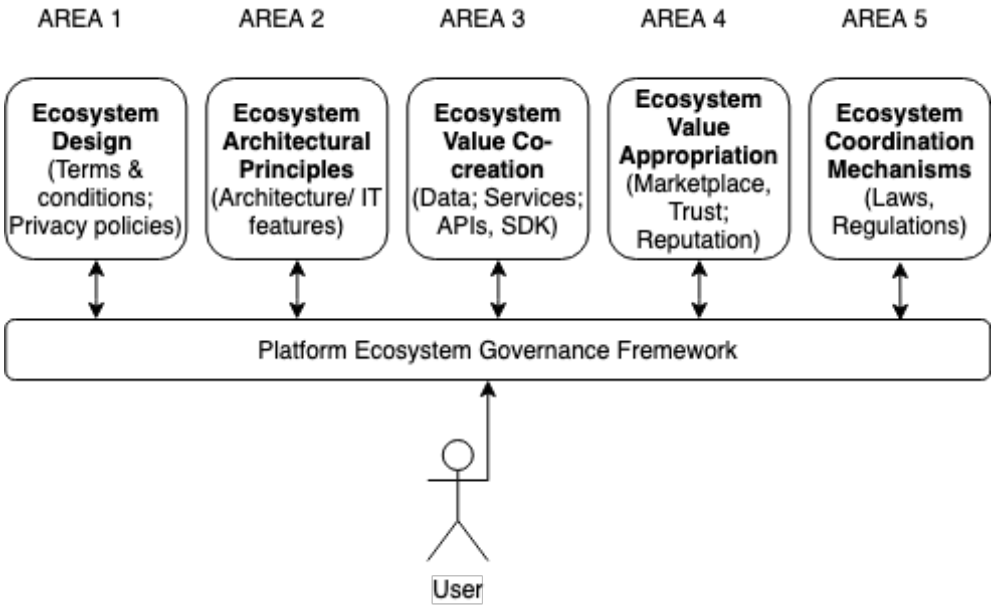


Figure 6 - Mapping of the five aspects of governance design to a Platform Governance Framework.

Figure below illustrates a high-level architecture of a governance framework for a federation of platforms as planned for NIMBLE. Apart from continuous platform monitoring and assessment, the framework includes Roles and Responsibilities, Governance Registry and Governance Decisions and Feedback services. Some examples of roles and responsibilities are: Governance Manager (defines the roles and responsibilities; defines business process lifecycle; monitor services, etc.), Business Process Designer (defines business process choreography policies and choreography level agreements), Service Provider, etc.

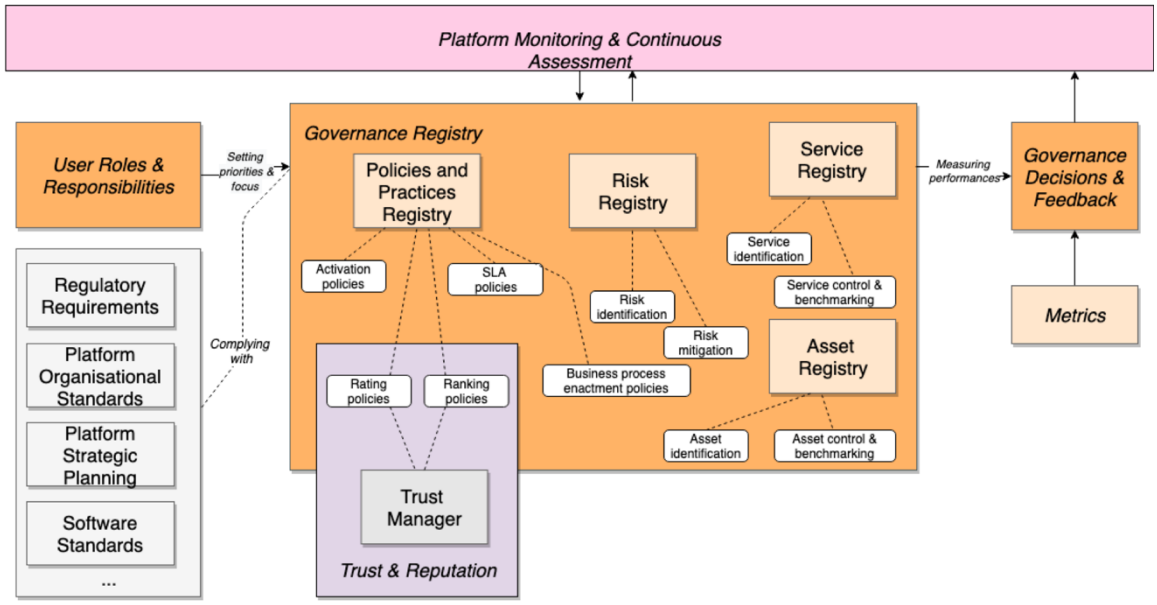


Figure 7 - A holistic federated governance architecture

Depending on the user's roles in the platform ecosystem, to create the best governance decisions and feedback, users set priorities and focus using the Governance Registry. In addition, the Governance Manager sets a variety of policies in the system, including rating and ranking policies, which are later used for calculating trust and reputation in the platform.

Despite having worked out a conceptual model for a governance framework, it must be said that NIMBLE at this stage, has only one active platform, whereas three more use cases are at best, in an experimental stage where issues of governance are far from requiring elaborate discussion. Looking at governance from an organisational point of view, three basic approaches are possible: "strong" governance, peer group governance and "loose" governance.

5.2.1 Strong Governance

The "strong governance" model would require establishing a governing body similar to a franchising system. The branding of platforms would be organized e.g. by a NIMBLE foundation that has the powers to retract a franchise if the governance rules are broken.

5.2.2 Peer Group Governance

The "peer governance" model would be similar to a shareholders association: the representatives of different platform owners would meet regularly and discuss, vote and agree on the common statutes of the NIMBLE association, including its mandatory and optional code of conduct. In fact, most European research projects are run in such a way, with a governing body of core partners and the coordinator as the spokesperson. Membership in such an organisation could be revoked on the basis of majority votes or in the face of clearly broken rules established by the association.

5.2.3 Loose Governance

The “loose governance” model would have no established governing body, but only a minimal code of conduct and a set of guidelines for best practice of running a NIMBLE based platform.

5.2.4 Which Governance Model is Practical for the NIMBLE Federation?

A franchising model (strong governance) would require significant financial and/or technological strength of the governing body: it would help the prospective franchise owner to set up the platform in the new market, it would take over some of the marketing activities and it would then take a cut of the franchise owner’s profit to invest in further growth of the federation.

A peer group model leaves most of the branding to the owner of the NIMBLE platform instance, e.g. in some specific sector. Also the business model is much more flexible and in the hands of the platform owner. The peer group may decide at some point that it is in the interest of all NIMBLE platforms to *establish a governing body*, but it is then up to that peer group to decide how strong the governing body should be. It is also likely that in the near future, *regulatory* bodies will either be established at European and national level, or existing regulatory bodies will get new powers to ensure a reasonable code of conduct of any platform, including those running on the basis of NIMBLE technology.
A loose governance model has the least overhead for any participating owner of a NIMBLE-based platform instance, and leaves governance entirely to the good will of the platform owners.

The NIMBLE project consortium has pitched the platform technology in such a way that all governance models are possible. The reason for this is that no subset of the consortium is even remotely capable of establishing any of the “strong” or “peer” governance models. The franchising model would require large investments and a long term strategy at global level, and the peer governance model cannot be decided at a stage in the development when there is only one platform instance in the position of becoming a business entity, although this in itself is already a huge success for the project. For example, it would be highly desirable for a peer governance model to remain compatible and interoperable at the level of product taxonomies and ontologies. However, the owners of the Furniture Manufacturing Platform have decided to bank exclusively on their sectorial ontology rather than the broader eClass taxonomy which would be a much better basis from the perspective of a working platform federation, albeit at the price of requiring more mapping between sectorial and overall taxonomy.

Looking at the practical side of governance, we have a group of partners from the NIMBLE project, who are also involved in the larger innovation action eFactory where the consortium was forced by the Commission, to establish a governing body that would ensure sustainability of the platform federation beyond the project’s timeline. As an answer, the eFactory Foundation (eFF) was established. This poses a practical problem for NIMBLE: despite offering the most mature and complete, platform functionality of any of the platforms participating in eFactory, the technical development of eFactory is already clearly departing from the NIMBLE system. Even a proposal by NIMBLE partners in eFactory, to refactor all of the contributing technologies on the basis of an established and commercially successful open source framework (WSO2) was turned down. It is beyond the capacities of the NIMBLE consortium, to influence such developments and it is therefore also much more likely that the “loose governance” model will be the only feasible form of collaboration between any platform instances coming out of the 2016 FoF Platform call and its successors, including eFactory.

5.2.5 Governance Rules for the Federation of NIMBLE Platforms

(1) *the NIMBLE ecosystem is a FEDERATION of independently managed B2B internet platforms based on the NIMBLE platform software or derivatives thereof.*
(2) *each NIMBLE B2B internet platform may develop its own governance structure within the following constraints*
    a. *to be NIMBLE compliant, the NIMBLE Open API has to be fully supported.*
    b. *to be NIMBLE compliant, commercial activities conducted on the platform must be in line with EU legislation.*
    c. *to be NIMBLE compliant, commercial activities must respect human rights, principles of equality, and fairness.*
(3) *As a person registered on a NIMBLE platform, you are responsible for respectful and trustworthy behaviour of the organisation you represent*
(4) *As a company registered on a NIMBLE platform, you are contractually bound to respectful and trustworthy behaviour of the people that represent the organisation.*
(5) *The OWNER of a NIMBLE platform is legally responsible for compliance of the platform with EU GDPR legislation of 2018 or later.*
(6) *Use of the NIMBLE identity for non-NIMBLE activities: we reserve the right to withdraw your right to use the NIMBLE branding of your platform if you are proven to violate any of the principles above (2) to (5).*

The last point "withdrawing the right to use the NIMBLE branding" requires a legal entity that is capable of conferring or withdrawing such a right and it also requires the creation of a NIMBLE brand that can be conferred upon a requesting platform provider.

We refer back to the issue discussed in the previous section: With a follow-on Innovation Action such as eFactory having established a representative body, NIMBLE has the choice of either following (i.e. joining the eFF) or establishing a competitor branding. In the interest of "learning to crawl before you can walk" we have taken the pragmatic approach of letting the first adopters ensure that their business models can work and to let governance develop over time.

5.3 NIMBLE Instance-Level Governance

We propose the following framework for NIMBLE Platform Governance – the text defines the constitutional setup of the NIMBLE ecosystem. These rules apply in particular for the platform as it will be run and supported via the NIMBLE project consortium, for the duration of the project. They refer to paragraph (2) of the federation rules – "each NIMBLE B2B internet platform may develop its own governance structure".

Whereas the federation rules are written by the NIMBLE association to govern the behaviour of platforms, the platform rules govern the behaviour of users and their organisations on a particular NIMBLE platform. Rules 1 to 3 connect the federation rules with the platform rules.

(1) ***Personal responsibility for the Commons*** *– As a person registered on a NIMBLE platform, you are responsible for respectful and trustworthy behaviour of the organisation you represent. We may deactivate your account if your organisation is found to break this rule.*
(2) ***Corporate responsibility for the Commons*** *– As a company registered on a NIMBLE platform, you are contractually bound to respectful and trustworthy behaviour of*

the people that represent the organisation. We may deactivate your organisation's account if your personnel break this rule.

(3) ***Collective responsibility for the ecosystem*** *– We, as the OWNER of this NIMBLE platform are legally responsible for compliance of the platform with European legislation, in particular for complying with EU GDPR legislation.*

Further rules can now be specified by the platform owners, depending on the business objectives of the platform. For NIMBLE releases of the MVP (Minimal Viable Product), which will come online during the research phase of the project, the following platform rules are proposed, but are subject to change at the consortium's discretion:

(4) ***Purpose of the platform*** *– NIMBLE MVP is a prototype B2B supply chain platform that can be used by interested parties for free while it is still under active development within the scope of a European research project. You are using it at your own risk and at this stage we cannot give guarantees for how the platform will be maintained beyond the lifetime of the project.*

(5) ***Network effects*** *- NIMBLE is like a telephone – it is useless if only one organisation has it, but it becomes very useful when everybody uses it. Therefore, the more partners you bring to the NIMBLE platform the better it gets for everybody.*

(6) ***Fair Play*** *- NIMBLE wants for all groups to share its benefits. If one group starts losing out in the game then the platform is at risk, too.*

(7) ***Level Playing Field*** *– No actor on the platform should have superior access to platform knowledge and tools, in comparison with others. This holds in particular for the platform owner, who is potentially in a position of power w.r.t. the customers of the platform.*

(8) ***Keep it as simple as possible, but no simpler*** *– There are no further rules at present – if we can keep it that way, and everybody is happy, then NIMBLE will become a success.*

The current governance rule (4) includes the fact that we cannot guarantee a professional continuation of the platform once the project is over, and this may be a serious obstacle to success. The conclusion from this is that setting up a clear roadmap towards a professionally run platform is a matter of great importance to the project.

At the same time, it should be clear to potential platform owners that a successful NIMBLE ecosystem could offer significant returns on investment, so this should be a potent incentive.

6 Use Cases' Platform Business Plans

This section reports an analysis of the business cases emerged from the 4 pilot activities of the project. The work started last year (and reported in D8.12) have been revised and extended, in order to develop some business plans for the devised, 4 different platform strategies. Specifically, for each business case, we report a description of:

- the devised platform strategy;
- the performed/ongoing validation activities;
- the reference market;
- the value sharing dynamics of the developed platform strategy (business model);
- the preliminary revenue model(s) and financial analysis;
- the route to market.

It is worth to highlight that the resulting 4 business cases have different maturity levels, but for all of them the next steps include additional technical and business development activities to actually reach the market and become viable.

6.1 Furniture Manufacturing Platform

The Furniture Manufacturing Platform (FMP) is a NIMBLE instance that enables companies to do business, search for products and services, find suppliers, arrange collaboration processes and make orders. Companies can register and publish its catalogue to the platform.

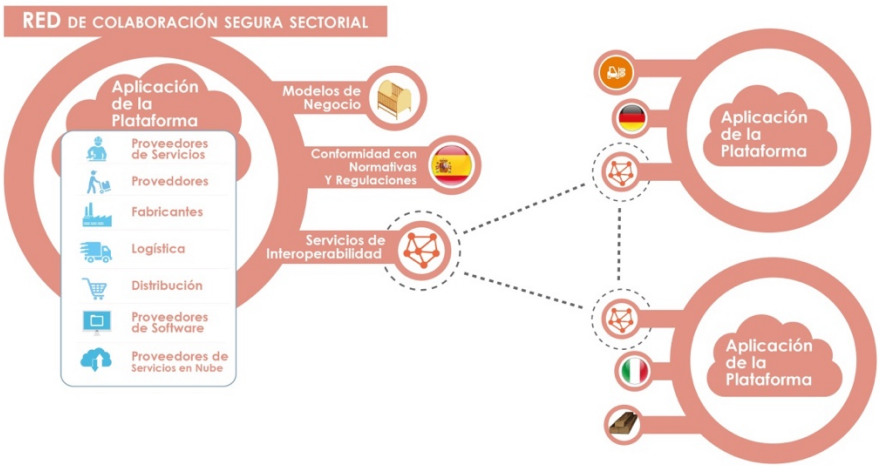


Figure 8 - Platform ecosystem(s) roles and interactions

The FMP is considered a European B2B platform that meets manufacturers, suppliers of materials and components, providers of services including logistics, architects, retailers and any party involved in the supply chain of the sector. The platform enables companies to expand their supplier network, find new customers, gain visibility, arrange useful collaboration with other parties, reduce costs related to supplying and launching of new products and increase the innovation capabilities.

Regarding the **early adopters**, the FMP involves all actors (companies, bodies, associations, self-employed workers, etc.) belonging directly or indirectly to the value chain of wood, carpentry and furniture sector. They are classified in the following categories:

- **Suppliers**: These are companies that provide raw materials and semi-elaborated products to the industrial companies, which transform them to produce the finished products. The suppliers may belong directly to the wood-furniture sector (by business activity and/or product) while others belong to other industrial sectors (metal, textile, chemicals, plastic, etc.) being indirectly linked to the wood-furniture sector (mainly a commercial linkage so most of its customers are part of the first sector).
  Suppliers' examples are: wood storekeepers, producers of wood veneer and boards, paints and varnishes, security equipment, fittings, wheels and bearings, packaging, cardboard, abrasives or machinery for wood, crystal, plastic treatment, etc.
- **Logistics providers**: Companies focused on logistics and transport of goods, providing warehousing and distribution services to all the members of the marketplace so they can physically connect buyers and sellers.
- **Service providers**: Companies that provide consultancy, certification and testing laboratory services among others.
- **Industrial companies**: Companies located in the centre of the value chain which search and acquire materials to manufacture its products, publishing its catalogue in order to increase visibility to current and potential customers.

- **Installers**: Companies that provide assembly and installation services of furniture and wooden equipment (floors, coatings, etc.) at different places (home, restaurants, stores, etc.). They enter the platform to find materials and offer its services to prescribers, architects and interior designers that could require them.
- **Architects and interior designers**: Its role in the platform is the search of materials, products and services to be involved in its projects (construction and renovation works) in order to offer them to its customers.
- **Retailers and distributors**: Companies focused on selling finished products to users and consumers. Its leading role in the marketplace is to search for the most suitable products and manufacturers in order to offer them to its customers.
- **Contract**: These are prescriber companies with the ability to influence in the products that its customers of the contract channel/HORECA (Hotels, Restaurants and Cafes) are demanding as they need them.

Following the methodology introduced in D8.12 (based on the Ecosystem Canvas Platform Design Toolkit[6]), we developed a digital platform strategy for the envisioned scenario above.

6.1.1 The FMP strategy

The updated Platform Design Canvas below summarizes from last deliverable D8.12 (Project Business Plan) the key elements of the FMP by setting the value proposition (core and ancillary), the key players (platform owners, partners, stakeholders and peer users), services (enabling and empowering ones, and others), and infrastructure and core components needed for running the platform. Additional canvas of the Ecosystem Canvas Platform Design Toolkit are reported in Annex, since some we have made some updates compared to the version reported in D8.12.

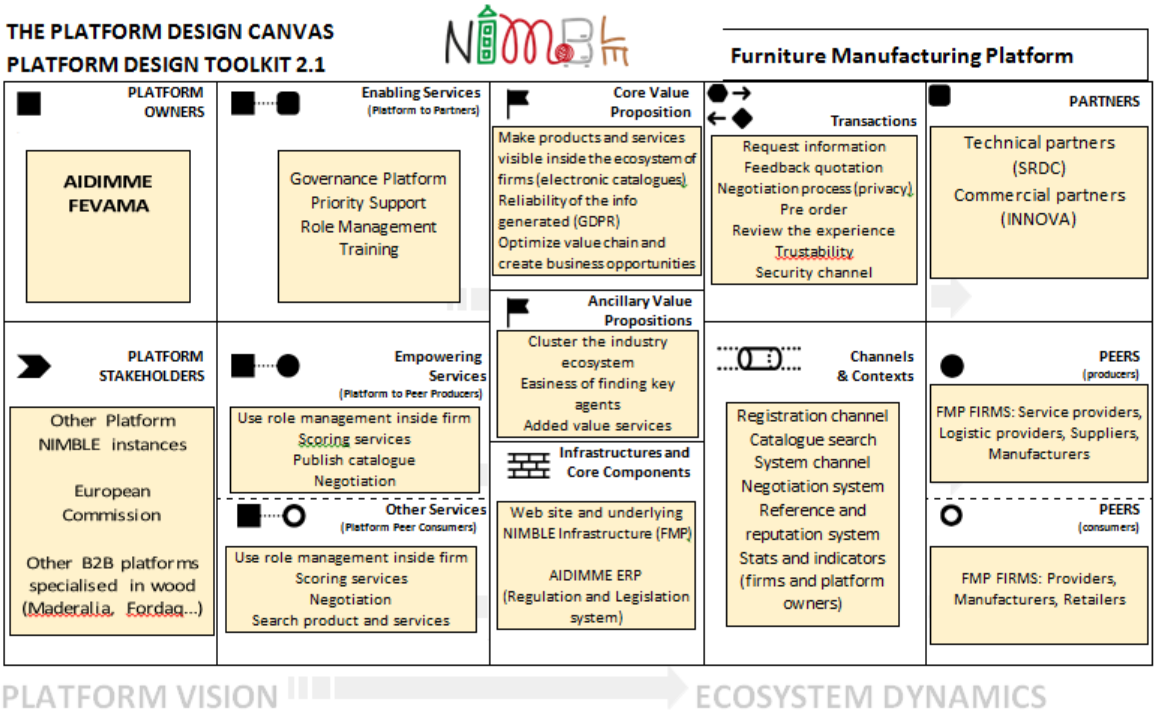


Figure 9 – FMP Platform Design Canvas

[6] https://platformdesigntoolkit.com/

Platform owner: AIDIMME and FEVAMA will be the two organisations owning the FMP. This is due to their background and knowledge on the furniture and related industries, mainly in Spain. Both organisations started to support the furniture industry back in the 80's, creating a large network of companies all along the supply chain. Wood activities such as carpentry, doors and windows, and flooring, as well as furniture manufacturing and related activities such as fittings, wood-boards and coatings are the current and potential associates.

Stakeholders are any organisation or player that is interested in the FMP success or failure (i.e. competitors). **FMP's peers** may be part of the furniture industry (associations, goverment agencies, etc.) or from other industries or markets (generalist marketplaces and platforms, related industries such as building or renovation, etc.).

In the current state of the FMP, three kind of stakeholders have been identified:

1) Other platform NIMBLE instances: in order to benchmarking and getting feedback, other NIMBLE instances may be interested in the type of solutions and performance features of the FMP.
2) European Commission: as main promoter interested in the development and dissemination of the FMP use by the industry.
3) Other B2B platforms: being generalist or furniture specific, other platforms could be competitors of the FMP (i.e.: Maderalia and Fordaq have been identified for the wood sector in Spain).

Regarding the **partners**, SRDC is considered a key partner for the FMP exploitation as a technical support provider. Furthermore, INNOVA is also considered a key partner for the market aspect so the company can support the engagement of early adopters.

The **Value Proposition of the FMP** is detailed in two levels of value, according to the Plataform Design Toolkit suggestion. The first level refers to the Core Value Proposition, which describes main the solution or benefit that the FMP provides to clients. The second level refers to the Ancillary Value Propositions, which may include several secondary utilities that the FMP provides to clients.

The **Core Value Proposition** of the FMP is defined as the platform which makes a company visible in the furniture value chain at European level. Three fundamentals of this Core Value Proposition are the following ones:

1. *Visibility for other companies*: FMP allows a company to share its electronic portfolio of products and services with other companies.

2. *Reliability of the information*: the information shared through the FMP is validated and checked by the platform administrators.

3. *European value chain*: activities involved in the FMP comprehend the furniture value chain with a holistic approach, creating business opportunities both with suppliers and clients. Further development of the FMP will aim to add firms at European level.

4. *Value-in-use* (P2P): value is created with the interaction and transaction between peer companies in a supplier-client basis (P2P, peer to peer). Interactions include several activities such as product searching, prices comparison, solving technical questions, bar-

gaining prices, etc. Transactions let firms to purchase and close operations with other companies.

The **Ancillary Value Propositions** are a complement to the main benefits of the FMP for a firm. These propositions focus on gaining knowledge about the sectorial ecosystem (firms, activities, clusters, etc.), the easiness of finding key players and added-value servicies for the industry (logistics, design, etc.).

FMP CORE VALUE PROPOSITION	**VISIBILITY OF BUSINESS:** Publishing electronic porfolio and information (technical data, certficiations, etc.) for other companies.
	RELIABILITY OF INFORMATION: Validation of information at company level and homogeneity of information amongst companies.
	EUROPEAN VALUE-CHAIN: enlarging the business scope at European level, dealing with potential suppliers and clients abroad.
	P2P INTERACTION: Finding businesses and platers, checking information, negotiating and pruchasing.
FMP ANCILLARY VALUE PROPOSITIONS	**SECTORIAL ECOSYSTEM ANALYTICS:** Data on clusters based on activities, markets, geographcial location, prices, service, etc.
	PINPOINT KEY PLAYERS: Identify leading firms in each market segment and get actual information about products and services.
	ADDED-VALUE SERVICES: Find service operators and related activities in other countries (transport, interior designers, installers, etc.).

Figure 10 – FMP Value Proposition

Main **assumptions** substantiating the value proposition of the FMP are related to reaching a high **number of participants** and a wide **coverage of business activities related to furniture**. These assumptions may be detailed as it follows:

- Reaching a critical mass of furniture firms taking part at European level.
- Involving main industrial activities within a holistic approach in the furniture value-chain: first transformation activities (woodwork, etc.), material suppliers (wood-based boards, fittings, coatings, etc.), furniture manufacturers (components, products), ancillary industry (subcontractors), and so on.
- Addressing players of main furniture markets: 1) the home furniture market (kitchen, bathroom, dining-room, bed-room furniture, etc.); 2) the contract furniture market (hotels, restauration, retail, education, office, etc.)
- Enlarging the scope of the FMP to a wide range of activities that serve the furniture value chain: machinery manufacturers, tools providers, retailers, wholesalers, dealers…
- Adding other productive sectors that pull the furniture demand, such as the building construction and renovation business (doors, windows, flooring manufacturers, etc.) and creative professionals and prescribers (architects, interior designers, furniture restorers, etc.) and decorative industries (lighting, glass, etc.).

In terms of **Infrastructure and Core Components**, the FMP makes use of almost all the platform packages and core services of NIMBLE.

Table 7 – NIMBLE assets used by the FMP

Asset	Description of asset consumption
Platform Package	
The NIMBLE Platform	This is the platform itself which is instantiated as FMP for the furniture use case.
Platform launch kit	The open APIs provided by the platform launch kit are valuable for the FMP, as well as the rest of content provided by this asset such as the instance launch guides, tutorials and specific configurations of the cloud infrastructure.
Core Services	
Frontend Service	All these assets are required for the FMP so they can be considered practically as mandatory components for every comprehensive NIMBLE instance. The frontend service provides web-based graphical interface to interact with the rest of services. The identity is required for the user management and the catalog service is used to provide persistency of products and services introduced in the platform. The business process service enables the arrangement of collaborative business processes between companies, while the indexing and trust services enable the search of items in the platform and the management of company ratings respectively.
Identity Service	
Catalog Service	
Business Process Service	
Indexing Service	
Trust Service	
Use case-specific tools/services	
Product Manufacturing Specifications according to National Legislation & Regulation Service	This is a valuable service that enables to find documents related to normative and legislation by searching through key parameters.

Regarding those use-case specific tools, the FMP only adopts the Regulation and Legislation System of AIDIMME, in order to ease the platform members contracting this system to meet the requirements of particular markets. The system includes a web interface to browse the document repository through specific searches and an API of services which provide the backend functionality.

6.1.2 Validation Activities

In order to face the validation of the platform, early adopters had been gradually incorporated into the instance, also providing its specific point of view. These are companies that collaborate in the testing of the platform and publish its catalogues of products and services. They also belong to other marketplaces so can be considered as “trailblazing” companies that drag new companies to the platform. In the onboarding, a proper balance between manufacturers and suppliers has been maintained to achieve more fluid collaboration processes between them.

The contact with the early adopters has been a personalized contact, taking actions with those companies that have shown interest, and showing them the details and operation of the platform and supporting them in the company registration and catalogue publishing processes.

The table below summarizes the status of the adoption process of companies by the FMP instance at the time of this document.

Table 8 – Summary of the adoption status by company profile up to date

Company profile	Number of companies	Percentage (%)
Manufacturers	63	45
Suppliers	57	40

Company profile	Number of companies	Percentage (%)
Logistics providers	2	1
Service providers	17	12
Retailers	2	2
TOTAL	**141 registered**	**100**

Onboarding and retention activities

Companies in general: for those companies not yet registered in the platform, a preliminary contact is being addressed by sending them a first email in which the main features and advantages of the platform are explained. After this, a phone contact with each company is arranged in order to explain them the importance of take part of this marketplace in further detail.

A third step is a face-to-face interview, in which the real functioning of the platform is presented, showing the published catalogue and the search tools and enabling the collection of feedback from users.

Furthermore, it is planned to participate in those meetings and events where entrepreneurs of the sector meet: conventions, technical conferences, sectorial fairs, sectorial observatories and other relevant events, with the goal of directly presenting the marketplace to the attendants.

Also focused articles are expected to be published in sectoral publications targeted to companies: reports, newsletters, magazines, etc.

Registered companies: In order for the registered companies to keep contact with the platform, a biweekly newsletter is sent to the registered users to keep them informed about the updates of each new version. This newsletter also includes sections to cover any news of the platform and information about upcoming events and material, such as workshops and video tutorials.

KPIs

At this stage (development of the platform ecosystem), the main indicator for the success of the platform is the number of early adopters, which are about 140 on the date of this document, and is expected to reach 250 at the end of the project.

Further indicators are being defined considering two main points of view:

- the company perspective (those indicators which become valuable for the adopters of the platform)
- the platform owner perspective (those indicators that enable to monitor the functioning of the platform).

All these indicators have been introduced in *D8.9 Feasibility and Impact Assessment Toolkit* and will further detailed and assessed by the end of the project in *D10.3 Architecture, Business Case and Governance of the Furniture Manufacturing Platform*.

In terms of results collected so far, we can state that the adoption is still in an early phase and the current population of the FMP instance does not allow to take conclusions on how the adoption is going to evolve. However, some insights can be can be done in the light of the statistics offered by the platform analytics, as can be seen in the following picture:

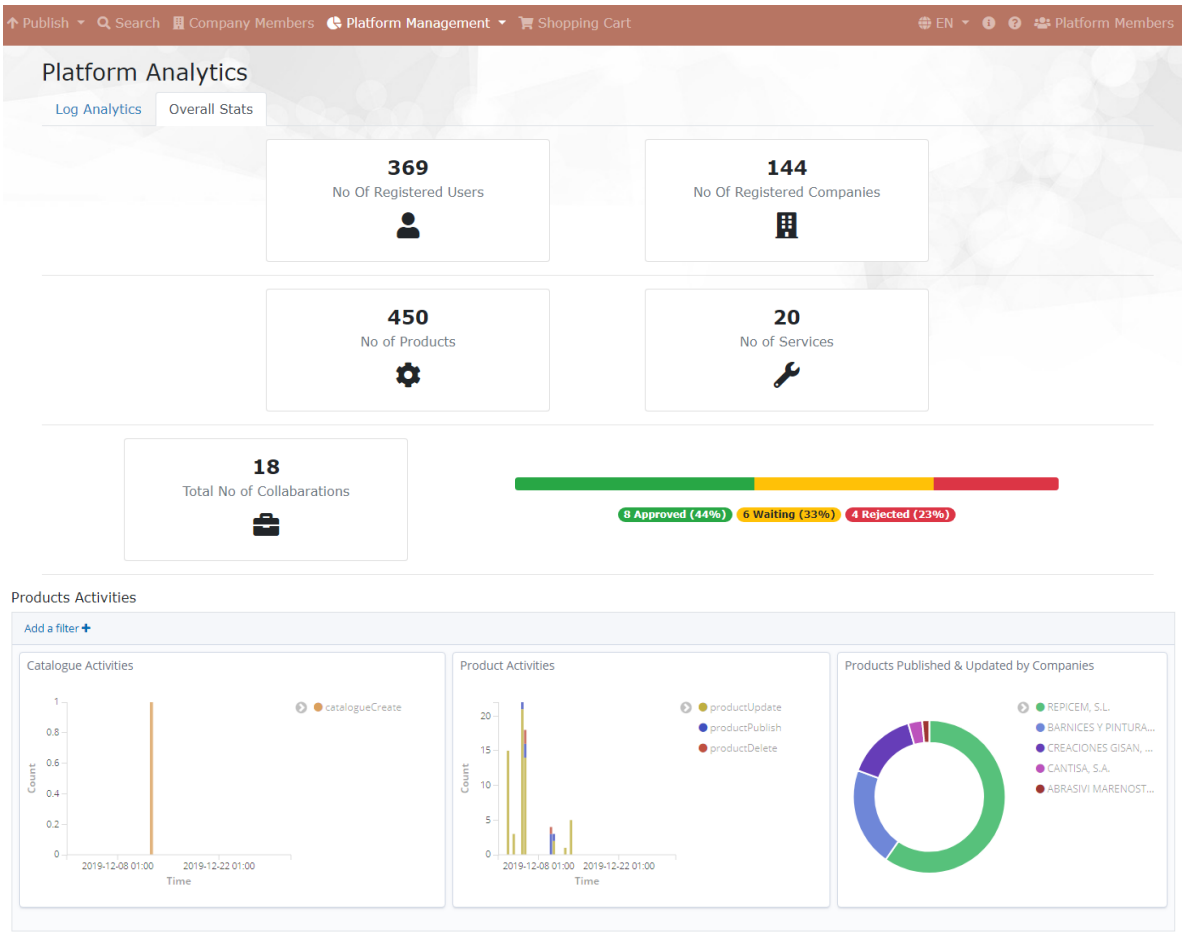


Figure 11 – Excerpts from statistics offered by the Platform Analytics in FMP instance

Also given the absence of enough critical mass in terms of platform population and interactions between partners is not possible to get significant insights from values related to collaboration statistics. As the population is increasing and the companies get feeling more confident with the platform, the interactions in collaborations will therefore start to increase providing reliable insights.

6.1.3 Market Analysis

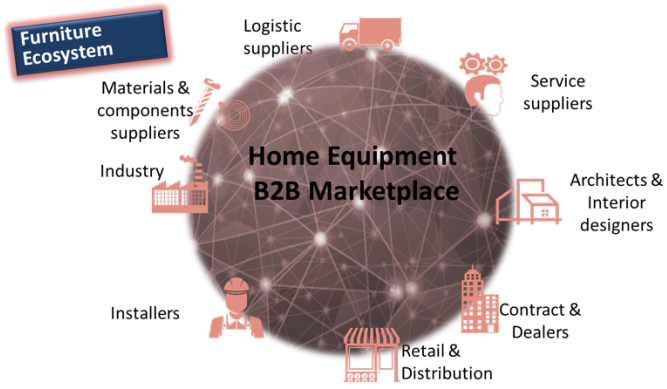


Figure 12 – The furniture ecosystem

The Furniture supply chain encompasses several industrial and service businesses, from supplying activities, to manufacturing, retailing and service offerings. This shapes a long

supply chain, so many firms and professionals may be involved in the FMP in the long-run. Moreover, the furniture ecosystem may be explained by two main supply chains according to the target markets: 1) home furniture (kitchen, bathroom, dining-room, bedroom furniture, etc.) and, 2) contract furniture (for collective use such as offices, waiting rooms in public facilities, hotels, restauration, etc.). In each supply chain there are materials suppliers, furniture manufacturers (final product or components), retailers and service providers.

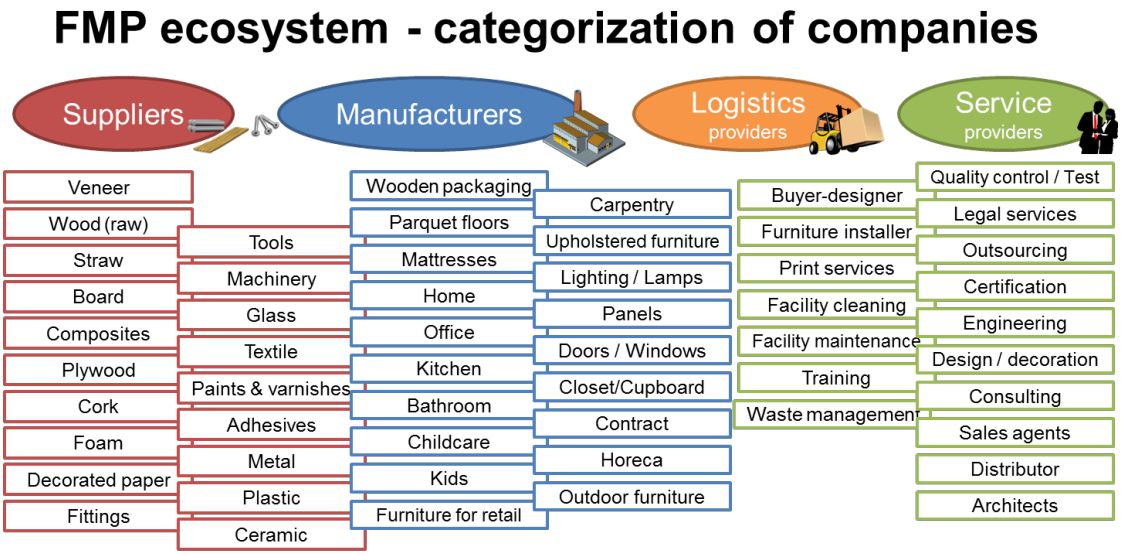


Figure 13 – Categorization of companies

The furniture market reaches 60,508 millions of euro (2017), according to Eurostat. Germany and Italy represent almost 45% of the total European value of production. United Kingdom (9.7%), France (7.1%), Poland (6.9%) and Spain (5.8%) are a second group of manufacturing countries. Rest of countries represent the 25.6% of the total value of production.

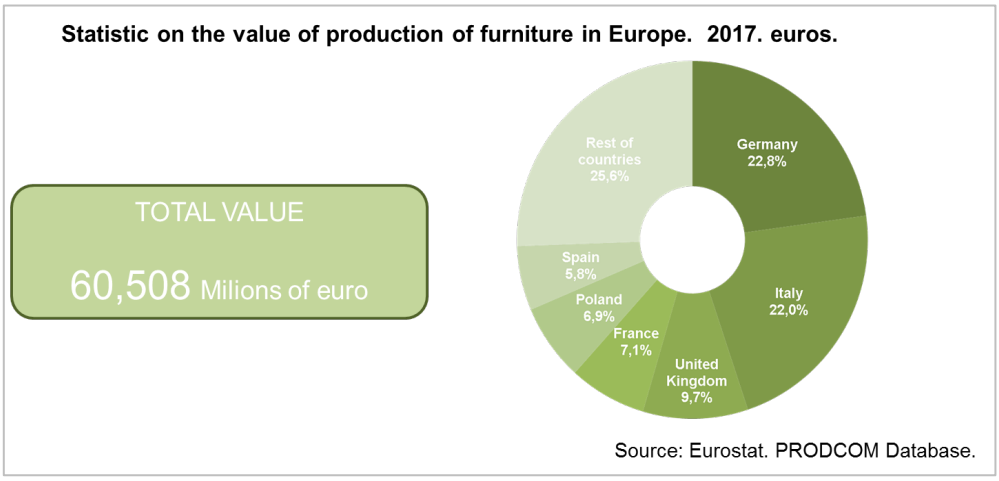


Figure 14 – Furniture value production in Europe

In EU, the sector employs around 1 million workers in 130.000 companies. It is a labour- intensive and dynamic industry, dominated by SMEs and micro firms, which produce kitchen, office, bedroom and other specialist types of furniture. While remaining a SME-based industry, **Europe is the headquarters of some of the biggest and most important global**

players. According to CSIL research, 81 out of the top 200 furniture manufacturers worldwide are located in Europe.

Focusing to the **Spanish market**, we may report that the Spanish wood/furniture sector is highly significant to Spain's industrial economy due to the number of companies and the employment it generates. The sector has **more than 18.300 companies** that are primarily small and medium sized firms covering a wide spectrum of activities with high flexibility and the capacity to the needs of their clients.

In terms of competition, beside the B2C growth, the presence of B2B e-commerce platforms is relevant and fast growing in the furniture industry. Raw materials and components suppliers have developed in recent years their own online platforms for providing service to furniture manufacturers. By this kind of platforms, suppliers with different activities (fittings, coatings, fiber boards...) are trying to optimize sales processes and increase loyalty of customers.

However, currently, the real competition is limited to Industry Directories with specific focus on companies selling wood/furniture products, such as www.furniture.eu, which they include many companies but they do not provide comprehensive B2B services and value added, data analysis services.

6.1.4 Value Sharing Dynamics

The FMP is a value-in-use based platform, this means that value is generated while interaction and transaction occurs within the FMP in a B2B relationship. Hence, the FMP is a relational and interactive platform. Dynamics between peer firms all along the furniture supply chain will create opportunities for market development and business growth. Dynamics are based on the following points:

- Publishing products and service portfolio.
- Finding specialised suppliers.
- Exchanging information (i.e. certifications, prices, etc.).
- Negotiating.
- Doing business through sales, collaborations, etc.

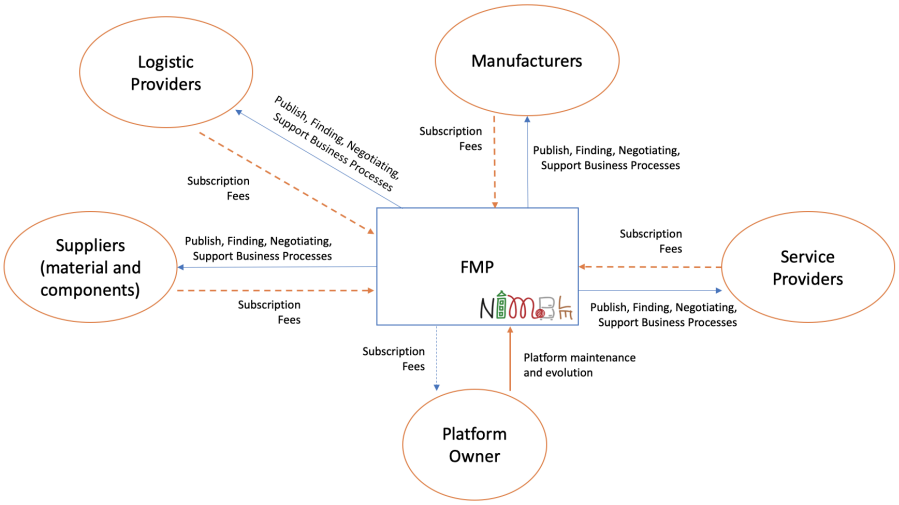


Figure 15 - Value sharing dynamics for FMP

As for the switching costs, these will be related to the technical costs and time assumed by a firm for entering the FMP at the beginning. These costs are mainly the elaboration of electronic catalogues and loading the requested information on the platform. Besides, the plat-

form requires personnel for keeping updated the information of the firm and for the search and bargain process. Initial time dedicated to the FMP for feeding it with electronic information (catalogues, certifications, etc.) could be lost once a company decides to withdraw.

No barriers of entry are expected to stop companies from registering in the FMP. If so, the main risk could be the difficulty for achieving a minimum base of participants. In this case, the FMP would not attract new companies and the B2B potentially could be interrupted. Neither technical or economic matters would affect new participants.

6.1.5 Revenue Model and Financial Analysis

The FMP **revenue model** is based in a pay-per-use fee that participant firms must defray. At the beginning, it is expected a single fee which is estimated to be 30-50€/month for a complete access to the platform and all its functionalities (from November 2020).
From April till November only new companies, not the Early Adopters during NIMBLE project duration) will pay. This fee will be earned starting at April 2020. Once FMP in production the estimation fees are:

- **Basic fee** (30€/month): accessing to platform for searches (no editing options)
- **Regular fee** (50€/month): uploading electronic catalogues and editing information (certifications, technical documents, etc.).
- **Premium fee** (100€/month): advance service packs (include ads of the firm in relevant spaces of the platform, data analytics of searches, etc.).

On the costs part, there are some **fixed costs** for running operatively the FMP, while other costs are related to personnel in order to make the FMP grow in functionalities and number of members:

- **Hosting**: hosting the FMP in the cloud (servers, domains, etc.).
- **Personnel costs**: people for helpdesk tasks (attending members of the platforms with technical support) and salesforce for recruiting more members and attending their service needs (type of fees, positioning the firm in the FMP, etc.).
- **Technical costs**: for developing and improving the FMP according to market necessities.
- **Marketing costs**: promotion of the FMP in other websites, industrial associations´ media, social networks, etc.
- **Other related costs**: licenses for running the FMP (i.e. Kibana, Keycloack…).

There are also some **variable costs**, which will depend on the number of members and the incidencies related to the FMP deployment:

- **Maintenance costs**: improvements and bugs revision in the FMP.
- **Unforeseen circumstances**: should be around a 15% of the budget, just in case unexpected issues arise (i.e. legal issues, communication costs, etc.).

In the following picture, we report 2 possible scenarios (the best and the worst one) taking into account the number of companies and different fees. It is worth to highlight that:

- the reported figures are just preliminary and based on an internal analysis. In the next months we will review them also collecting evidences from the additional platform operation and insights/suggestions coming from the early adopters.
- the financial analysis is based just in the needed resources just in Spain. It is needed a more complex sheet exploiting the platform in multiple countries with the involvement of commercial partners, such as INNOVA in Italy.

We will exploit the next months of platform running to collect additional information and reviews the revenue models and financial analysis. The updated version will be reported in *D10.3 Architecture, Business Case and Governance of the Furniture Manufacturing Platform* and *D8.16 Innovation, Exploitation and Standardisation - Final Report*.

FMP launching tentative financial analysis	Scenario 1 (best)			Scenario 2 (worst)		
Scenario description	One country (Spain)			One country (Spain)		
	Participation goals achieved			Participation fails		
	250 FMP EAs at April 1st (free)			250 FMP EAs at April 1st (free)		
	2020: Production starts November 1st			2020: Production starts November 1st		
Years	2020	2021	2022	2020	2021	2022
Target members (number of firms)	200	300	400	100	200	300
Basic members (% of total registrations)	60%	50%	40%	90%	70%	50%
Regular members (% of total registrations)	40%	45%	50%	10%	25%	40%
Premium members (% of total registrations)	0%	5%	10%	0%	5%	10%
Revenues						
New EAs fee (10€/month) [Until November 1st]	3.500,00 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €
Basic fee (30€/month) [Since November 1st]	7.200,00 €	54.000,00 €	57.600,00 €	5.400,00 €	50.400,00 €	54.000,00 €
Regular fee (50€/month) [Since November 1st]	8.000,00 €	81.000,00 €	120.000,00 €	1.000,00 €	30.000,00 €	72.000,00 €
Premium fee (100€/month) [Since November 1st]	0,00 €	18.000,00 €	48.000,00 €	0,00 €	12.000,00 €	36.000,00 €
TOTAL REVENUE	**18.700,00 €**	**153.000,00 €**	**225.600,00 €**	**6.400,00 €**	**92.400,00 €**	**162.000,00 €**
Fixed Costs						
Legal incorporation	3.005,00 €	€ 3.005,00	€ 3.005,00	3.005,00 €	€ 3.005,00	€ 3.005,00
Technical training (in SRDC)	0,00 €	0,00 €	0,00 €	1.600,00 €	0,00 €	0,00 €
Hosting cloud	900,00 €	1.200,00 €	1.200,00 €	900,00 €	1.200,00 €	1.200,00 €
Licenses (Keycloack, Kibana)	0,00 €	0,00 €	0,00 €	2.040,00 €	2.040,00 €	2.040,00 €
Technical programming (SRDC or external firm)	26.280,00 €	35.000,00 €	35.000,00 €	72.000,00 €	96.000,00 €	96.000,00 €
FEVAMA personnel	18.765,00 €	25.000,00 €	25.000,00 €	18.765,00 €	25.000,00 €	25.000,00 €
Personnel: Platform Technician (AIDIMME)	18.765,00 €	25.000,00 €	25.000,00 €	18.765,00 €	25.000,00 €	25.000,00 €
Personnel: User's Helpdesk (1/2) (AIDIMME)	9.000,00 €	12.000,00 €	12.000,00 €	9.000,00 €	12.000,00 €	€ 12.000,00
Personnel: Sales Force (AIDIMME)	18.765,00 €	25.000,00 €	25.000,00 €	18.765,00 €	25.000,00 €	€ 25.000,00
Commercial expenditure	2.400,00 €	2.400,00 €	2.400,00 €	2.400,00 €	2.400,00 €	€ 2.400,00
Marketing actions	4.000,00 €	€ 24.000,00	€ 24.000,00	4.000,00 €	€ 24.000,00	€ 24.000,00
TOTAL FIXED COSTS	**101.880,00 €**	**152.605,00 €**	**152.605,00 €**	**151.240,00 €**	**215.645,00 €**	**215.645,00 €**
Variable Costs						
Unforeseen circumstances (+15% i.e. legal services…)	15.282,00 €	22.890,75 €	22.890,75 €	22.686,00 €	€ 32.346,75	€ 32.346,75
TOTAL VARIABLE COSTS	**15.282,00 €**	**22.890,75 €**	**22.890,75 €**	**22.686,00 €**	**32.346,75 €**	**32.346,75 €**
TOTAL COSTS	**117.162,00 €**	**175.495,75 €**	**175.495,75 €**	**173.926,00 €**	**247.991,75 €**	**247.991,75 €**
EXPECTED RESULT	**-98.462,00 €**	**-22.495,75 €**	**50.104,25 €**	**-167.526,00 €**	**-155.591,75 €**	**-85.991,75 €**
MARGIN (ROI)	**-84,04%**	**-12,82%**	**28,55%**	**-96,32%**	**-62,74%**	**-34,68%**

Figure 16 - FMP launching tentative financial analysis (one country: Spain)

In the best scenario, on third year FMP starts with annual benefits and from the fifth year with profits. In the worst scenario, better not to continue in second year.

6.1.6 Route to Market

Our **take-up strategy piloting Spanish furniture market** for addressing FMP-Early Adopters can be summarised in the following steps, shown in the figure below:

- Starting with associated companies to FEVAMA and AIDIMME (starting with the ones with the highest business relationship;
- MICUNA inviting their suppliers (first-tier) and service providers (fittings, wood, chemicals,…);
- **e-mails** inviting companies to our booths and to join NIMBLE (Personalized and general public) and face-to-face meetings
- **Fairs** (AID/FEV and MIC)
    - Demonstrations

- Spanish material (Leaflet, roll-ups,…)
- **Habitat Congress** Oct 18th.
- Networking sessions. (AID/FEV and MIC)
- Press, Newsletters,…
- Getting the support of relevant suppliers like FINSA

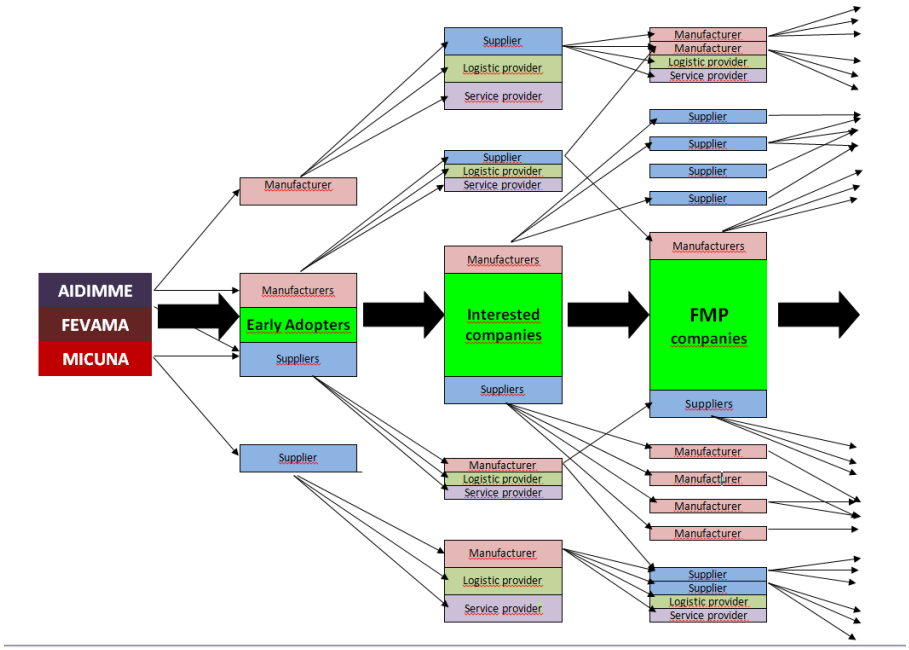


Figure 17 – Take-up strategy for FMP market

AIDIMME has started a second phase contacting with specific associations in different furniture segments or related to furnishing: bathrooms (ARVET), carpentry and wood (ASEMAD), Interior decorators (CDICV), product designers (ADCV)…

FMP Route to market can be represented in the following picture:

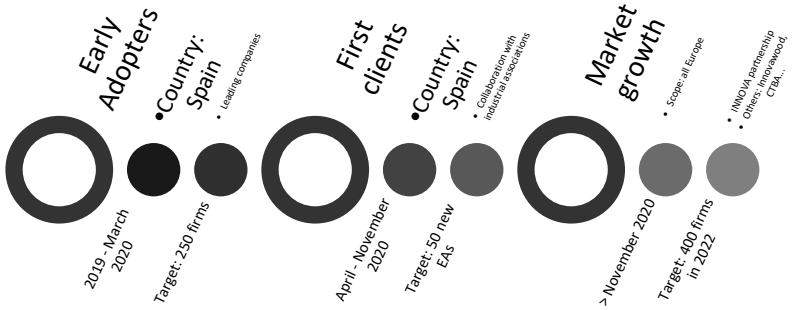


Figure 18 – Evolution of FMP adoption

Starting with Spanish firms as EAs till March-20 (250 firms) we think after ending NIMBLE project new companies will be registered till November-20 where FMP-production will be launch jointly with our PARTNERS like SRDC and INNOVA.

6.2 Eco Houses Business Case

The Ecohouse platform targets the eco-segment of the Swedish construction industry. Ecological awareness throughout the supply chain by using natural materials like wood and a focus on ecological friendly processes characterises the market segment. LINDBÄCKS as a manufacturer of pre-fabricated wooden houses and its supply chain has been the application case the for the platform development.

Specifically, the Eco Houses business case started from the idea of using the NIMBLE platform to im- prove the information flow along the LINDBÄCKS supply chain to reduce costs by accelerat- ing the information exchange by automating the order process and minimize errors caused by manual information transfer. During the project, additional technical solutions, extending the core NIMBLE services, have been designed and integrated in this business case:

1) A 3D-configurator (developed by a third party software provider: Lundqvist) allowing customers to customize PODCOMP's bathroom and visualize each of their choices. Customers can choose from a wide range of tiles, bathtub, toilets, mirrors. The bathroom cost is displayed and automatically adjusted according to customer choice. As a result, customers get a better impression of the final customised bathroom during the ordering process and the customisation process is finalised at the same time.
2) Track and Trace component for supply chain management that exploits IoT and blockchain technologies for providing full audit trail of data, creating an everlasting record along a supply chain.
3) Life-cycle-analysis (LCA) component for estimating the environmental impact of the requested products and services.

The following picture depicts the final reference scenario and the main, enabling technology components.

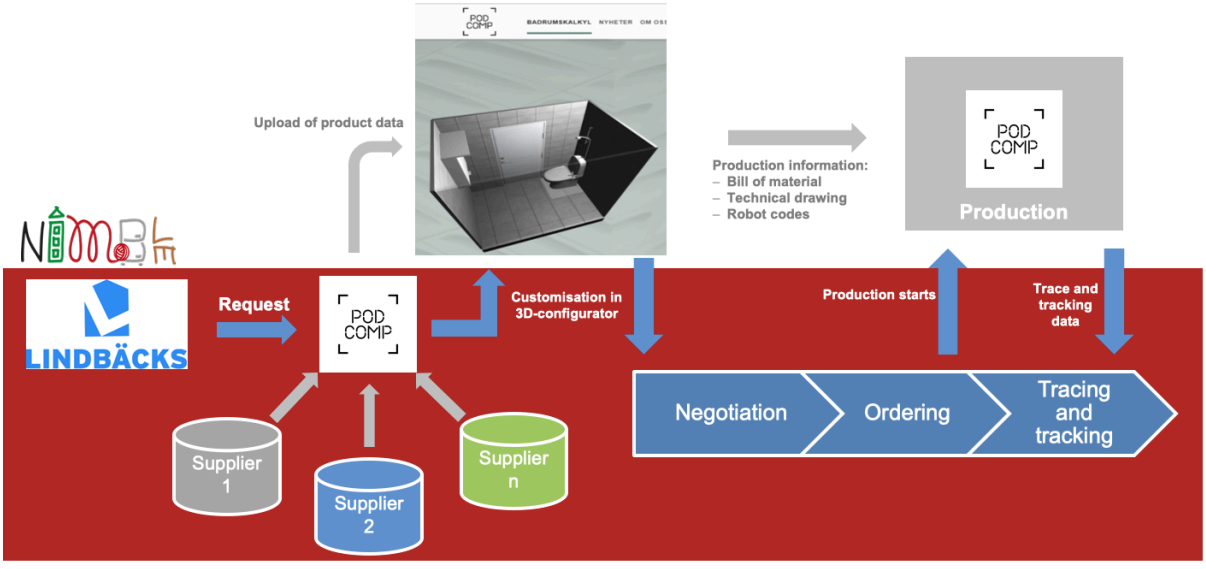


Figure 19 – Reference scenario of the Ecohouses business case

Following the methodology introduced in D8.12 (based on the Ecosystem Canvas Platform Design Toolkit[7]), the involved partners (LBAB, PODCOMP, BIBA, BAL) designed a strategy for a digital platform able to provide all such services.

[7] https://platformdesigntoolkit.com/

6.2.1 The Ecohouse Platform strategy

Figure 20 below reports the Platform Design Canvas that summarises the main outcomes of the devised platform strategy.

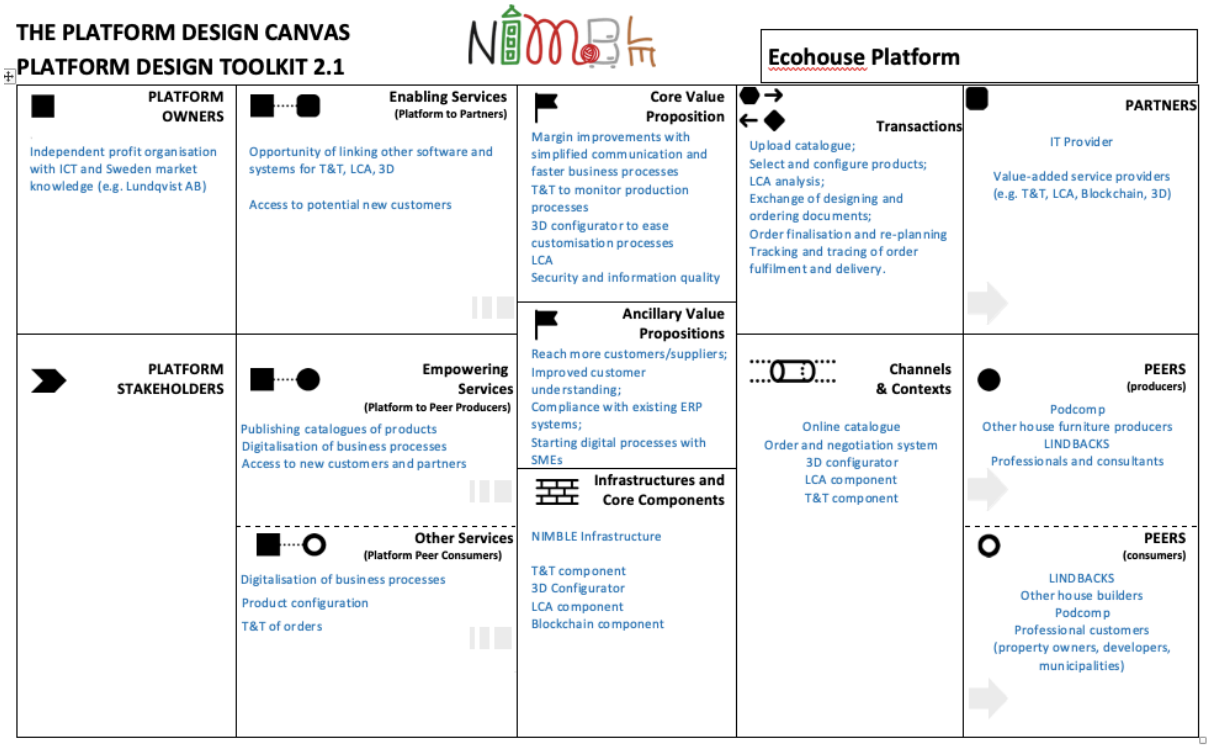


Figure 20 - Platform Design Canvas for the Ecohouse platform

Below a brief description of the key elements of the analysis:

The actual **platform owner** has not been identified yet. LINDBÄCKS, as key partner in the Eco-house use-case, could not become the platform owner for several reasons:

- LINDBÄCKS is a key stakeholder in the eco-house market segment. In case LINDBÄCKS would become the Eco-house platform provider, it would cause a barrier for competitors to get on the Eco-house platform, since competitors are expected to have no interest in sharing data on a B2B Platform to which their competitor has access and paying fees for it. As a result, the potential market for an Eco-house platform would shrink to the supply chain of LINDBÄCKS, which limits the value proposition of the platform and the revenue potential.
- LINDBÄCKS key business area is the construction of pre-fabricated wooden houses. There is no experience, expertise or background to enter the ICT-market. Any activity in this direction would require substantial investments without a clear benefit (see first point as well)
- The LINDBÄCKS IT-department has no capacity to explore new business areas and build up experience in this field. Any activity in this direction would require substantial investments and clear benefits.

Similar motivations are applicable for PODCOMP as well.

The key finding of the decision process is that the platform owner shouldn´t have a commercial interest in offering products/services on the platform (Amazon receives the same critique for acting as a seller on their own platform). As a result, the platform owner should be an

independent organisation with profound ICT knowledge and skills in conjunction with knowledge and experience in the realm of the Swedish construction industry.

There are Swedish companies with the described characteristics, such as Lundqvist AB. In fact, use-case partners have presented the Ecohouse platform to them and discussed the business potential. As a result, the TRL-Level of the NIMBLE platform was considered too low (see also Section 6.2.6 about the planned route to market).

Partners: the most important business partnerships for the Ecohouse platform are service provider of the Track and Tracing, Life Cycle Analysis and the 3D-configurator. The services are part of the value proposition and the provider of the above mentioned services are responsible for maintaining and updating their services as well.

Peers: the main targeted customer segments of the Ecohouse platform are the Swedish building construction industry and its supply chain with special focus on the Ecohouse segment of the industry. There are two main channel to reach to the customer segments:

- Promoting the Ecohouse platform in industry-focused media, like professional journals and on industry specific events, like fairs.
- Recommendations of companies using the Ecohouse-platform and would like to enhance the benefits by lifting their supply network onto the platform.

Platform Services: the utility of the platform is related to the possibility of publishing catalogues of products and digitalise business processes among all partners of the building construction supply chain. In addition to that, the platform enables the integration of (custom) added-value services, such as the ones currently integrated: T&T, LCA and Product configurator.

Value Propositions: The Ecohouses platform has been set up to achieve the core value proposition of faster and more reliable information exchange along LINDBÄCKS supply chain, by accelerating interaction times and minimise manual errors based on the automated ordering process, resulting in overall lower procurement process costs. Additional value propositions are supposed to attract a wide B2B customer segment in the construction industry in Sweden:

- The Track and tracing functionality of the Ecohouse platform has been developed by project partner BIBA and provides the opportunity to track and trace products along the supply chain in order to monitor the production process, reduce reaction times and increase transparency.
- The interaction of NIMBLE with a 3D-Configurator enables the supplier of customisable products, like the bathrooms of PODCOMP, to guide potential customer through the available options and visualise potential combinations in conjunction with the associated price. As a result, customers get a faster and better impression of the final customised product during the ordering process and the customisation process is finalised at the same time. After completing the customisation, the order is placed and an automated bill of materials is generated and provided to the manufacturer in order to start the procurement process.
- The Ecohouse platform offers the additional service to analyse the environmental footprint and to calculate the life cycle cost of a product, which are displayed as product properties on the platform. The opportunity to search or advertise especially environmental products is important in the targeted market segment of the Eco-house platform.

Finally, in terms of **Infrastructure and Core Components** perspective, a high performance server infrastructure for the NIMBLE platform will be a key resource. The server will also host the software for added value service:

NIMBLE Tracking and Tracing (T&T): T&T service is an open source (Apache 2 license) solution that provides companies the possibility to connect their local T&T infrastructure with the NIMBLE platform. It adopts the EPCIS standard of the GS1 consortium to ensure interoperability. The solution visualizes events that represent the production and logistics progress status (see picture below, left side). Each event means that a product reached a new location. Besides these location data, the T&T service can visualize time series data from sensors via Grafana8 (right side of the Figure). This feature uses IBM's Blockchain service to ensure that the time series data is authentic (NIMBLE stores a copy in the Blockchain). The T&T service notifies the platform user via Email about delays by comparing the planned delivery date with the T&T events.

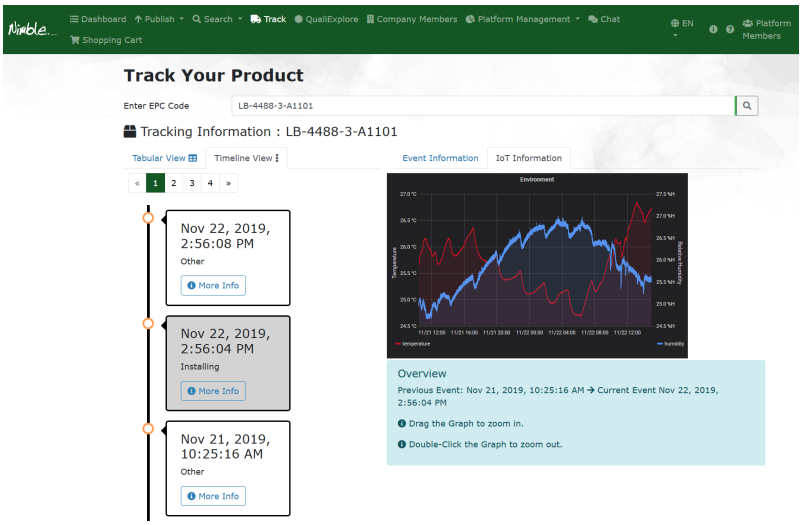


Figure 21 - The tracking and tracing interface in the Eco House platform

Product configurator: NIMBLE offers an interface to connect third-party product configurators to the business processes. In the Eco House case, the 3D-product configurator is part of an application that is a proprietary software developed by the Swedish company Lundqvist AB. The 3D-configurator allows potential purchasers to customise bathroom units (and potentially other rooms) in real time and to see the individual product at the same time. The price of the customised product is displayed immediately based on the selected configuration. The configurator can request the customization options (products) from the NIMBLE product catalogue via the NIMBLE API. Once the buyer completes the customization in the third-party tool, a bill of materials is generated and can be provided to the seller via the NIMBLE API in order to proceed with the negotiation process.

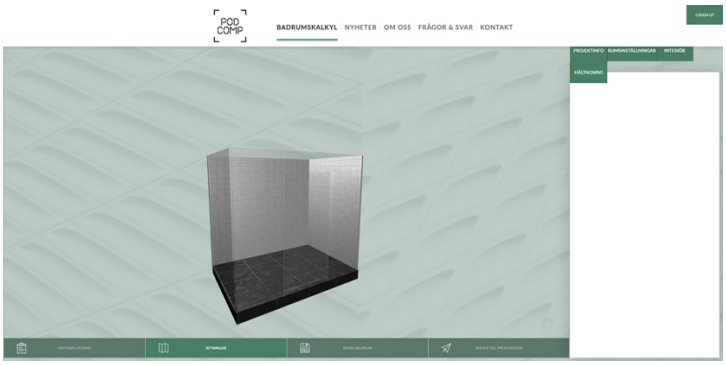


Figure 22 - 3D bathroom configurator

[8] https://grafana.com/

LCA: BAL.LCPA has been developed in the course of the EU-funded research projects BESST (Grant Agreement No. 233980) (Breakthrough in European Ship and Shipbuilidng Technologies , 2013) and JOULES (Grant Agreement No. 605190). The overall developed approach investigates several economic and environmental Key Performance Indicators (KPI) like Net Present Value (NPV), Global Warming Potential (GWP), Cumulative Energy Demand (CED), Eutrophication Potential (EP) Acidification Potential (AP) and Aerosol formation potential in a comprehensive analysis that allows to compare multiple objects numerically and visually.

Frame contracts: Frame contracts are an agreement between B2B partners that determines the terms and conditions for trading in a certain timeframe (usually two years). As a result, the business partners don´t have to start a negotiation for each order and thereby reduce procurement process costs. Based on the described business practise, the Eco-house platform supports the use of frame contracts.

6.2.2 Validation Activities

In the process of validation activities, several companies involved in the LINDBÄCKS supply chain have participated in NIMBLE-workshop and testing events. A more detailed description of the validation activities will be reported in D 7.2.

6.2.3 Market Analysis

With 3 million enterprises and a total direct workforce of 18 million people, the construction sector contributes at around 9% to the GDP of the European Union.
99.9% of the European construction sector is composed of small and medium-sized enterprises (fewer than 250 employee). In the EU, the average size of construction enterprises is of 4 workers (employees or not). Small and medium businesses produce 80% of the construction industry's output. Small enterprises (less than 50 employees) are responsible for 60% of the production and employ 70% of the sector's working population. At the end, of large enterprises with more than 1,000 employees there are only about 2.000. According to Deloitte[9], local real estate experts have noticed an increased focus on supply chain integration in the construction markets since 2016.

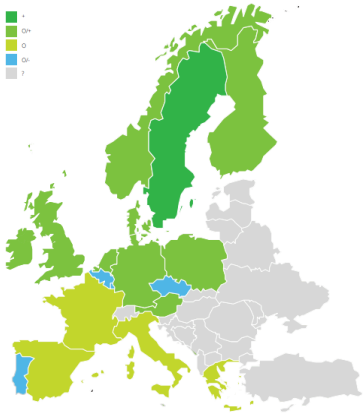


Figure 23 – Construction market

With growth being projected for most EU construction markets, it is expected an increased focus on supply chain integration in the coming year. Another noticeable trend is the increased application of digital construction across Europe.

Now, as markets recover and demand for construction increases, the use and development of new technologies in the construction sector is finally growing.

However, little – or very little – has so far been done in digitizing the building construction sector.

[9] European Construction Monitor | 2016-2017: Growing opportunities in local markets

The following picture is the result of a EU survey about "Construction 4.0"[10]:

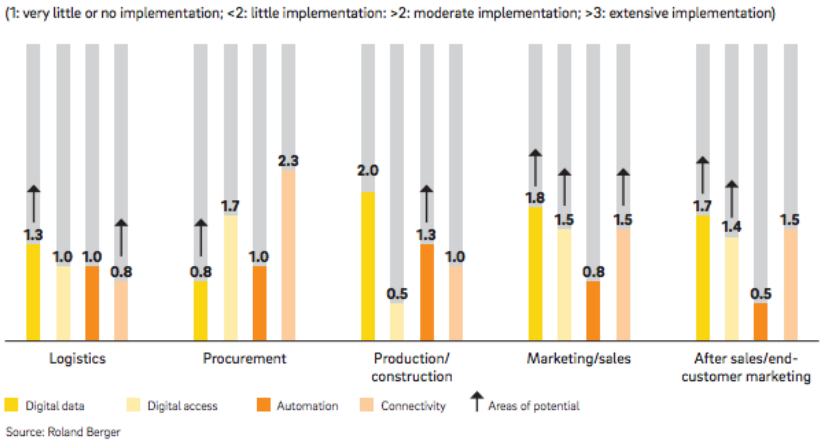


Figure 24 – Digitalisation trends in the building construction sector.

More in details, the Swedish building construction industry developed extremely positively in the last decade. The production value almost doubled in the timeframe from 2009 – 2018 (+ 87,5 %) with an average annual growth rate of 7,2% (see Figure below).

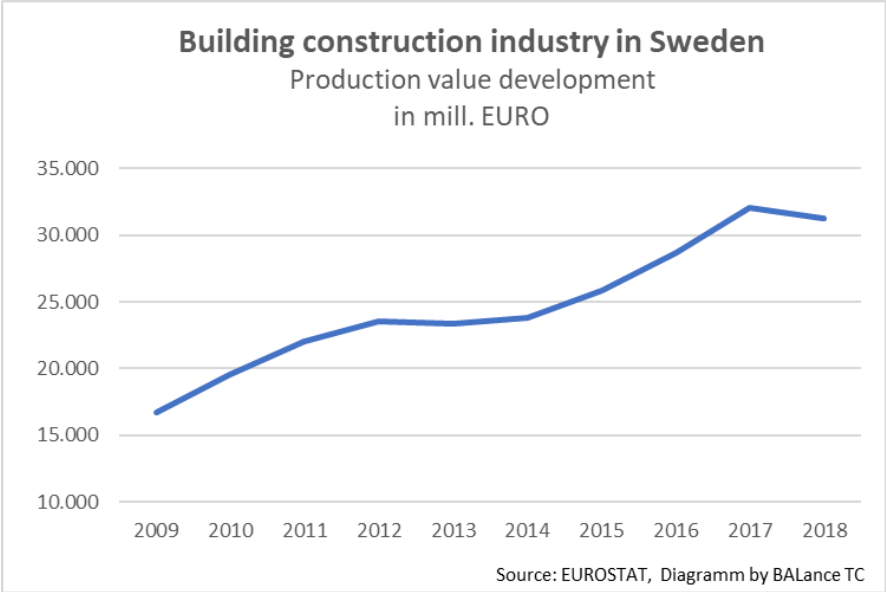


Figure 25: Production value development of the building construction industry in Sweden

Interestingly the share of value added on the production value has decreased from 25% in 2009 to round about 20% in 2018 while the share of purchase values on the production value increased accordingly from 75% in 2009 to 80% in 2018 with an overall purchase value of the Swedish building construction industry of more than 25 billion EURO in 2018.

There is clear trend to outsource the production, which increases the impact of an cost-efficient procurement process.

[10] Roland Berger, Think Act: Digitization in the construction industry, June 2016.

The number of companies acting in the Swedish building construction industry increased since 2009 from 17,405 to 22,298 in 2018. In addition, many of their suppliers are summarised in the NACE-class 43 “Specialised construction activities”, in which another 74,454 companies are reported. In the end, both industries belong to the target group of the Ecohouse platform with overall 96,752 companies (EUROSTAT 2019).

The market analysis underlines the business potential of the Ecohouse platform with more 96,000 companies and a potential trading volume of 25 billion EURO.

6.2.4 Value Sharing Dynamics

Based on the overall business model emerged through the development of the platform strategy (summarised in the Platform Design Canvas reported in Section 6.2.1), the following picture depicts the value sharing dynamics between the distinct involved actors.

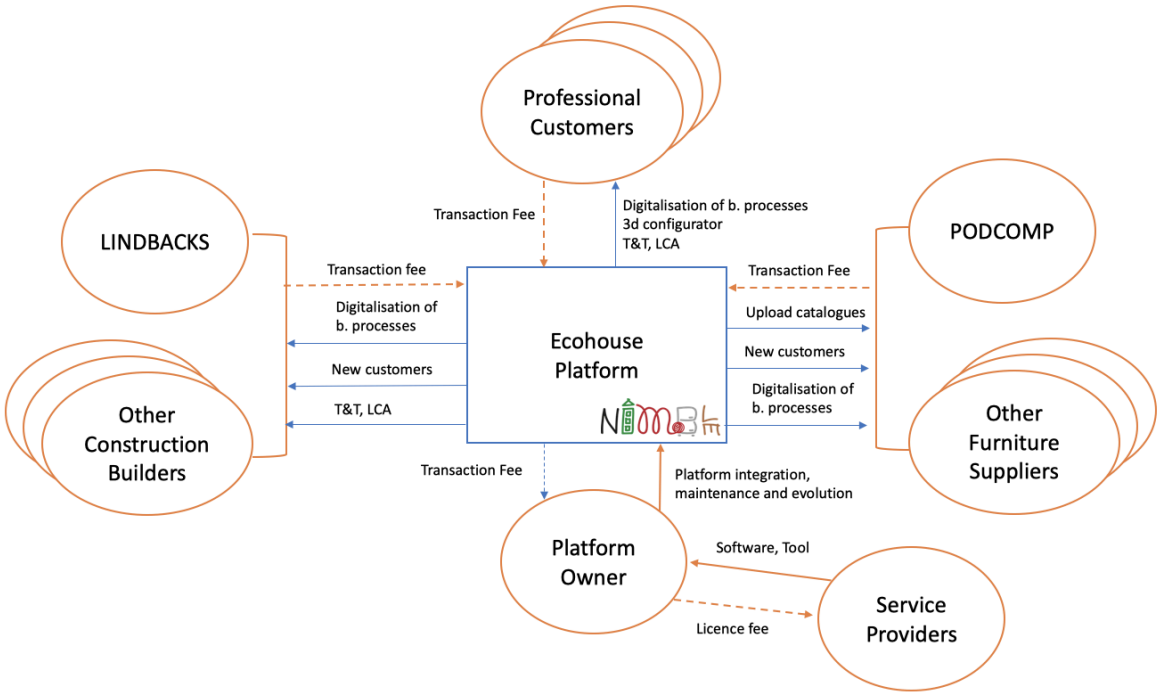


Figure 26 - Value sharing dynamics for the Ecohouse Platform.

At the centre of the schema, the platform is the enabler of a multi-sided business model, where the exchanged values are mainly the margin improvements due to the simplification of the communication and faster business processes (solid lines), as well as the access to valued-added services (solid lines), in exchange of payments (dashed lines) related to the actual number of transactions.

Further details are reported in the next subsection, where some hypotheses for the revenue model are discussed.

6.2.5 Revenue Model and Financial Analysis

As anticipated in the previous section, the revenue streams are planned to be based on the actual number of transactions on the platform. Currently, the hypothesis is that for each transaction on the Ecohouse platform a fee in the amount of 0,50 € will be charged. However, this is just an illustrative analysis, since the actual revenue model and pricing strategy can

be defined only once the Platform Owner will be identified and the platform will have reached a (pre-)commercial maturity (see Section 6.2.6).

The reported analysis (Figure 27) is based on first insights coming from project partners about costs and complexities for managing the developed Ecohouse platform and linked added-value services. Notice that, differently to other business cases, the analysis is limited to an estimation of the yearly costs and the necessary revenue streams to cover such a costs.

Specifically, the cost structure includes the costs for the high-performing server infrastructure, some personnel costs for managing and promoting the platform, a legal advice for operating the platform, in particular for what concerns GDPR, data protection and liability aspects. This lead to an annual cost of about 140.000 euros.

In order to cover such a cost, we estimated a minimum number of about 100 users making transactions on the platform. In fact, it has been estimated that:

- a typical business process form ordering to delivery contains at least 7 transactions;
- in average, there could be about 400 business process per year per user.

This leads to a total volume of transactions of about 280.000 units.

		Year 1			
		Unit Cost	*#Users*	*Volume*	*Revenues*
Revenue Streams					
	Transaction fee	0,50	100,00	280000	140.000,00 €
	TOT Revenues				140.000,00 €
Cost structure		Unit Cost		FTE	TOT
	Platform infrastructure management in-cluding security				12.000,00 €
	Legal advice, GDPR compliance				30.000,00 €
	Platform Business Manager	48000		1	48.000,00 €
	Customer support & Communication manager	33000		1,5	49.500,00 €
	TOT Costs				139.500,00 €
	Profit/Loss				500,00 €

Figure 27 – Ecohouse Platform Cost and Revenues estimation

6.2.6 Route to Market

The route to market for the Ecohouse platform firstly includes to advance from the current TRL 7 (system prototype demonstration in operational environment) to TRL 8 (system complete and qualified) and then TRL 9 (actual system proven in operational environment) with two distinct sets of activities and, thus, investments. Specifically:

To **reach TRL 8** the platform owner needs to resolve the following issues:

- Install automated software/code tests in all relevant platform components to ensure that employees can efficiently maintain the software and extend it without breaking platform functionality or introducing fundamental bugs. The estimated effort for this is 3 PM to get experience with the code plus 9 PM to write the tests.
- Usability improvement of:

    - the core functions (especially the negotiation and order process) to realize efficient workflows and improve comprehensibility. Estimated effort: 2 PM
    - the administrative interfaces (user and company profile management, company member management, platform analytics, trust management, tracking and tracing). Estimated effort: 2 PM
- Fix remaining bugs and perform bug bounty programme. Estimated effort: 4PM
- Prepare for data security audit with additional code and an instance-specific security risk assessment to ensure that platform-related procedures and data processing is not threatened. The estimated effort for this is 3 PM.
- Prepare for data privacy audit to ensure conformity with GDPR. The estimated effort for this is 2 PM.
- Perform a reliability test and improve reliability to >99% (<80 hours downtime per year) to ensure that companies can perform critical business processes in time. The estimated effort for this is 2 PM and an unknown infrastructure cost.

The advance to TRL 8 would thus require ~30 PM.

To **reach TRL 9** the platform owner needs to resolve the following issues:

- Extend the catalog ontology to cover as many products as possible in the construction industry. This is a continuous effort and requires international standardization activities (as currently in progress).
- Build up a customer/technical support process to efficiently identify and address technical and administrative issues. Estimated effort: 0.5 persons for 12 month for a total of 50k Euro
- Gain experience with unexpected cost factors. Estimated reserves for risk coverage:
    - Insurances (data loss, security breach): 100k
    - Additional resources to avoid performance shortage : 50k
    - Compensations payed to users for downtimes: 50k
    - Legal resolution for providing faulty/erroneous data: 50k
- Develop and test common NIMBLE API adapters for third party systems, especially from product information management. Estimated effort: 6 PM

The advance to TRL 9 would require approximately 12 months, 300k Euro additional investment and 6 PM development effort.

6.3 Textile Business Case

The textile business case was originally devised as a specific customization of the NIMBLE platform to support the existing supply chain structure of a textile company like Piacenza. The idea was to link all the SMEs of the production chain of the textile sector, setting for them a common language. In this way, they could be ready to operate with new actors on the market, exchanging technical data thanks to the use of standards. This could lead to a wider presence on the market, and open new frontiers of collaboration among actors of the textile value chain.

As reported in previous D8.12, the involved partners (Piacenza, Domina and ENEA) realized the opportunity to define a platform strategy for two distinct, more scoped, scenarios within the textile domain:

4) *Collaborative design scenario*. In this scenario, the platform ownership could be the joint effort of two types of entities: an IT provider (dealing with the platform infrastructure management) in collaboration with a textile and clothing association and/or a sectorial district association (dealing with the com- munity / commercial development). The focus of the scenario is developing a platform that enables a dynamic and trustworthy co-design of textile / clothing products.
5) *Certification of origin scenario*. This scenario focuses on the opportunity of developing a platform able to manage/issue certification of origin about textile/clothing products. In this case, the role of platform owner could be played by Customs offices (interested to govern / track the certification of origin) in collaboration with Textile/Clothing associations and/or Sectorial district associations.

The following picture summarizes the main data flow in the business case with the 2 main phase involved: (i) phase 1 deals with the certification of origin creation; (ii) phase 2 deals with the collaborative design interactions.

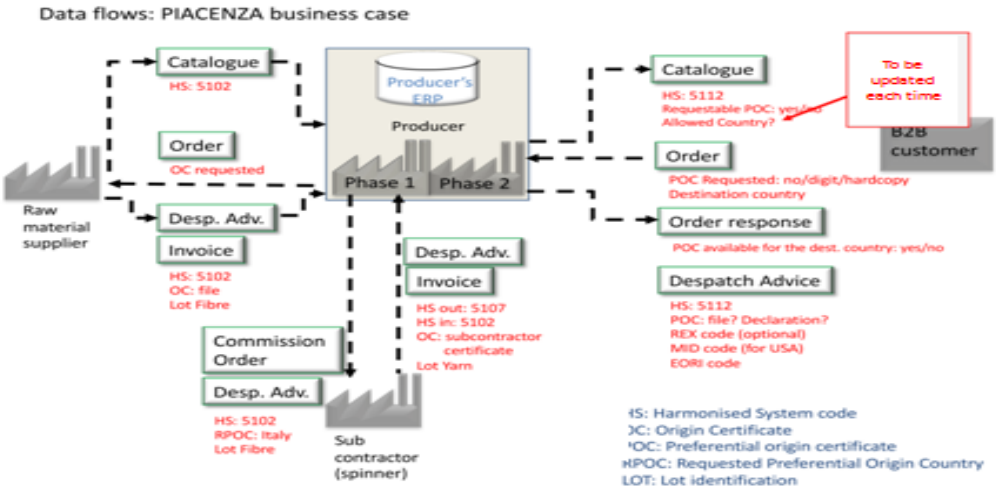


Figure 28 - Data Flow diagram of the Piacenza Business Case

During the last year's activities, from the business development perspective, the focus has been put on the Collaborative Design scenario, while the Certification of Origin features have been considered as an extra that could be integrated in a second stage.

This decision mainly followed by the availability of DOMINA to become a platform owner, with a concrete business idea of extending its current CAD and ERP offerings for textile companies with the collaborative design features developed within the NIMBLE project.

6.3.1 The Collaborative Design for Textile Industry Platform strategy

Figure 29 below reports the Platform Design Canvas that summarises the main outcomes of the devised platform strategy for the collaborative design and the certification of origin scenarios (joined into one unique canvas).

Below a brief description of the key elements of the analysis:

DOMINA has expressed its interest to become the **Platform Owner** of a solution that includes the main technology features developed in this business case. DOMINA is an IT company with great experience and contacts with companies in the textile sector. It is in fact a provider of ERP and CAD software customised for textile companies and it sees the opportuning of enhancing its software with novel functionalities that enables the collaborative design.

Partners: the main partner for running the platform is another IT provider that can host the platform on the cloud (currently DOMINA does not have relevant server infrastructures) and possibly other CAD/ERP suppliers that be interested to integrate the collaborative design features into their software.

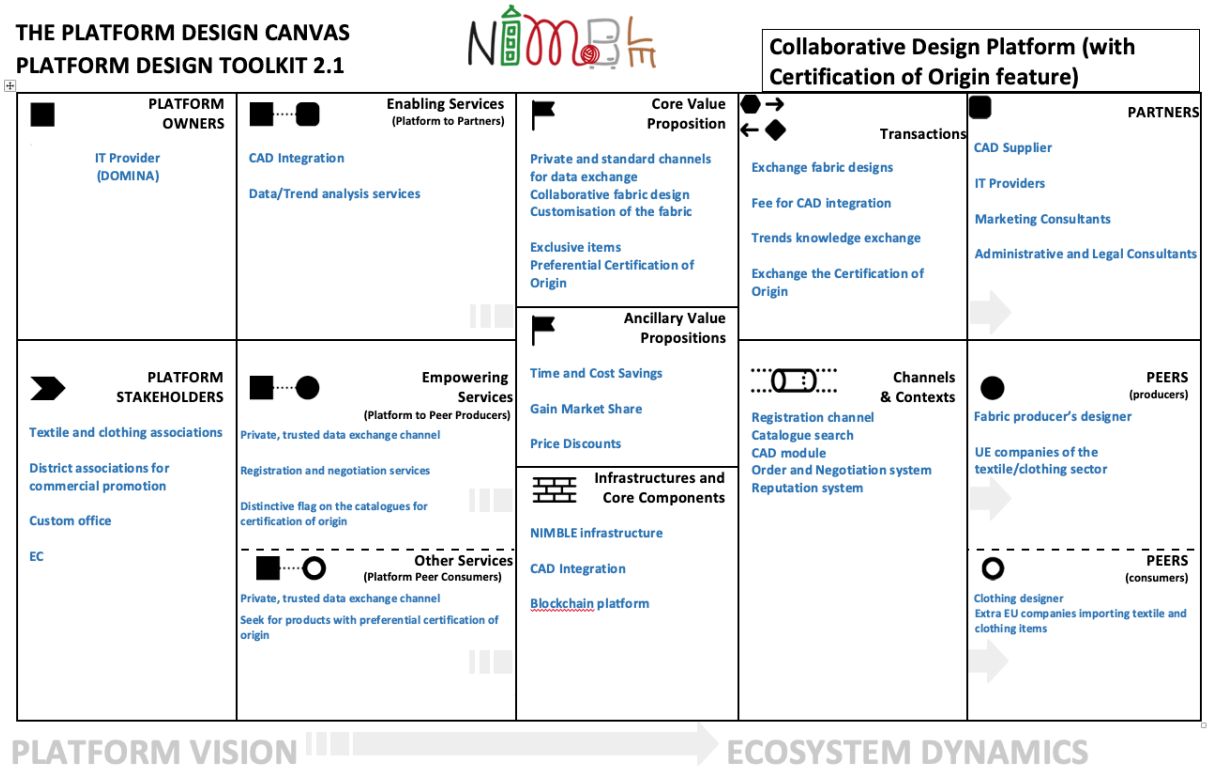


Figure 29 - Platform Design Canvas for the Collaborative Design for Textile Industry Platform.

Peers: focusing on the collaborative design scenario, the main involved peers are the fabric producers (e.g. Piacenza) and, more specifically, their designers that can collaborate with external designers, such as clothing designers, in order to create much more qualitative and valuable fabric designs for the customers (i.e. the clothing companies). If we also consider the certification of origin feature, we should include in the analysis the companies importing textile and clothing items (in particular outside the EU), which perceive the certification of

origin as a key, distinctive parameter when seeking textile/clothes in the catalogues of EU companies of the textile/clothing sector.

Other **Platform Stakeholders** includes organizations that support the companies in the textile/clothing sectors, such as industry associations, district associations as well as the EC, and can be interested to outcomes (impact) of the proposed solutions.

Platform Services: the main utility of the devised platform is to create standardized, bi-directional channels between the identified peers and, thus, reduce the friction for exchanging designs between fabric producers and external designers, in order to enable an effective collaboration. This is achieved within an environment that is already well known by the involved parties, such as CAD and ERP software (no need to learn another tool). In addition to that, the platform includes the possibility for fabric producers to register and negotiate with customers their products. In doing so, they can also flag their products with the certification of origin.

Value propositions: the effective and unified exchange of data will lead to the following immediate value propositions (core):

- Creation of collaborative and/or customised (for the single customer) fabric design;
- Creation of exclusive products;
- Creation of preferential purchase based on the issued certification of origin.

Then, in the mid-long term, it is expected to obtain the following value propositions (ancillary):

- Time and cost savings;
- Gain market shares;
- Introduce price discounts policies.

In terms of Infrastructure and Core Components, the platform is based on 3 main components:

1. The NIMBLE Infrastructure that implements all the necessary channels and Web interfaces for the secure and effective exchange of data.
2. The CAD software as external components that interfaces with the NIMBLE infrastructure through the NIMBLE APIs
3. The Blockchain platform for the track and tracing of raw materials and thus issuing the certification of origin.

6.3.2 Validation Activities

Validation activities are currently ongoing, engaging with different professionals (e.g. designers) from both PIACENZA and PIACENZA's suppliers, as well as some companies in the partners' network of DOMINA. A more detailed description of the validation activities will be reported in D7.3.

6.3.3 Market Analysis

The reference market for the DOMINA platform services is the Textile & Clothing Industry and specifically the fashion-luxury market. Luxury is one of the fastest growing markets worldwide and EU is THE absolute leader worldwide: 4 of the 5 largest conglomerates fashion-luxury groups are located in EU (LVMH, Richemont, Kering and Hemes). They exploit the peculiar competitive advantages of EU in design, quality and service and image for the so-

phisticated luxury market. Just to give some facts & figures from the Euretex Annual Report 2018[11]:

- With a household consumption of 520 Billion €, the EU-28 is the largest world market for textile and clothing products.
- In 2017, the EU Textile and Clothing industry reached a turnover of 178 billion €.
- After China, the EU is the world's second exporter in textiles and in clothing, with 23% and 28% of world sales respectively.
- World clothing consumption represents 75% of total Textile and Clothing consumption (estimates).
- The average size of companies is relatively low which explains why they principally trade within the internal market, with intra-EU exports representing 73% of EU trade to the world.

In addition to that, it is worth to highlight that this market is characterized by some very specific peculiarities, among which some ones are critical and can be addressed only by services such the ones envisioned in this business case.

- extremely high number of product variables in terms of style/material/colour
- deep customisation of products
- hardly predictable demand (i.e. shorter delivery requests)
- length of production cycle (rigid deliveries, i.e. quality of service)
- real prototyping (even if limited in the future) for style final choices
- physical sampling for purchase choice (rigid quality of product)
- fragmented distribution
- un-efficient vertical information transfer

Finally, the recent pheonomenon of re-soring, i.e. the return of production to Europe, is due to the increasing sensibility of consumers towards ethical, sustainable and ecofriendly production, which can be only franted by EU manufacturing. This tendency, joint with the custom rising form United States, explain the need of textile and clothing companies of a reliable and fast certification of origin of their products.

The combined effect of the increasing demand for high design goods and for sustainable one is making textile/clothing one of the most promising manufacturing sectors for EU manufacturing.

6.3.4 Value Sharing Dynamics and Revenue Model

Based on the overall business model emerged through the development of the platform strategy (summarised in the Platform Design Canvas reported in Section 6.3.1), the following picture depicts the main value sharing dynamics between the distinct involved actors.

At the core of the schema, the CAD and ERP software are the actual interfaces between the different actors. The software are enhanced with the collaborative design, catalogue search and product negotiation features that are enabled by the NIMBLE infrastructure. In addition, also the Certification of Origin (CoO) feature could be included in the service offering (in particular for labelling the products that has such a certification), provided that the availability of a blockchain platform that can deal with registering all needed steps for issuing a CoO (at this stage the blockchain element is not ensured for the future).

[11] https://euratex.eu/wp-content/uploads/2019/05/Euratex-annual-report-2018-LR.pdf

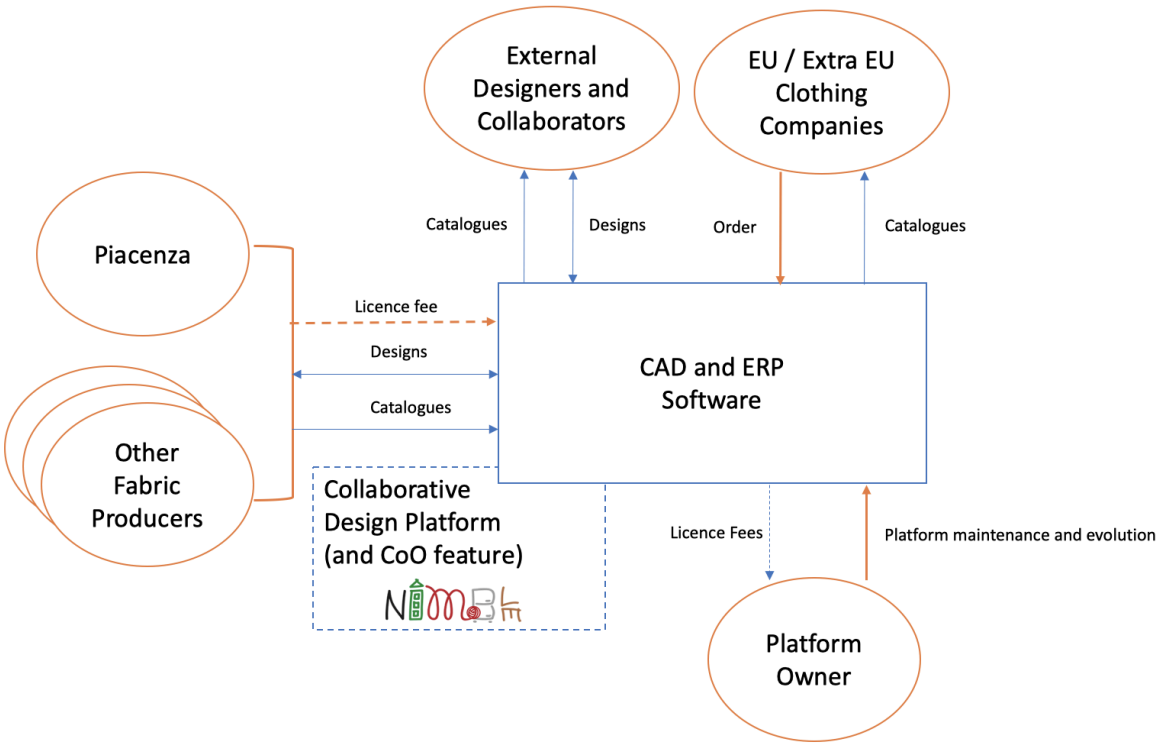


Figure 30 - Value sharing dynamics for the Collaborative Design platform as envisioned by DOMINA

The reference revenue model for this business case is based on licence fees payed by Fabric Producers to use the enhanced CAD and ERP software sold by DOMINA. As described in the following sub-section, DOMINA is already selling textile-specific CAD and ERP solutions to Fabric Producers by using the licence fee approach. The introduction of the NIMBLE capabilities will allow DOMINA to increase the cost of a licence. This will partly cover the internal costs for running and maintaining a NIMBLE instance, but also provide additional revenues to the company.

6.3.5 Business Plan and Route to Market

As anticipated in the previous sections, DOMINA plans to integrate some of the NIMBLE features into existing commercial products (software) of the company, namely:

- DOT.ERP[12]: where the feature for catalogue, negotiation and ordering management can be integrated (and possibly later introduce the CoO feature).
- DOT.CAD[13]: where the features of collaborative design can be integrated.

In both cases, the new features will be (initially) optional and, thus, it will be up to the fabric producers to include them or not. In addition, in the case of DOT.CAD and collaborative design, it is planned that each customer will have at its disposal about 15 accounts to manage it collaborators/employees included in the software license. If needed, additional accounts can be added and payed separately.

[12] http://www.domina-biella.it/en/software-solutions/dot-erp/

[13] http://www.domina-biella.it/en/software-solutions/dot-cad/

It is worth to highlight that the integration of both features in the commercial products of DOMINA will require some additional development work and proper testing and pre-commercial validation. Moreover, according to customer's needs, further personalization/improvements of the NIMBLE features are possible for the commercialization phase.

Therefore, DOMINA has currently devised a 3-years deployment plan rather than a proper commercialisation plan:

Year 1: the focus will be on carrying on the use of NIMBLE features in Piacenza in TRL7 conditions (current stage). Piacenza is in fact the first early adopter and will support DOMINA in designing the necessary improvements/customisation and thus reach a sound pre-commercial solution by the end of the first year.

Year 2: the new solution will be offered to other DOMINA consolidated customers for DOT.CAD and DOT.ERP. The new early adopters will upgrade to the pre-commercial solutions developed in Year 1, without supplementary fees to showcase new capabilities and promote customer retention.

Year 3: once the customer retention is achieved, it will possible to start charging for the annual fee payment. The annual fee of NIMBLE features will be included in DOT.ERP and DOT.CAD annual fee. The fee extensions for each function has be estimated to be around €2.500.

Among the DOMINA consolidated customers, the following one have been selected for becoming additional early adopters in year 2.

For extended DOT.CAD	For extended DOT.ERP
- Loro Piana (Luis Vuitton Group) - Tollegno 1900 spa - Moessmer AG spa	- Moessmer AG spa - Zignone Spa - Gruppo Zegna - Lanificio Cesare Gatti

The following table provides a summary of the expected investment of DOMINA for the next 3 years in order to start commercializing its products enhanced by NIMBLE features. In fact, for the first 2 years DOMINA will invest its own resources for moving the current project results to a pre-commercial product.

		Year 1			Year 2			Year 3		
		Unit Cost	*Volume*	*Revenues*	*Unit Cost*	*Volume*	*Revenues*	*Unit Cost*	*Volume*	*Revenues*
Fabric Produces										
	DOT.ERP (extra fee)	0	1	0,00 €	0	5	0,00 €	2.500	5	12.500,00 €
	DOT.CAD (extra fee)	0	1	0,00 €	0	4	0,00 €	2.500	4	10.000,00 €
				0,00 €			0,00 €			0,00 €
	TOT Revenues			0,00 €			0,00 €			22.500,00 €
Cost structure		Unit Cost	FTE	TOT	Unit Cost	FTE	TOT	Unit Cost	FTE	TOT
	Cloud Infrastructure, HW materials and SW licences			8.000,00 €			15.000,00 €			15.000,00 €
	Technical and Administrative Personnel	45000	1	45.000,00 €	45000	0,5	22.500,00 €	45000	0,5	22.500,00 €
	Platform Operation and Management	55000	0	0,00 €	55000	0,5	27.500,00 €	55000	1	55.000,00 €
	Marketing and Business Development	45000	0	0,00 €	45000	0,3	13.500,00 €	45000	0,8	36.000,00 €
	Added Value Support Services									
	TOT Costs			53.000,00 €			78.500,00 €			128.500,00 €
	Profit/Loss			-53.000,00 €			-78.500,00 €			-106.000,00 €

Figure 31 - Investment plans for the next 3 years

Only, during the 3rd year DOMINA will start to generate extra-revenues based on the new solutions. However, it is estimated that DOMINA will need to extend its customer base up to 50-60 paying companies in the following years to actually cover given the costs for running and managing/promoting the NIMBLE platform (considering only the extra-revenues).

6.4 White Goods Business Case

The White Goods business case started from the idea of exploiting the heterogeneous data management capabilities (Backend Connectivity and Interoperability & Intelligence services) of the NIMBLE Platform and its open interface towards third party's software for addressing the following needs:

- improve the flow of information from WHR customer service and field service back to the internal supply chain organizations;
- adoption of structured feedback mechanisms aims to deal with quality problems identi-fied by the field service in order to improve product design;
- place for fast and reliable exchange of different types of critical data;
- collaboration between a company and the external third-party SMEs offering field services to end customers;
- transactions of data and information without face-to-face interactions.

Throughout the project development, it emerged the opportunity/interest of involved partners (namely WHR, HOLONIX and BAL) to achieve a more challenging platform for trading data and information, involving multiple stakeholders. As the economy is based more and more on data, from acquisition to management and trade, the WHR business case has in fact explored how the NIMBLE Platform could be used to enable a fast, easily enabled, contract-related, polymorphic, trustworthy and standard data trade process within its network of partners in the value chain. These partners around the world are almost all SMEs that will need a tool able to create data-channels toward their IT systems in a smooth, simple way with as little programming effort and cost as possible.

Trading Data has several commonalities with physical products trading, and therefore the core business functions of NIMBLE. In fact, for an open data market there is the need for a catalogue to enable data-buyers to autonomously find the data interesting to them, a contract negotiation, to enable flexibility but within clearly defined boundaries, and a "logistic" which in the case of data is represented by the data-channel as the medium to "transport" the data from the IT system of the seller to the one of the buyer in a simple and smooth way, automatically generated once the contract is signed.

The following picture depicts the final reference scenario as it has been introduced in D7.1 - Value Proposition of NIMBLE for the White Goods Service Supply Chain.

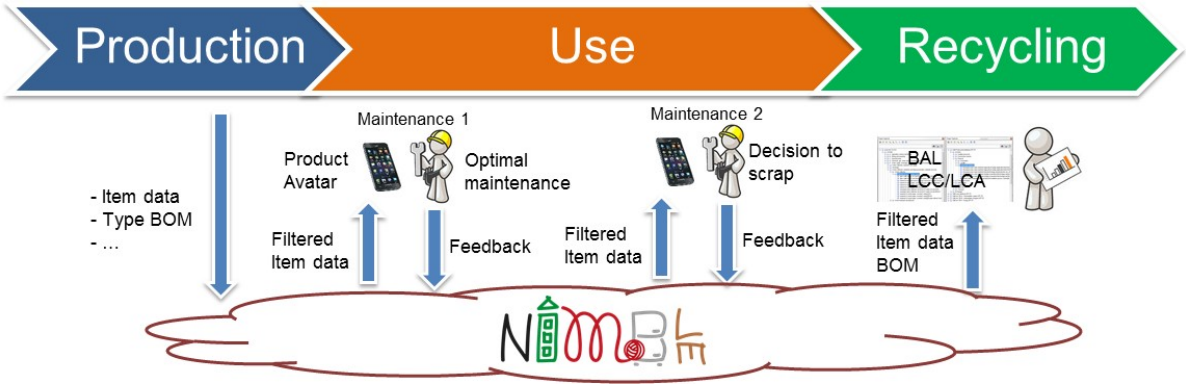


Figure 32 - Final reference scenario for the white goods business case

The final scenario supports the overall lifecycle of the physical good, where different actors are involved (Good and component producers, FTS and Recycling companies) demonstrating more business implications of the data marketplace and demonstrating more of the technical possibilities of NIMBLE.

Following the methodology introduced in D8.12 (based on the Ecosystem Canvas Platform Design Toolkit[14]), we developed a digital platform strategy for the envisioned scenario above.

6.4.1 The Data Trade for White Good Industry Platform strategy

Figure 33 below reports the Platform Design Canvas that summarises the main outcomes of the devised platform strategy.

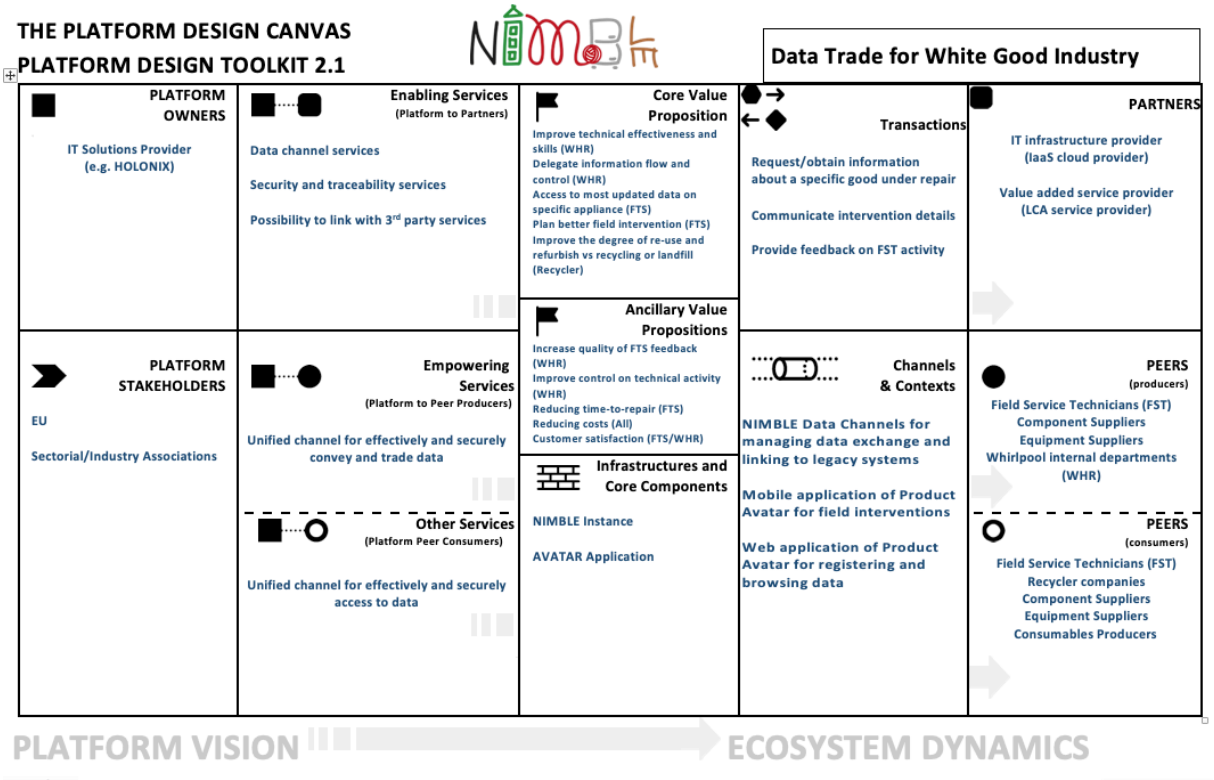


Figure 33 – Platform Design Canvas for the Data Trade for White Good Industry platform.

Below a brief description of the key elements of the analysis:

First, the **platform owner**, which it has been identified in an experienced IT/Platform provider that has the necessary skills for integrating (with some necessary customisation activities) the back-ends of medium/large good producers with the platform. At this stage HOLONIX has expressed its interest to possibly become a platform owner with WHR as its first early adopter. In fact, HOLONIX has a great interest in becoming a first mover in the market of platforms for data trading. And it also has the necessary contacts (e.g. recycler associations) for starting to populate the platform ecosystem. However, the final decision will depend on additional market tests that could be based on the integrated solutions developed within the White Good use case.

[14] https://platformdesigntoolkit.com/

Partners: the platform owner can be supported by external IT and Service providers. In particular a cloud IaaS provider for deploying the platform will be necessary. Moreover, external service providers can use the platform for link their value added services, such as LCA services.

Peers: the platform will mainly distinguish between data producers (sellers) and data consumers (buyers). Overall, we can report that Good, Components and Equipment suppliers (e.g. WHR) are data producers and aim to share and (in some cases) sell their data on the platform, while FTS and Recycler companies are interested to mainly interested to use the data accessible through the platform. Although, it is worth to highlight that some data consumers (e.g. the FTS) can also act as data producers. As reported in D7.1, in the reference scenario of the use case, the following main interactions have been defined:

- *Seller to Buyer*: In this scenario the data producer is the seller, who will not receive any feedback from the buyer on the activities carried out using the data. This is used by the recycling scenario, where recyclers acquire a single item Bill of Materials (BOM) to optimize the recycling process and logistics, but are not equipped to provide any feedback. Other possible scenarios have been evaluated but are not implemented in NIMBLE.
- *Buyer to Seller*: This scenario is technically equivalent to the previous, as both are one-way data exchanges. An example for the possibilities from this scenario is that the buyer of an appliance will provide his/her usage data in exchange for a discount of the appliance itself.
- *Two ways data channel*: in this case the contracts will set the data channel to enable the information exchange both from the seller to the buyer and from the buyer to the seller. In this way feedback from the data usage can be provided to the buyer, creating a positive loop of enrichment of the information. This scenario is used by the FST, where the real time IoT data are provided by the seller (WHR) to its repair centres network, while they'll provide feedback on the executed actions and activities to enrich the database and enable further optimized maintenance or recycle.

Other **platform stakeholders** include sectorial and industry associations, that can be engaged by the platform owner to support the onboarding of the users (in particular SMEs) into the platform, as well as other institutional organisations, such as the EC, that is very interested to develop data-markets (see the Horizon 2020 call DT-NMBP-40-2020 that aims to create an open market place for industrial data[15])

Platform Services: the utility of the platform is to create standardised, bi-directional, data channels among the different peers and, thus, reduce the friction for trading the relevant data. The peers do not need to use different tools for different providers, but they have a unique one-stop interface for the core services (accessing/sharing the data) but also for other added value services linked to the data (e.g. LCA or other data processing/analysis services). Of course, all data exchange processes will happen in a secure environment (no data leaks, only granted users can access the available data).

Value propositions: the effective and unified exchange of data will lead to the following immediate value propositions (core):

- Improve technical effectiveness and skills (WHR perspective)
- Delegate information flow and control (WHR perspective)
- Access to most updated data on specific appliance (FTS perspective)
- Plan better field intervention (FTS perspective)

[15] https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/dt-nmbp-40-2020

- Improve the degree of re-use and refurbish vs recycling or landfill (Recycler perspective)

Then, in the mid-long term, it is expected to obtain the following value propositions (ancillary):

- Increase quality of FTS feedback (WHR)
- Improve control on technical activity (WHR)
- Reducing time-to-repair (FTS)
- Customer satisfaction (FTS/WHR)
- Reducing costs (All)

Finally, as detailed in D7.1, from the **Infrastructure and Core Components** perspective, the platform Data Trade for White Good Industry Platform is based on 3 main components:

1. The NIMBLE Infrastructure (MVP Release) that implements all the necessary channels and Web interfaces for the secure and effective exchange of data. Specifically, the following NIMBLE modules have been adopted.

IT Component	Description	How it is used in WG	Added-value provided by the Component in WG
Front-end	Main access point into the NIMBLE platform for end-users, integrates various components for interacting with platform applications and back-end	No modifications, same usage as in MVP	Allows end-users the use of the components, including the ones exploited in WG
Identity	"Security" component managing user authentication, authorization, access control issues	Identity Management used also by AIS, which point to the specific NIMBLE Instance supporting WG	
Registration	Provides features for user and company registration	No modifications, same usage as in MVP	Allows registration of the adopters
Search	Provides search functionalities and communicates with the Catalogue to get information about products	No modifications, same usage as in MVP	Searches for product in catalogue
Publish	Provides administration of products and categories used for their semantic annotation, interacts with the data stores to get details about categories maintained as taxonomies	No modifications, same usage as in MVP	Publishes products which can be object of order and negotiation in WG scenario
Catalogue	Stores products and services persistently	No modifications, same usage as in MVP	Presents WG products for order
Negotiation	Provides functionalities supporting and augmenting negotiation between companies	No modifications, same usage as in MVP	Enables the negotiation in the use of the data monitoring option, at the base of the concept of data-trade
Matchmaking	Provides functionalities for matching companies, which are likely to fulfil each other requirements	No modifications, same usage as in MVP	No added-value for WG scenario except for default use
Business Process	Provides the definition of communication workflows among multiple supply chain partners and the execution of the designed	No modifications, same usage as in MVP	No added-value for WG scenario except for default use

	process through the Camunda BMP		
Data-channel	Provides functionalities for transferring, making available and filtering data	Exposes features and access points allowing integration and use of AIS	Enables the use of the AISs Advanced Product Avatar and BAL.LCPA Tool
Analytics	Performs analytics on collected data	No modifications, same usage as in MVP	Not used for supporting the WG scenario
Product Avatar (basic version)	Provides a mobile frond-end for IoT and PLM data retrieval and visualization	Integrates extensions concerning the use of AIS features	Enables advanced optional functionalities supporting WG
Logistics		No modifications, same usage as in MVP	Not used for supporting the WG scenario

2. The Product Avatar solution (3rd party component developed by HOLONIX) that implements the mobile app user interfaces for data consumers, including the possibility to send back some comments and information to data producers (e.g. from FTS).
3. The Life Cycle Performance Analysis (LCPA) is one of the additional services available on NIMBLE. The BAL.LCPA (BALance Life Cycle Performance Analysis) tool is a commercial tool which offers evaluation services on request for NIMBLE products. The tool facilitates the LCA (Life Cycle Assessment) and the LCC (Life Cycle Costing) in parallel by taking product data from the platform via an API, performing the calculations and returning the results to the platform using the same API (see D5.3 Cost and Ecological Footprint Estimation for Product Life Cycles). This service can be the basis for Recycler companies to assess the market value of disposed white goods, in terms of available valuable materials within the specific white good. The actual market prices of the valuable materials (gold, copper, iron, etc.) are stored in the tool and are updated on a daily basis. By using the purchased WHR data the recycler can decide whether he/she takes the scrap or not and how they will process it.

6.4.2 Validation Activities

A business validation of the developed prototype of the platform has been performed by WHR and its results reported in D7.1. In the following, we just report the main findings, distinguishing between data producer, data consumer and platform owner perspectives.

Data producer perspective (WHR)

Although a monetary evaluation of a data-set is very difficult to assess at this stage (due to the lack of a real market), a data producer like WHR can see a lot of benefits of using a digital platform for trading data, provided that the platform owner will be able to ensure:

- *Stability*: the platform functionalities and performances should be guaranteed for a medium to long term (minimum 5 years) in order to build relationships and explore potential new trading opportunities
- *Flexibility*: the platform should be able to be interfaced with legacy systems or new applications in an easy and fast way.

- *Open to future evolution*: as soon as a standardize way to govern data sharing will be present (e.g. Industrial Data Space Association, https://www.internationaldataspaces.org/) the platform should be adhere to standard.
- *Open to innovative revenue model*: platform owner should be able to find alternative way to ensure income other than fees from users.

In terms of expected benefits (beyond possibly monetary returns due to the trading of data), WHR highlights the following key aspects:

- Improve effectiveness of FTS for Whirlpool which has a direct impact on:
  - reducing cost for appliances under the warranty period;
  - increasing the customer loyalty on all the appliances.
- Collect valuable feedback from FTS that can be aggregated and analyzed to derive useful insights about data, components, goods quality.

Data consumer perspective (FTS)

The main advantage is that they could have a single point of contact to several appliance maker through the platform, which should offer:

- *Standard Interface*: the interaction with product avatar and the way data is presented should be maintained in time and independent from the data producer.
- *Semantic Consciousness*: meaning that data interpretation should be more and more embedded as a service provided by platform, reducing the need for alignment meetings and training with data producer

Platform owner (HOLONIX)

The analysis highlighted two main aspects:

- There is a clear immediate benefit in adopting the NIMBLE core service for supporting large-medium enterprises to overcome their data-lake issues and, thus, support them in merge and manage their multiple data sources and effectively share them with external partners.
- Once this process of unifying data sources will be completed, the actual data trading part can really start. Being the frontrunner in this space is a huge advantage, but also a risk; in fact, if the market is not ready, the platform will not have enough volumes and sales to be sustainable.

6.4.3 Market Analysis

Following the considerations reported in the platform owner perspective above, we can firstly consider the positioning of the NIMBLE + Product Avatar solution within the market of the Field Service Management (FSM) software. FSM technology was created to help automate field service operations to improve both efficiency and visibility. Rapid adoption from businesses of every type and size is fueling FSM software market growth. Despite, or perhaps because of, this rapid growth, FSM soft- ware vendors have struggled to keep pace with consumer mobility trends and customer ex- pectations— until recently. Now, rapid business technology advancements and economical Software-as-a-Service (SaaS) deployment options are fueling FSM software market growth. Companies now demand real-time tracking, strong collaboration between office and field workers, and other tools and enhancements that allow technicians to accomplish their tasks without any delay or interruption— all at an affordable price.

One of the key trends that will gain traction in the field service management (FSM) software market is the integration of IoT solutions in FSM tools. The adoption of IoT-enabled devices in the field service industry enables enterprises to improve their services by monitoring equipment performance. Moreover, it also helps enterprises to enhance customer satisfaction and aids in the reducing the cost of service calls by decreasing the equipment downtime and improving the productivity of the technicians.

It is worth to highlight that FSM software market is highly competitive due to the presence of many vendors. However, current offerings mainly include tools for:

- customer appointments, trouble ticketing, order management;
- complex scheduling and routing optimization;
- managing worker activity (driver logs, time tracking, job status updates);
- automatically locating vehicles and ensuring driver safety;
- integrating with inventory, accounting, and other back-office systems

In other words, they are limited to managing activities of the single Field Service companies. But, A field service management system that integrates with existing CRM or ERP systems is critical, as information that is captured in the field often needs to be available across several departments. Enterprises, especially those with multiple departments/plants, should focus on integrating information across all business units.

In this context, the NIMBLE + Product Avatar capabilities described in this business case can represent a valuable add- on/complement to the current FSM offerings that with a cloud-ready solution will be able to ensure integration up to the manufacture production facilities of the linked Global Product Organizations. Moreover, NIMBLE can create a marketplace of many field service providers linked to a Global Product Organization, rising competition and increasing service quality standards.

In view of moving towards the full realization of the Data Trade for White Goods Industry Platform, we should consider that in the last years, many players emerged with the core business of trading data: Apple I-Tunes, Netflix, Amazon are already selling data to end consumers in the form of music files, video streams, e-books etc. In addition, there is a growing consensus and awareness that Digital data is an essential resource for economic growth, competitiveness, innovation, job creation and societal progress in general. According to the EC[16], the value of the EU data economy was more than €285 billion in 2015, representing over 1.94% of the EU GDP. Due to a year-on-year growth rate of 5.03%, this value increased to €300 billion representing 1.99% of the GDP in 2016. If favourable policy and legislative conditions are put in place in time and investments in ICT are encouraged, the value of the European data economy may increase to €739 billion by 2020, representing 4% of the overall EU GDP. As part of the EU Digital Market Strategy, the Commission intends to support the creation of a common European data space — a seamless digital area with the scale to enable the development of new products and services based on data. Data should be available for re-use as much as possible, as a key source of innovation and growth. This mainly involve “promoting the re-use of public and publicly funded data” but also “assessing the need for further action on access to and re-use of private sector data”. The latter includes the development of B2B and B2G platforms like envisioned in the present business case.

[16] https://ec.europa.eu/digital-single-market/en/news/final-results-european-data-market-study-measuring-size-and-trends-eu-data-economy

In this context, the Data Trade for White Goods Industry Platform will be one of the first players in the market able to act as an open marketplace for data, and has to be considered therefore as a frontrunner of this concept, being thought 3 years before the idea arrived in the EC call and having now a working demonstrator of the overall solution.

6.4.4 Value Sharing Dynamics

Based on the overall business model emerged through the development of the platform strategy (summarised in the Platform Design Canvas reported in Section 6.4.1), the following picture depicts the value sharing dynamics between the distinct involved actors.

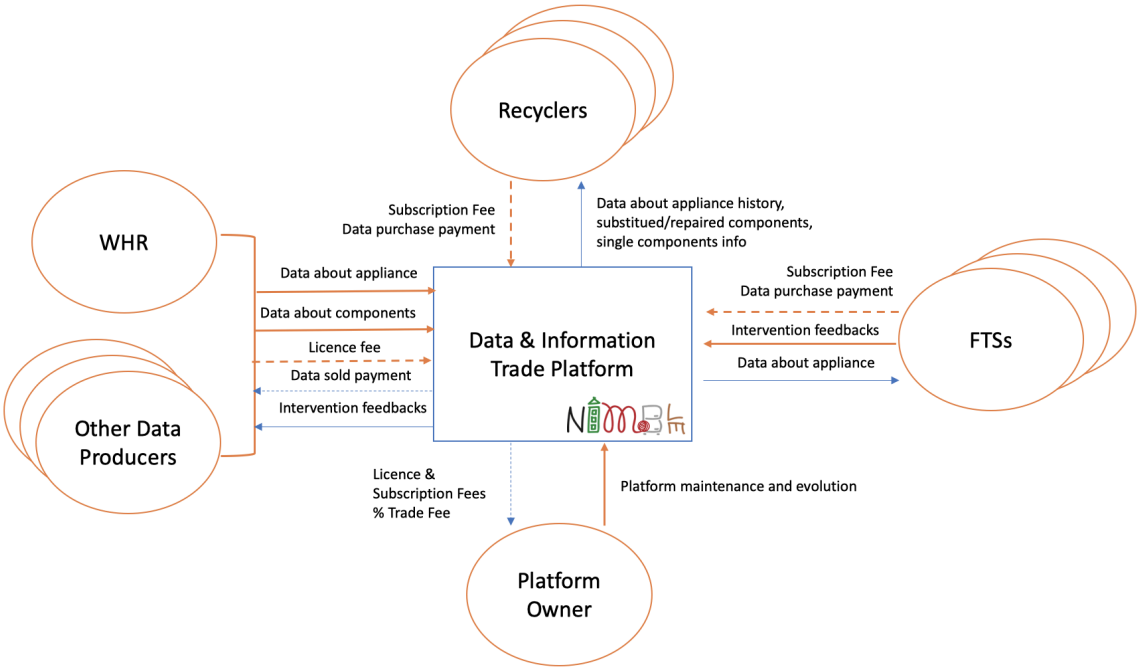


Figure 34 – Value sharing dynamics for the Date Trade for White Goods Industry Platform.

At the centre of the schema, the platform is the enabler of a multi-sided business model, where the exchanged values are mainly data (solid lines) and payments (dashed lines).

The model captures the opportunities of using the platform for both (i) initially merge and sharing data from WHR and Other Data Producers to FTSs and back to Data producers, and (ii) then trade the data between Data Producers and Consumers (FTSs and Recyclers).

Further details are reported in the next subsection, where some hypotheses for the revenue models are discussed.

6.4.5 Revenue Models

The revenue model for the platform can be quite articulated and dependent on many variables, such as:

- The type of user (producer vs consumer).
- The sharing of data during the warranty period or after the warranty period.
- The activation or not of the trading capabilities.
- The possibility of introducing revenue models linked to the actual effectiveness of the platform.

It is worth to highlight that the actual mix of revenues models will be up to the Platform Owner and it most likely will evolve throughout the time, according to the maturity of both technical and market aspects. At this stage, we can just formulate some possible hypothesis.

Data Producers – Licence Fee.

The first option for a Platform Owner is to propose a License Fee model to Data Producers in order for them to start merge and share data through the platform. The license will include:

- An initial cost for enabling the interconnection of the different data-lakes of the data producer to the platform, as well as other custom features.
- An annual fee to cover platform management and maintenance cost, help desk, training etc.

The license could be also different according to the number of possible data consumer connections (e.g. > or < a given number).

Warranty Period vs After Warranty Period
During the warranty period, data producers have great interest to share data with FTSs, because the costs for interventions are up to them. Therefore, they aim to improve, as much as possible, the effectiveness of the FTS interventions, in order to avoid that the same issue will raise again. In the same way, the FTS feedback about the performed intervention could be very important to learn about possible design issues in the specific white good. In this view, during the warranty period the Data Producers could not charge any cost to FTSs to access their data (no data trade). Instead, in the after warranty periods, the intervention costs are up to the end-user, therefore the Data Producer can be interested to charge data access costs to the FTSs that in turn can charge the end-user for a more rapid and resolute intervention.

Innovative Revenue Models
With the actual use of the platform, the platform provider will start to collect a lot of information about the platform performances in terms of KPIs. For example, it could be able to "measure" the savings a Data Producer has achieved thanks a more effective data sharing with FTSs. In this view an attractive model for Data Producer is to link the license fee to the actual savings that can be measured through the platform. Specifically, Platform Owner and Data Producer can agree on a basic / cheap annual fee for using the platform. Then, yearly the Platform Owner can receive a Bonus proportional to the actual measured savings of the Data Producer (i.e. X% of the total savings). Of course, this is a high risk for the Platform Owner that can properly weight it only after an adequate operating period of the platform with selected early adopters.

Data Consumers – Subscription Fee, Data Purchase Payments and Transaction fee.

From the data consumer perspective, the Platform Owner can offer the access to platform services through a Subscription Fee. Differently to the Data Producers, the costs for onboarding them is much less, since they just need to access to their user interface (mobile or web). This can be covered by a monthly/annual subscription fee that will give them access to the basic functionalities (e.g. search). The subscription fee could be different between FTSs and Recyclers since they will use different user interfaces and will access to different data sets. For example, in the case of recyclers the user interface can be the BAL.LCPA tool, which is provided by an external service provider, and thus the subscription fee could be higher.

Within the respective applications, the data consumers can purchase data and the payments will be issued to the data producers. As introduced above, in the case of FTSs, if the appliance is in the warranty period, there would not be any payment. Whilst in the case applianc-

es in the after-warranty period for FTSs and in any case for the recycler companies, the data purchase will be linked to a payment through the platform. For the transaction, the Platform Owner can charge a fee (e.g. in the range between 2% and 7% of the payment).

6.4.6 Pricing Strategy and Financial Analysis

Just to provide an illustrative instantiation of the revenues models hypotheses introduced above, the following table summarises a financial analysis of running the Date Trade for White Goods Industry Platform for 3 years.

The reported analysis (cost structure and pricing strategy) are based on first insights coming from project partners about costs and complexities for managing the NIMBLE platform and the analysis of other existing digital platforms for what concerns the pricing strategy. However, it is worth to highlight that the actual figures could be defined by the Platform Owner, only after running the platform in a pre-commercial environment.

		Year 1			Year 2			Year 3		
		Unit Cost	*Volume*	*Revenues*	*Unit Cost*	*Volume*	*Revenues*	*Unit Cost*	*Volume*	*Revenues*
Data Producers										
	Connection/Customisation fee	10.000	1	10.000,00 €	10.000	5	50.000,00 €	10.000	10	100.000,00 €
	Annual Licence (up to 500 users)	15.000	1	15.000,00 €	15.000	4	60.000,00 €	15.000	7	105.000,00 €
	Annual Licence (more than 500 users)	35.000	0	0,00 €	35.000	1	35.000,00 €	35.000	3	105.000,00 €
FTS										
	Annual Subscription fee	120	200	24.000,00 €	120	1200	144.000,00 €	120	3000	360.000,00 €
Recyclers										
	Annual Subscription fee	600	20	12.000,00 €	480	80	38.400,00 €	480	200	96.000,00 €
Trade Fee										
	FTS Data Purchase	0,14	76800	10.752,00 €	0,14	460800	64.512,00 €	0,14	1152000	161.280,00 €
	Recyclers Data Purchase	7	24000	168.000,00 €	7	96000	672.000,00 €	7	240000	1.680.000,00 €
	TOT Revenues			239.752,00 €			1.063.912,00 €			2.607.280,00 €
Cost structure		Unit Cost	FTE	TOT	Unit Cost	FTE	TOT	Unit Cost	FTE	TOT
	Cloud Infrastructure, HW materials and SW licences			12.000,00 €			60.000,00 €			130.000,00 €
	Technical and Administrative Personnel	45000	3,5	157.500,00 €	45000	6,5	292.500,00 €	45000	10	450.000,00 €
	Platform Operation and Management	55000	0,5	27.500,00 €	55000	1	55.000,00 €	55000	1,5	82.500,00 €
	Marketing and Business Development	45000	2	90.000,00 €	45000	3	135.000,00 €	45000	4	180.000,00 €
	Added Value Support Services			7.200,00 €			15.360,00 €			38.400,00 €
	TOT Costs			294.200,00 €			557.860,00 €			880.900,00 €
	Profit/Loss			-54.448,00 €			506.052,00 €			1.726.380,00 €

Figure 35 - Financial Analysis

We started from the definition of the possible Cost Structure for running the platform, which mainly includes the following items:

- Cloud infrastructure, HW materials and SW licences;
- Technical personnel for daily IT operations, for maintaining and improving the platform;
- Administrative personnel for managing payments and other administrative activities;
- Platform Operation and Management, for coordinating the team of people dealing with the platform and interfacing with existing customers;
- Marketing and Business development, for promoting the platform adoption and the development of the business based on the platform;
- Payments of added values services integrated in the platform (e.g. LPCA service).

The cost for managing and developing the platform is expected to growth throughout the 3 years with the increase of the number of users and the possibility to improve the available platform features and added value services.

For the Pricing Strategy, we based on what reported in the Revenue Models section.

For Data Producers we expect a fixed, initial payment (10.000 euros, although it could change case by case) for setting up their connection to the platform and then an annual li-

cense fee that depends on the number of data consumers that can be linked to their data channels.

Data Consumers pay an annual (but it could be also monthly) fee which is low for FTS (120 euros/year) and higher for recyclers (600 euros/year), since the latter will benefit of a more complex tool for accessing and exploiting the data.

In addition to standard license fees to use the platform, the actual revenues for the Platform Owner will derive from the data trading on the platform. For this part, we made a hypothesis of a 7% fee for all data purchases.
It is very hard now to quantify the cost of a unitary data purchase, but we assumed that for a FTS the price could be 2 euros (and thus the earning for the Platform Owner is 0,14 euros) for each acquisition, while a Recycler company might pay about 100 euros (and thus the earning for the Platform Owner is 7 euros) for accessing to data about a single appliance.

In terms of expected volumes, we have been quite conservative, assuming a slow adoption rate due to the overall immaturity of this market, considering that for each new data producer connected to the platform there could be about 200 FTSs that can be interested to use the platform services. For calculating the volume of data purchases (Trade fee part), we made an estimation on the average number of data purchase in a year:

- FTS might need the data for 4 technical interventions in each working day. But only 40% of them will be out of warranty and thus need to be purchased (under warranty they are free).
- Recycler company might need the data for 100 white goods in a month.

Based on these analysis, we expect a loss for the Platform Owner in the first year. A lot of work needs to be done from the technical and marketing/business development perspective to start generating enough revenues and sustain the platform. In particular, it clearly emerges that the license fees are not sufficient. The actual economic value will come from the data trading.

6.4.7 Route to Market

NIMBLE includes also an extremely innovative concept of trading data within a marketplace, where these are accessible from a catalogue and can flow from a company to another using a self-configured data channel able to manage polymorphic data. This is a quantum leap compared with the current expensive closure, rare disclosures and hardwired connections among different company IoT systems.

As part of the business case development, the original scenario has been extended to include a new class of stakeholders (namely the Recycler Companies) that, as emerged from all the analysis reported in the previous sections, could (i) have a large benefit from adopting the Data Trade for White Goods Industry Platform and (i) represent a relevant market for the Platform Owner to make profit. In fact, as also reported in D7.1, according to the Italian roadmap on Recycling, we can assert that:

- The Italian separate collection and recycling system coped with the crisis better than others.
- Excellent results for all the recycling pipelines.
- With 33 million tons of recovered materials, Italy is a leader in the EU, only second to Germany.

- Recycling allows to save 53 million tons of CO2, i.e. 10% of Italy's emissions.
- 200 million tons of materials, worth US$90 billion, are handled on the global market.
- The recycling industry is a key component of the European green economy with over 500.000 employees.

Therefore, for implementing the platform strategy presented in Section 6.4.1, two different communities (FST, Recycler) will be approached separately and using two distinct channels:

1) **FST - Field Service Technicians**. FST partner network is coordinated through Consumer Service department, a unit of Whirlpool EMEA based in Fabriano Headquarters. FST are usually SME that operate in the country, very often with non-exclusive contracts. The FST that will be contacted to ask for the participation in NIMBLE needs to have some special characteristic: medium sized; strong partnership record; openness to collaborate. Consumer Service department will thus select an initial list of FST that will be asked to register in the platform and that will be exposed to the demo.

2) **Recycler**. Recycling is a very fragmented world in the field of WG (White Goods) and there is no formal contact between Whirlpool and recyclers. So, we have contacted ECODOM which is a consortium of more than 100 SMEs operating in the sector and acting as a formal validator. ECODOM has already participated in research projects with Whirlpool and can provide a solid contribution. We will also contact Consorzio Remedia, the second largest recycling consortium in Italy. If we manage to get interest from both consortia, we would reach almost 80% of the recycled white goods appliances in Italy.

In parallel to those commercial activities, the Platform Owner will need to further invest on the platform technical finalization and carry on the cooperation with WHR as early adopter of the Platform.

7 Conclusions

The analysis carried out in this document are part of continuous work performed in the scope of Task 8.7 and reported in the project Business Plans (D8.11, D8.12, D8.13) and Innovation, Exploitation and Standardisation reports (D8.15, D8.16).

Starting from the outcomes reported in previous D8.12 and D8.15, the present deliverable:

- Gives a summary and update of the NIMBLE solutions (as exploitable results) and their innovative aspects, including the federated approach.
- Provides an update on the NIMBLE exploitation strategy to follow, including the platform governance aspects.
- Provides a more comprehensive analysis of the project business cases that have been initially reported in D8.12 by reviewing the devised platform strategy based on the NIMBLE platform and then introducing some hypothesis for the business plan and the route to market to implement such a strategy.

Specifically:

- In Section 3, we reported a brief description of NIMBLE and its exploitable results;
- In Section 4, we analyzed the innovation potential of NIMBLE, in terms of:
    - *Opportunity*; i.e. the market context where NIMBLE will operate, including: trends, drivers, customers' expectations, etc.
    - *Value added*; i.e. the ability of the NIMBLE solution to address the existing needs.
    - *Competitive landscape*; i.e. existing/potential competitors.
    - *Unique selling points*; i.e. the main factors that will make the NIMBLE solution emerge.
- In Section 5, we introduced the main exploitation lines devised for NIMBLE and reported about the Consortium decision to focus on an open source-based strategy. The selected strategy has led to the need for business leadership for launching new NIMBLE platform instances on the market. Therefore, as part of the NIMBLE Platform Launch Manual we devised a methodology to support new potential platform owners to define their own platform strategy. In addition, a platform governance strategy for NIMBLE has been investigated and the main outcomes reported.
- In Section 6, we reported how we applied the devised strategy to start defining a platform strategy and a preliminary business plan for the 4 project business cases.

Finally, although this deliverable represents the report for the final business plan, the technical, validation and business development for the distinct business case will continue till the end of the NIMBLE project. Therefore, we expect to improve some of the reported analysis, such as the revenue models and the financial analysis. In fact, for example, new insights about operation costs and business values could be derived from the ongoing validation activities, as well as new business opportunities might emerge from dissemination/community building activities. In this view, the final exploitation report will be the opportunity to report changes and/or improvements to the current business case descriptions.

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ANNEX 1 – List of main Canvas of the Platform Design Toolkit for the FMP case

The Target Ecosystem is depicted in the canvas below. It includes any actor in the supply chain of the furniture manufacturing industry (e.g. manufacturers, suppliers of materials, service and logistics providers and retailers). Within this target group, the most relevant segment includes SMEs. In a first stage, the focus is on Spanish companies, but in the mid and long-term the idea is to extend the audience to other EU countries according to the value-chain of the companies registered in the FMP.

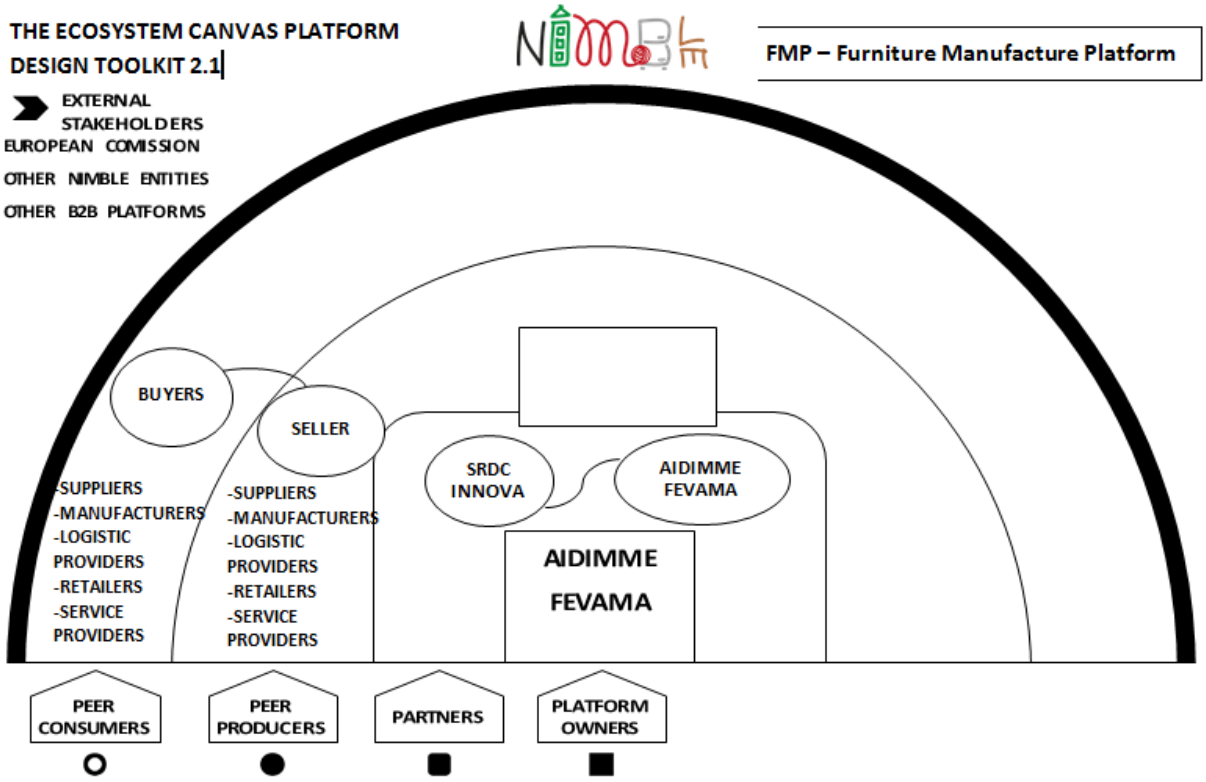

Figure 36 - FMP Ecosystem Canvas

The following Entity Portrait Platform canvas shows the current Goals and Performance Pressures of AIDIMME and FEVAMA (as Platform owners) and the expected Gains by implementing the platform.

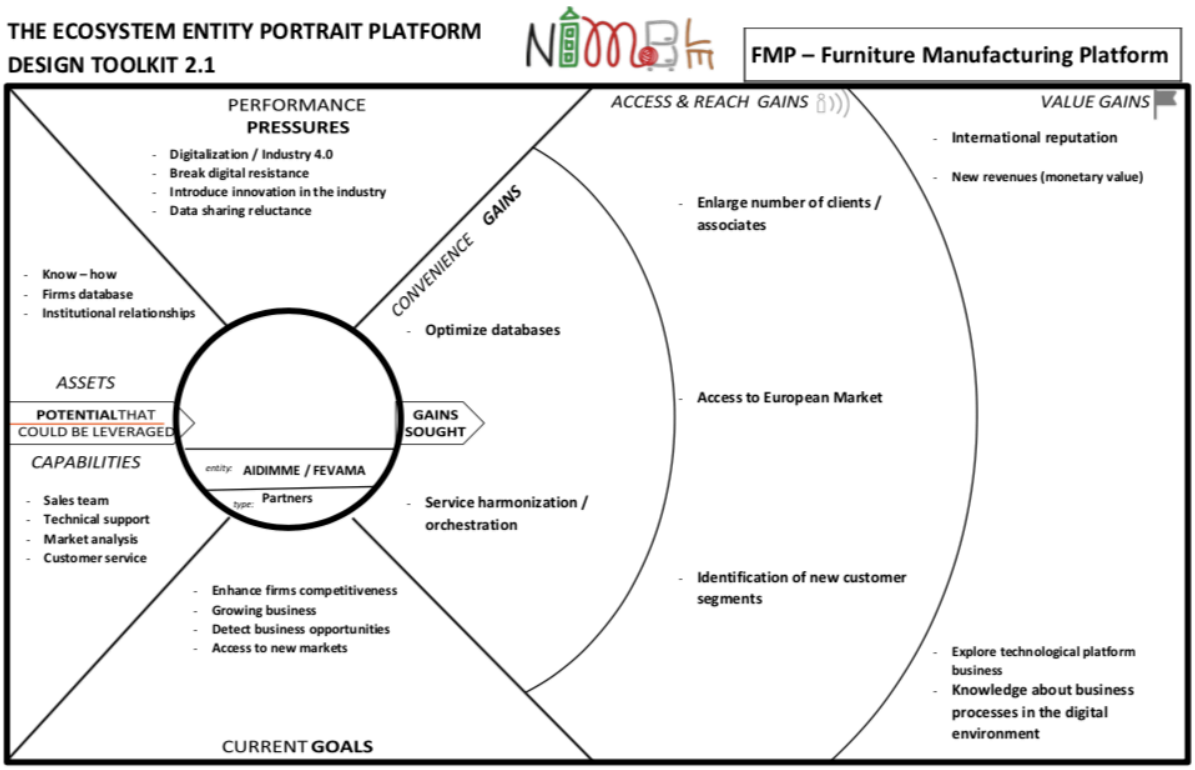

Figure 37 - FMP Entity Portrait Canvas

The following Motivation Matrix captures the value emerging from the transaction between all key actors of the target ecosystem with the P2P interactions.

THE ECOSYSTEM'S MOTIVATIONS MATRIX PLATFORM DESIGN TOOLKIT 2.1

FMP – Furniture Manufacturing Platform

gives to →	AIDIMME / FEVAMA	MICUNA	SRFG / SRDC	PEER PRODUCERS: SUPPLIERS, MANUFACTURERS, LOGISTIC AND SERVICE PROVIDERS	PEER CONSUMERS: MANUFACTURERS, CONTRACT CUSTOMERS, RETAILERS
AIDIMME / FEVAMA (Pa / PP / PC)	• Industrial and institutional support • Technical support collaboration	• Platform advantages due to participation in FMP – NIMBLE	• Instantiation in a real industrial environment • Validation with real users	• Digital service • Platform administrator • Visibility at European level • Engagement	• Digital service • Platform administrator • Visibility at European level • Engagement
MICUNA (Pa / PP / PC)	• Platform tester validation • Requirements definition / elicitation • Procedure detailing • Supply chain engagement			• Suppliers engagement • Cocreation	• Suppliers engagement • Cocreation
SRFG / SRDC (Pa / PP / PC)	• Technical development of platform • Technical suport • Connection to other instances			• Access to other platform instances (e. G. MVP – EU)	• Access to other platform instances (e. G. MVP – EU)
PEER PRODUCERS: SUPPLIERS, MANUFACTURERS, LOGISTIC AND SERVICE PROVIDERS (Pa / PP / PC)	- Monetary value - Reputation			• Negotitation and business • Access to new markets	• Negotitation and business • Access to new markets
PEER CONSUMERS: MANUFACTURERS, CONTRACT CUSTOMERS, RETAILERS (Pa / PP / PC)	- Monetary value - Reputation	- Negotiation and business - European contacts	• Success of the pilot FMP	• Negotitation and business • Access to new markets	• Negotitation and business • Access to new markets

Figure 38 - FMP Ecosystem's Motivation Matrix

To do business on the platform, the identified peers (both producers and customers) need to register and, after validation, they can publish their catalog of products and/or services, and thus begin to:

- Search for products and / or services.
- Obtain immediate information about the products / services and their availability.
- Contact companies and initiate negotiation processes with the most appropriate suppliers.

The following Transactions Board captures and details a portion of the expected transactions between buyers and sellers. Moreover, it also introduces the possible transactions between the platform owners and the technical providers for future improvements of the FMP instance.

THE TRANSACTIONS BOARD PLATFORM

FMP – FURNITURE MANUFACTURING PLATFORM

E1	Transaction/ Interaction	E2	Currency/ Value Unit	Channel or Context	Notes
Buyer	Information request	Seller	Information request	FMP	
Buyer	Information response	Seller	Information	FMP	
Buyer	Negotiation process	Seller	Feedback, quotation, networking	FMP	Retailing, prices, shipping, etc.
Buyer	Pre - order	Seller	Pre - order	FMP	
Buyer	Scoring	Seller	Reputation, trustability	FMP	
Platform owners	Development of FMP improvement Support and maintenance	Tech parties	Improve user experience, stability	FMP / mail / phone	Troubleshooting
Platform owners	Solutions	Tech parties	$, €	WEB? / LIVE?	

Figure 39 - FMP Transactions Board

The following Learning Engine Canvas foresee the opportunity for platform users (as producers and as sellers) to progressively earn the role of “Key Partner” and gain more visibility in the ecosystem.

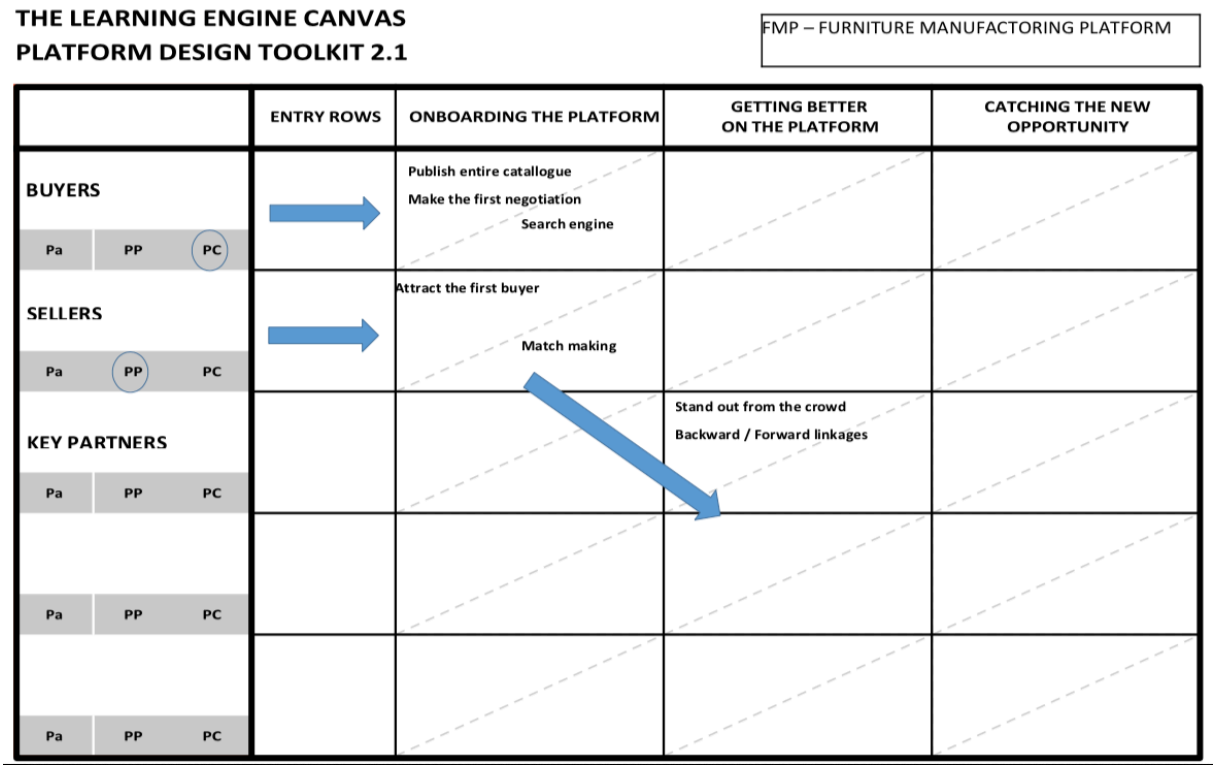

Figure 40 - FMP Learning Engine

The following canvas reports a high level design of the core FMP experience, depicting the process for a company to register to the platform, publish its catalogue and start making business with other peers (customers and service providers such as logistic companies). In the same canvas, the partners have already identified key elements of the platform business model: core value proposition, the main technical components, a list of expected costs and the revenue model.

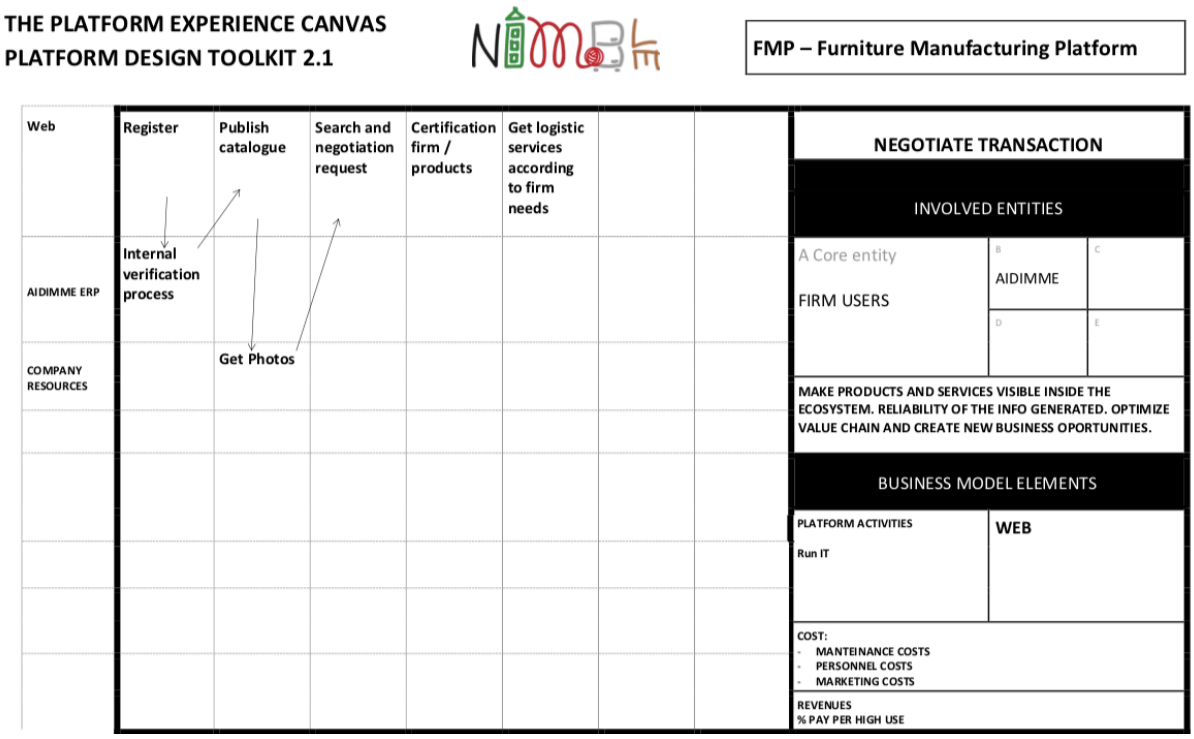

Figure 41 - FMP Platform experience canvas

Finally, the last FMP canvas identifies the key assumptions (i.e. the key values) that will be "measured" during the validation stage of the FMP instance for the selected core platform experiences. This is reflected by the Minimum Viable Platform (MVP) canvas:

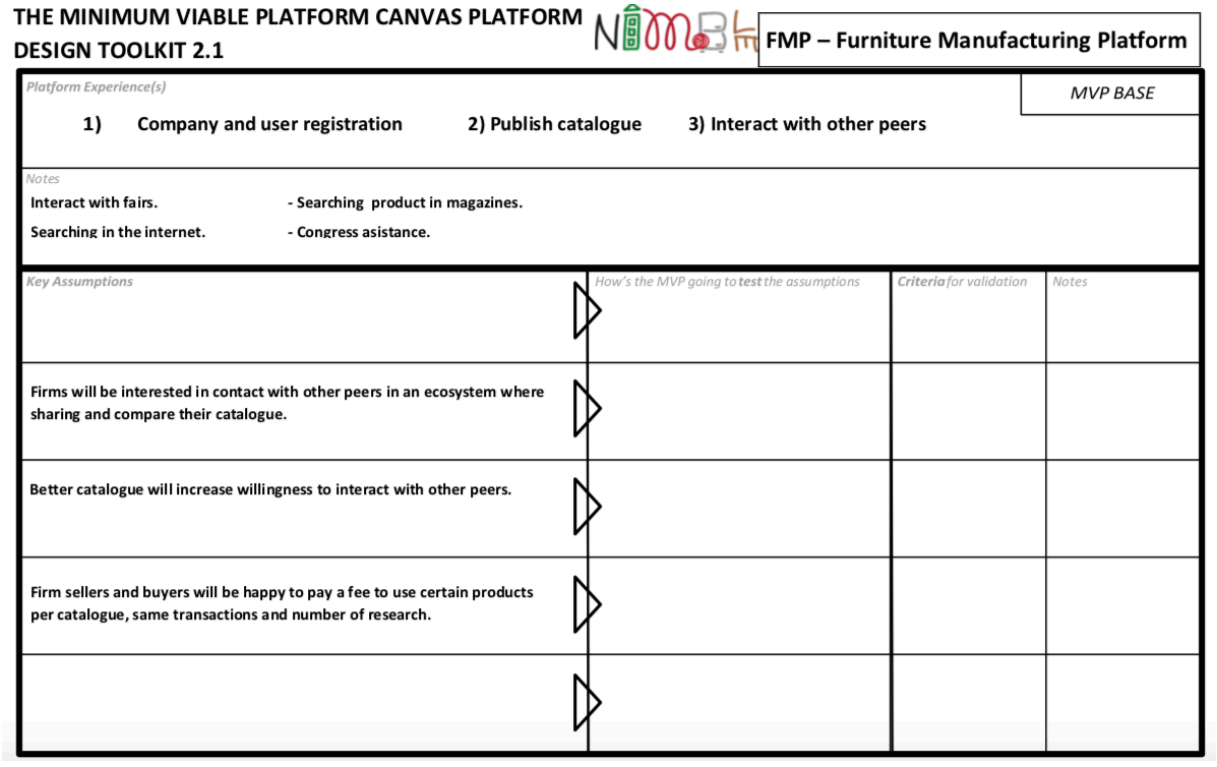

Figure 42 – FMP Minimum Viable Platform

Notice that the actual metrics and criteria for the validation of the MVP are not reported in the canvas above. But those metrics have been already included in a more comprehensive assessment toolkit developed within the SEED Programme and reported in D8.9 (Feasibility and Impact Assessment Toolkit).