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North Atlantic Whitefish Marine Living Lab



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Executive summary

Cod and haddock products from the North Atlantic come primarily from sustainably harvested stocks, are healthy to eat and have comparatively low environmental impact. In an ideal world these favourable characteristics should provide these products with a competitive advantage and higher prices in the market, but currently this is not the case. A key reason for this is the lack of differentiation of cod and haddock products from the N-Atlantic compared to other whitefish species, for example similar products from Asia – e.g. pangasius and tilapia. The products are homogeneous, they do not stand out in comparison with competing products and there is little done to try to highlight the many positive properties that they have. The WhiteFishMaLL project was initiated to address these challenges.

WhiteFishMaLL, which stands for *North Atlantic Whitefish Marine Living Lab*, was a three year research and development project that ran from beginning of year 2012 until early 2015. The primary objective of the WhiteFishMaLL project was to build a branding platform for whitefish from the North Atlantic that facilitates market differentiation in terms of sustainability and superior consumer benefits. The project had also a secondary objective, which was to demonstrate how a Living Lab can be established in the marine sector, dealing with a specific innovation challenges, where the solution is co-created, explored, demonstrated and evaluated with a user-centric approach in real-world environments. This meant applying Living Lab approaches to meet with the main objective, and using that process to demonstrate how Living Lab can be applied in the Nordic marine sector.

The structure of the project was designed according to Living Lab methodologies. Users and variable stakeholders within the value chain of N-Atlantic cod and haddock products sold in the UK, identified consumer needs and market differentiation parameters, and then co-created a solution to meet with the identified consumer needs. The identified consumer needs addressed issues such as distrust in information on product packaging regarding various product properties, origin, sustainability, quality and product history. A solution capable of meeting those needs was then co-created with users and stakeholders, such as consumers, retail, foodservice, wholesalers, distributors, processors, fishers and technology providers. The solution was a mobile application called the *DigitalFishmonger* that is capable of disseminating facts on the product's history on a batch-level. This application requires information from the fish business operators, and this information system will constitute a branding platform for whitefish from the N-Atlantic.

This report gives a holistic view of the progress of the WhiteFishMaLL project, how it was set-up in accordance with Living Lab methodologies and run with the aim of including users and key stakeholders in co-creating a solution that would meet with the users needs. The report also includes guidelines for starting and running Living Lab projects in the marine sector, as well as an evaluation report on the application of Living Lab methodologies in the WhiteFishMaLL project from the viewpoint of external Living Lab experts that monitored the project on behalf of Nordic Innovation, which funded the project.

A key finding of the project is the gap which is between consumer needs regarding availability of information and what the suppliers are actually willing to give. Another finding is the lack of trust from consumers to information provided by the suppliers. A third general finding is the reluctance from especially the retail sector to provide consumers with on-line, fully traceable information about the origin, date of catch and processes involved in bringing the seafood from the ocean to the retail store.

This gap between consumers, retailers and foodservice sectors is of fundamental interest to many stakeholders and policy makers. A relevant research topic for the future is to elaborate on how this gap can be closed. Some would argue for stricter labelling regulations, and others for some industry concession declaring that they are willing to increase value chain transparency. Very likely there are other options as well.

The interest of consumers with respect to this gap are well documented and published in this project. The report describes a solution that has been co-created with participation of consumers and seafood suppliers in a Living Lab process. The solution should comply with what the consumers want in order to differentiate in terms of premium price with respect to whitefish from the North Atlantic.

Acronyms	
CC	Competence Centers
<i>DigitalFishmonger</i>	The <i>DigitalFishmonger</i> is the primary product of the WhiteFishMaLL project. It is a mobile application that provides information on seafood products by scanning a QR code with a smartphone or tablet
ERP	Enterprise Resource Planning
ERS	Electronic Recording and Reporting System
FBO	Food Business Operator
ICES	International Council for the Exploration of the Seas
ICT	Information and Communications Technology
IRF	Iceland Responsible Fisheries
IUU	Illegal, Unreported or Unregulated
MA	Market Agents
MCS	Marine Conservation Society
MSC	Marine Stewardship Council
RTD	Research and technological development
R&D	Research and development
SO	Specific Objective
TP	Technology Providers

1. Introduction

Cod and haddock products from the North Atlantic come primarily from sustainably harvested stocks (ICES 2015a) (ICES 2015b), are healthy to eat (Mateljan 2015) and have comparatively low environmental impact (Buchspies, Tölle og Jungbluth 2011) (Winther, et al. 2009). In an ideal world these favourable characteristics should provide these products with a competitive advantage and higher prices in the market, but currently this is not the case. There are various reasons for this, such as:

- Competition from less expensive whitefish products that do not have the same favourable properties. In particular farmed warm-water species like pangasius and tilapia, as well as double frozen whitefish products processed in Asia.
- Lobbyism from environmental NGOs that advice consumers not to buy cod and haddock as they claim that these species are coming from unsustainable stocks or caught in a manner that is harmful to the environment.
- Lack of creativity when it comes to capturing the attention of consumers, in respect to product innovation on packaging, presentation, quality and communication.
- Majority of cod and haddock products from the N-Atlantic are typical standard products, where the market can to a large degree decide on the price. It is a homogeneous commodity where differentiation is scarce.
- Large share of the products are sold as intermediate products or as raw material for further production.
- Lack of branding and marketing is preventing increased differentiation in the market, so that the desirable characteristics of these products relating to the sustainability of the stocks, the low associated environmental impact, the high nutritional value and the guaranteed transparency and legality of the catch is in practice almost ignored by the retailer and consumer.
- The issue of stable versus unstable supply is not favourable for the N-Atlantic FBOs when considering expected development in supply, as well as traditional yearly and seasonal fluctuations, from farmed fish, e.g. pangasius and tilapia, compared to the more unpredictable supply of wild caught fish like cod and haddock.

If the N-Atlantic cod and haddock industry is to thrive, it needs diversification through market innovation where the desirable characteristics of their products are communicated in a way that is relevant and understandable for the consumer. These challenges were the motivation for the WhiteFishMaLL project.

WhiteFishMaLL stands for *North Atlantic Whitefish Marine Living Lab* and it is a research & development project that ran from beginning of 2012 until the end of 2014. The objective of

the project was to differentiate wild caught N-Atlantic cod and haddock products in terms of consumer information, sustainable production and superior consumer benefits. The project applied the Living Lab approach to facilitate user-centric innovation, as well as application, testing and validation in real-life circumstances. This meant actively involving users, such as suppliers, fishermen, processors, distributors, wholesalers, retailers, foodservice and consumers throughout the whole project.

The expected outcome of the project was “vaguely” described in the beginning of the project as a branding platform for whitefish from the N-Atlantic. This branding platform was to focus on sustainable production and superior consumer benefits and should be relevant for the N-Atlantic whitefish sector as a whole, and not just for the industry partners in the project. It would not have been in line with the Living Lab approach to be more specific in regards to the expected outcome, as the solutions needed to be co-created with the users.

In addition to developing this branding platform the project had a second objective, which was to demonstrate how a Living Lab can be established in the marine sector, dealing with innovation challenges deriving from a user-centric approach in a real-world environment. Guidelines or recommendations for how Living Lab can be used to further enhance innovation in the marine sector, along with descriptions of its implementation in the project were to be a part of the project’s final outcome.

The partners in the project were the research and development companies Matís (IS), Syntesa (FO), Nofima (NO) and the Fisheries Council of Canada (CA), along with the seafood companies Vísir (IS) FISK seafood (IS), Framherji (FO), Aker Seafoods & Norway Seafoods (NO) and OCI (CA). The project also employed external Living Lab experts to monitor the work and give recommendations.

2. The methodology and overall progress of the WhiteFishMaLL project

The structure of the project and the methodology applied were adopted from established Living Lab approaches. The work was broken into three sections where the first one was aimed at market innovation, the second at process innovation and the third at product innovation. And within each section were four tasks that were repeated iteratively three times within the project. These tasks were co-creation, exploration, experimentation and evaluation.

The market innovation focused at identifying consumer needs, how they could be met and evaluating possible solutions. The process innovation focused on practical implementation within the supply chains i.e. developing actual solutions to meet consumer needs. The product innovation then focused at getting the solutions to market and demonstrating their applicability.

The project had the following seven specific objectives (SO) that needed to be met in order to ensure successful completion of the project:

1. Identification of market demand for differentiation
2. Conceptualisation of differentiation parameters and indicators
3. Design and specification of information generation
4. Development of communication channels and distribution systems
5. Demonstration of brand stature and strength
6. Evaluation of consumer preferences, applicability and performance
7. Recommendation on how Living Labs can enhance innovation in the marine sector

The structure of the project and how it aimed at meeting the specific objectives was partly based on the FormIT methodology (Ståhlbröst and Bergvall-Kåreborn 2008). The structure of the project in relation to the specific objectives can be seen in Figure 1.

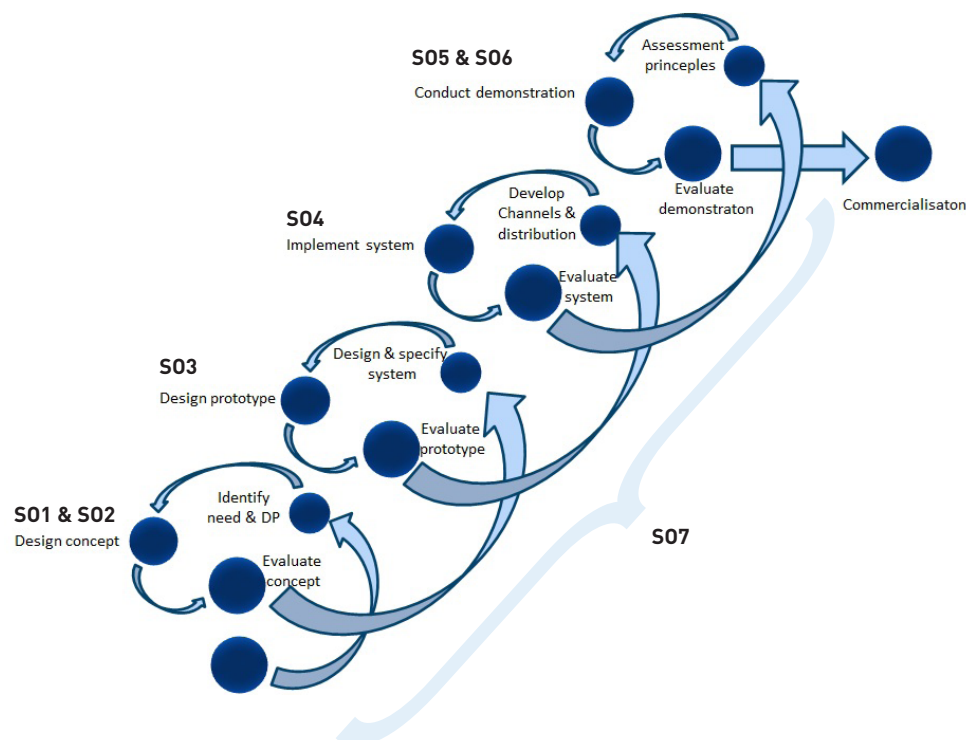


Figure 1: The WhiteFishMaLL project model/structure

The first year of the project was focused at identifying consumer needs and how suppliers could meet those needs in a cost efficient way (SO1), as well as conceptualising differentiation parameters and indicators (SO2). The key differentiation parameters were identified as transparency, traceability, origin, sustainability, personalised buying experience, convenience, quality and nutritional & health benefits.

By the end of the first year the project participants had agreed upon a branding concept. The concept of the North Atlantic Whitefish Branding Platform¹ uses a combination of the “Hit Them Where They Aint” and “Changing Economic Characteristics” strategy (Drucker 1985) where the innovator doesn’t create a major new product or service, but uses the information already generated within the value chain of the North Atlantic fish business operators and transforms this information into an accessible media, that creates value for the consumer in terms of enhanced trust to the product, increased availability of relevant information and more personalised service.

The project participants suggested that the solution or product would be a mobile application accessible with smartphones and tablets by scanning a QR code. This mobile application was then intended to address these differentiation parameters.

The second year of the project was used to design a prototype of the mobile application (SO3), which by that time had been given the name *DigitalFishmonger*. This work included considerations of data availability, data extraction methods, software and hardware requirements, data sharing & harmonisation, as well as data storing & data security. The design of the *DigitalFishmonger*’s outlook, layout and granularity was also a key component of this work.

The first version of the prototype was available in the summer of 2013, at which point the work of introducing it to the users, such as consumers and Food Business Operators (FBOs),

¹ Reported in the Paper on Branding Concept with differentiation parameters (A4.1) (2012/2013)

could start. For the next year the project partners presented the prototype to potential users, received inputs on possible improvements and challenges associated with implementation. Issues such as target groups, communication channels and distribution (SO4) were considered within this phase.

The final version of the *DigitalFishmonger* was ready by the autumn of 2014. The project entered then the demonstration phase (SO5) where the solution was presented to FBOs and tested in real-life circumstances, as well as in a large quantitative consumer survey. The pilot tests and the consumer survey gave valuable results that could be used for evaluation of the *DigitalFishmonger*'s performance and applicability (SO6). The results from the demonstrations and the consumer survey gave encouraging indications that the "product" would be a valuable tool for facilitating market differentiation and price premiums. The applicability is though likely to be dependent on the target users and complexity of the value chains.

The second objective of the WhiteFishMaLL project was to demonstrate how Living Lab can be applied in a Nordic Marine Innovation R&D project and develop recommendations on how Living Labs can enhance innovation in the marine sector (SO7). For this purpose the project employed two external Living Lab experts that monitored the project, gave good advice and published their evaluation, along with guidelines and recommendations for running Living Lab projects in the Marine sector, at the end of the project. They, along with other project participants, concluded that the WhiteFishMaLL project had been a good example of how Living Lab can enhance innovation in the marine sector and that it has produced valuable knowledge on applying Living Labs that will be possible to build on future R&D.

The following chapters address each of the above mentioned SOs.

3. Identification of market demand and differentiation parameters

The first priority of the WhiteFishMaLL project was to identify what affects consumer purchasing behaviour and which differentiation parameters are most important. The aim was to develop a solution(s) that would increase consumption of whitefish from the N-Atlantic and provide price premiums for the suppliers applying the solution(s).

For practical reasons the project participants decided to limit the work to fresh and frozen cod and haddock in the UK market. This was decided because it was in the best interest of the industry partners and because it was believed that UK would be a good representative for the rest of Europe and results could easily be transferred to other products and markets. The work started as a desk research, followed by focus group sessions and interviews with Food Business Operators (FBOs), which provided qualitative inputs into consumer needs and possible ways of meeting those needs. These inputs were then used to design a quantitative consumer questionnaire which was used in an online survey. The survey confirmed many of the differentiation parameters and indicators that had been established in the qualitative research. The combined qualitative and quantitative inputs were then used to design the initial branding concept that addressed the established differentiation parameters. Figure 2 shows the research design used to develop the initial branding concept, which was reviewed at later stages of the project when solutions had been developed and tested.

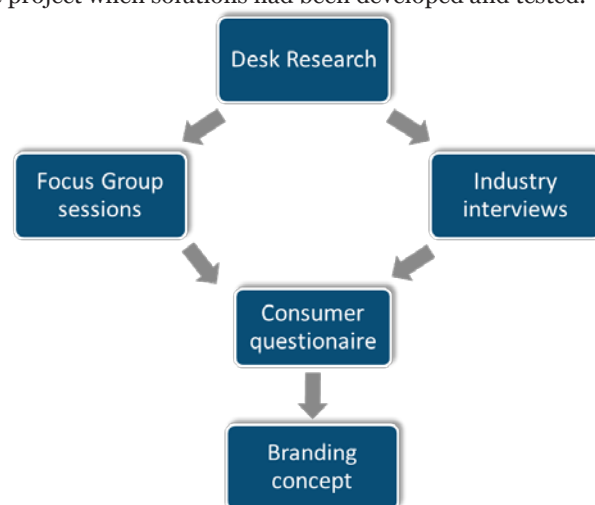


Figure 2: The research design used to develop the initial branding concept

The desk research provided insights into what affects consumer behaviour and what differentiation parameters are likely to govern purchasing decisions. As with all commodities, it is price and real- and perceived qualities that will inevitably be the key factors controlling consumer preferences when buying seafood. The way to persuade consumers to buy more expensive alternatives is by establishing and highlighting key quality attributes that justify paying price premiums. This can be achieved by highlighting already present attributes or by developing new ones. The desk research gave the project participants some good insights and ideas, which helped them to prepare for the first focus group sessions. They nevertheless made an effort of entering the focus groups with no pre-given results regarding market demand and differentiation parameters.

Focus group I

There were two focus group rounds held in Reading in the UK in 2012, which were facilitated by the consumer research agency Sensory Dimensions. Sensory Dimensions selected 30 persons from their database to take part in the focus groups. The selection was aimed at employing medium- and high income seafood consumers, with equal gender and age distribution. The focus group participants needed also to commit to attending three focus group sessions over a two year period i.e. two focus groups to identify market demand and differentiation parameters in 2012 and one to contribute to the development of the prototype in 2013. Each focus group round was split into three 10 person sessions where a consumer study expert from Sensory Dimension facilitated the groups, but the script had been prepared in collaboration with the WhiteFishMaLL RTD team; which also observed the focus group sessions from behind one-way mirror. Figure 3 shows one of the focus groups.



Figure 3: One of the focus groups in round 1 of the project

The first sessions took place in May of 2012 and the take-home message was that the consumers would prefer seafood products with the following attributes:

- **Reliable information in a fully traceable chain:** Transparency when providing information to consumers, where traceability details are provided. The focus groups mentioned their distrust in general product information, which was impacted by recent scandals where products had been fraudulently marketed. Specific examples were mentioned, such as pangasius being sold in Fish & Chips shops as cod (Dolan 2010), cod and haddock being replaced by less expensive products in retail (Miller og Mariani 2010), frozen fish being de-frosted and sold as fresh, origin forged and food safety standards ignored (Thomson 2011).
- **Attachment to the product and convenience to its preparation:** Personalised buying experience where consumers can get the same feeling as buying from fishmongers. Majority of consumers buy fish in retail stores, but miss the experience of buying from local fishmongers that know the “story behind the fish” they are selling and can give advice on what to select and how to prepare. This also includes innovative product presentation where convenience, quality, nutritional & health benefits, as well as preparation instructions are presented.
- **Reliable information on ecosystem impact:** Credible information on sustainability issues, where the consumers are presented with facts about the sustainability and environmental impacts of the products they are buying.

These focus group results were then discussed with FBOs and possible solutions considered. All of the issues highlighted were considered to represent opportunities for the N-Atlantic cod and haddock sector, as it has already relatively good traceability in place, has a good “story” to tell behind the products and are for the most parts coming from sustainably harvested stocks. All N-Atlantic FBO’s supplying cod and haddock to the EU market are of course in full compliance with Article 58 of Council Regulation (EC) No 1224/2009, which states that ‘all lots of fisheries and aquaculture products shall be traceable at all stages of production, processing and distribution, from catching or harvesting to retail stage’. They are also in full compliance with EU labelling laws, such as regulation (EU) No 1379/2013 and regulation (EU) No 1169/2011 that have placed increased requirements on suppliers to provide traceable information on their products. These obligatory information’s are though only minimum requirements, which the focus groups did not feel were detailed enough.

The personalised buying experience was regarded as a challenge by the FBOs. The fact that the number of fishmongers had been decreasing and the share of retail chains increasing in seafood sales suggested that consumers were more interested in prices than personalised buying experience. The product presentation was also discussed as a never-ending challenge.

The discussions with the FBOs addressed issues such as ecolabelling and chain of custody rules, documentation and traceability requirements within the EU, PR materials, lobbyism by environmental NGOs and possible cooperation with them. The opportunity of providing consumers with more batch-based information and the dilemma of when it becomes too much information, as well as concerns that some information might have negative properties. The associated costs and benefits were also discussed in detail.

These discussions did not lead to a specific conclusions as such, but provided valuable input for the further development work within the project.

Focus group II

A second round of focus group sessions were held in August of 2012 in Reading, with the same facilitator and participants as in the first round. They were asked some of the same questions, which confirmed the previous results. They were then asked to be more specific in identifying the most relevant differentiation parameters. The parameters most often mentioned were:

- Upstream value chain information in order to trust and prefer a brand
- Information on freshness
- Information on nutritional value and in particular omega-3
- Information on health benefits from eating the product
- Locally sourced is preferred
- Origin i.e. from where the fish is sourced
- Catch method
- Is the fish species endangered or sustainable
- Packaging should allow the consumer to see the product
- Recyclable packaging is positive
- Recipes and cooking instructions are a “must”
- Packaging for kids
- Fish counters in retail stores should have computer touch screens where consumers can check any information they are interested in. The opportunity of printing out recipes or other interesting details would be appreciated.
- Interest in knowing the “story” behind the fish i.e. who caught it, where and when.
- A mobile phone app (called “fishmypedia”) where consumers can check “anything” would be optimal.

These results were similar to the once from the first focus group session rounds and did little more than confirm the previous results, although it provided a little bit more detailed information on the consumer needs. These focus group sessions and the industry interviews were then used as input for a design of a quantitative survey.

Consumer survey I

The qualitative input from the desk study, focus groups and industry discussions were partly used when designing the questionnaire for target consumers. The purpose of this quantitative survey was to acquire statistically significant indications on differentiation parameters and issues affecting purchasing decisions. The survey was conducted by Redshift Research, which is a market research company in the UK. The survey was carried out in accordance with the Market Research Society’s code of conduct, which guarantees anonymity to all respondents, and was designed to reveal consumers’ needs when buying and consuming seafood products. The research was conducted in September 2012 using an e-mail invitation and an online survey. The survey was conducted among 1616 of UK adults that regularly buy fresh or frozen fish. Quotas were set to ensure reliable and accurate representation of the total populations

aged 18 and older. Results of any sample were subject to sampling variation, as the magnitude of the variation is measurable and is affected by the number of interviews and the level of the percentages expressing the results. In this particular study, the chances were 95 in 100 that the survey result would not vary, plus or minus, by more than 2.4 percentage points from the result that would be obtained if interviews had been conducted with all persons in the universe represented by the sample. The sample was selected from the Crowdology panel. Crowdology™ is an online panel owned and operated by Redshift Research. The panel is balanced across regional, age and gender demographic factors, and is nationally representative of the UK population. Each respondent completes 120 profiling questions before being accepted to join the panel. Panel Quality Management is carried out frequently to ensure reliable surveys. One of the criteria for being eligible to take part in the survey was to regularly buy and consume fresh or frozen fish. This meant buying fish at least once a month. More than half of the respondents, or 55%, said they buy fish on average once a week or more, 30% once every two weeks and 15% once a month. When asked where they usually buy fish the overwhelming majority said they buy fish in supermarkets. However when asked where they would prefer to buy fish, fishmongers and local fish markets got strong support, as shown in Figure 4.

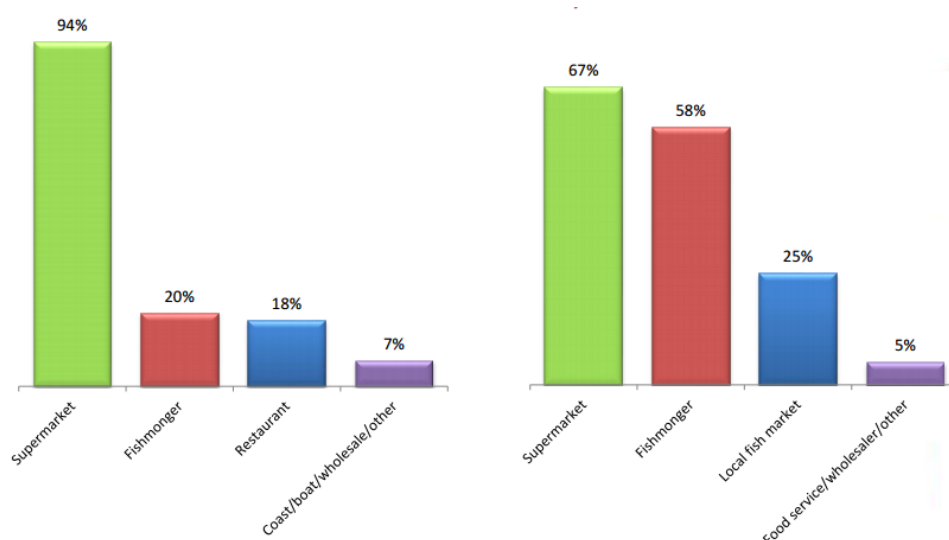


Figure 4: Where do you usually buy fish? (Left figure) – Where would you prefer to buy fish? (Right figure). Respondents can choose two

This suggested that although majority of people buy their fish at the supermarket, many of them would prefer to buy it from fishmongers. Perhaps convenience, price or availability explains why they do not act on these preferences. These results confirmed an important differentiation parameter identified by the focus groups i.e. the need for personalised buying experience.

In another question the respondents were asked if they agreed with statements on factors that affect purchasing decisions. These questions were on issues such as price, sustainability, information flow, labelling etc. The results can be seen in Figure 5.

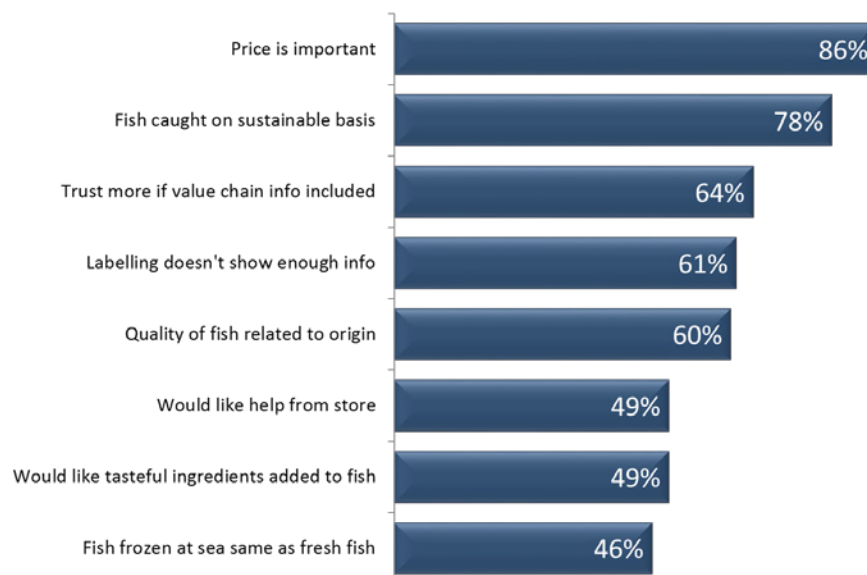


Figure 5: How do you rate your agreement or disagreement with the following statements? (Significant answers; strongly agree/agree)

The results from these questions showed some variability depending on age, where for example the 18-24 age group saw sustainability as important as price. A central message from these questions, in relations with the results from the focus groups, were that consumers want more information than is available today. The respondents clearly felt that presenting value chain information would increase their trust in the products and the claims set fourth regarding important differentiation parameters. When asked about what influences trust in a seafood brand, 80% responded that their own personal experience was most important, 29% said product labelling on the package, 15% said information provided by staff at the store and 8% information in the media. There was a strong age correlation, showing that own experience increased with age, whilst the other factors were more important with the younger respondents.

When asked about which value chain information the respondents were most interested in, the date of catch, fishing method and catch area were most commonly mentioned. By far the most important information was the date of catch, which 60% of respondents mentioned, as can be seen in Figure 6.

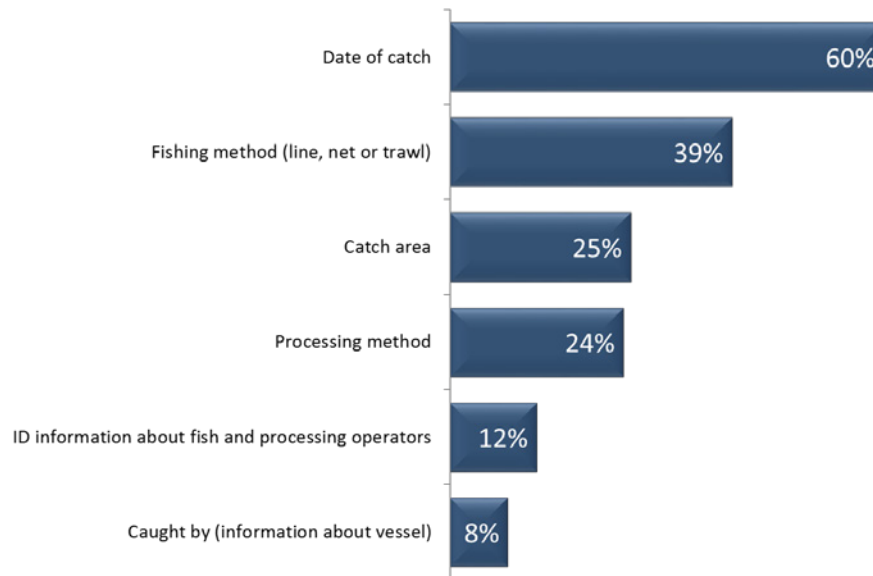


Figure 6: Which information from fish – and processing operators do you think is important when buying fish?

When asked from where they would like to seek this information and other value chain details, the majority identified fish counter personnel or fishmongers, but interestingly 25% suggested digital interactive display at the fish counter and 12% wanted to scan a code with their smartphones.

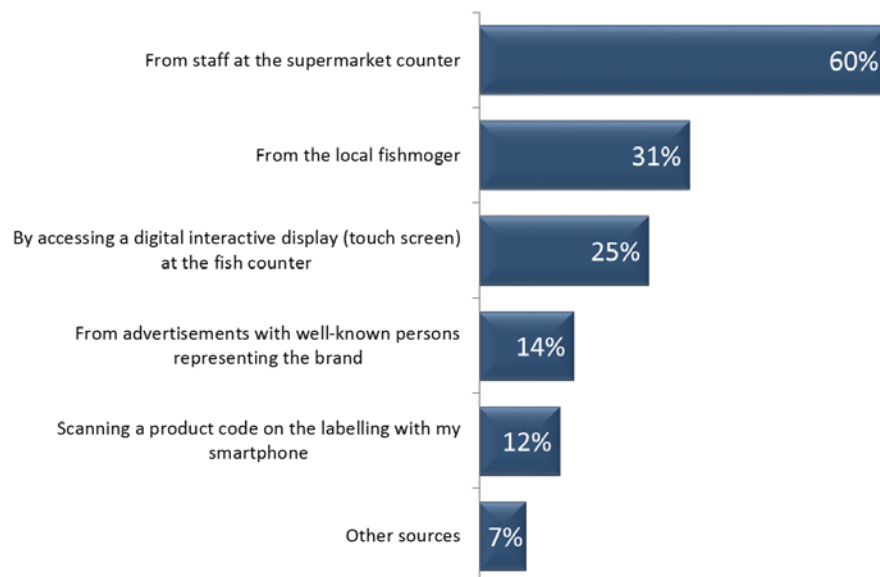


Figure 7: From where would you like to seek information about fishing- and processing operations related to your fish product?

These responses confirmed results from the second focus group rounds, where the option of seeking information through ICT solutions were suggested.

When asked which labelling information the respondents would be most interested in 51% mentioned origin, 40% freshness and 38% nutritional information, as can be seen in Figure 7.

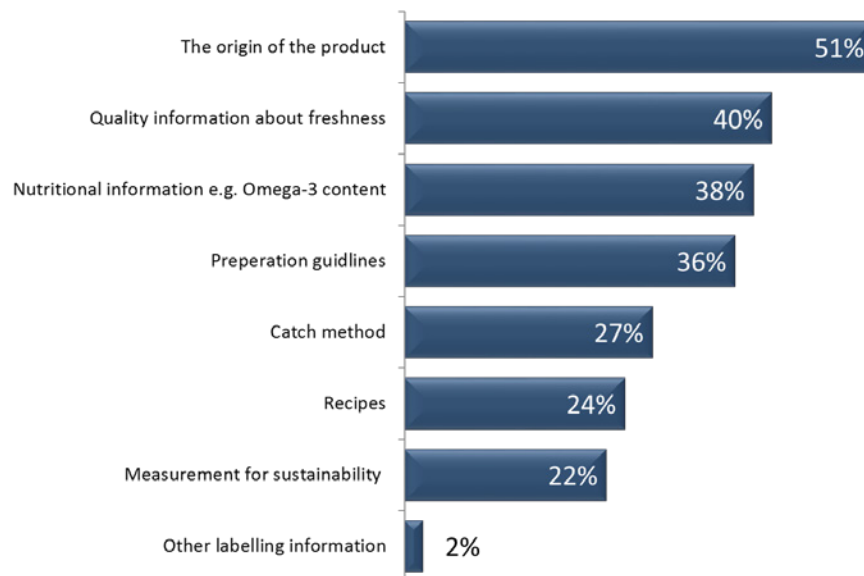


Figure 8: Which of the following labelling information would you most prefer to be on the package?

27% responded this time that they would be interested in knowing the catch method, compared to 39% when they were asked what information they were interested in from the catch- and processing link (Figure 6). The responses therefore vary, depending on which link in the chain are being focused at.

The next question was about how important the in-shop experience is when buying fish, which relates to the focus group results that suggested that personalised buying experience was an important factor in purchasing decisions. Around 70% responded that this was an important factor, as can be seen in Figure 9.

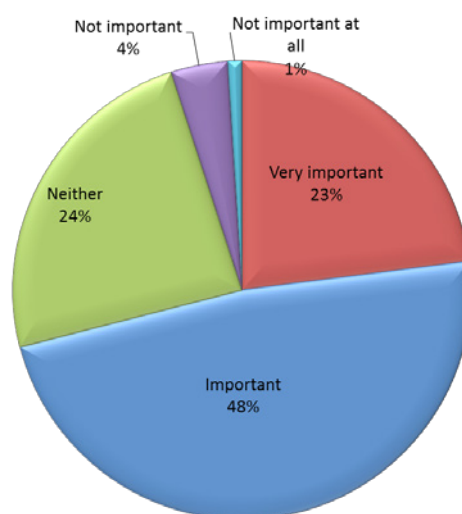


Figure 9: How important is the in-shop experience to you when buying fish?

Following this question the respondents were given a number of alternatives to choose from that could improve their buying experience at fish counters. Respondents were asked to choose four of the options and overwhelming majority put “trained person at the fish counter” as a first priority. Interestingly, 29% of respondents put “digital interactive display at fish counter” as second priority, as can be seen in Figure 10.

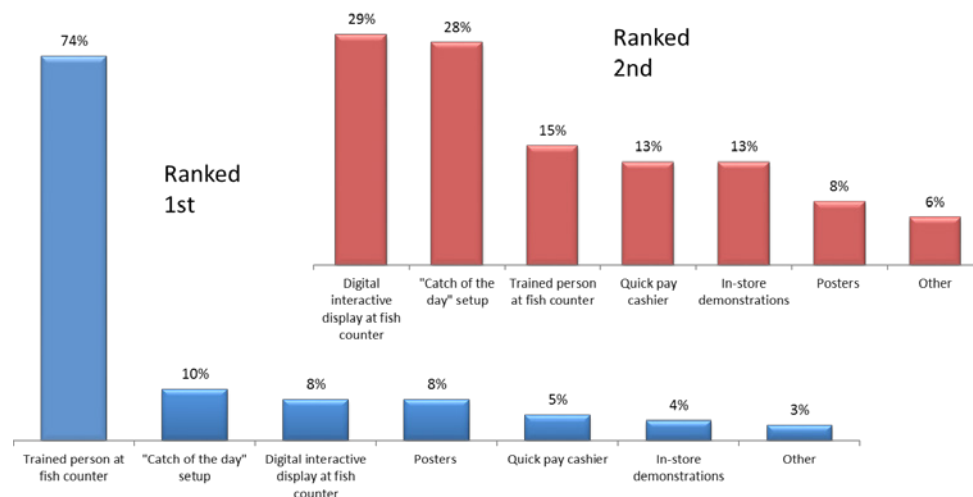


Figure 10: In order to have an ideal experience when buying fish at a store – how would you like the fish counter to appear? (Choose 4 and rank them from 1-4)

These answers, yet again, confirmed results from the focus groups - that personalised buying experience and the possibility of using ICT solutions could be a differentiation parameter worth exploring further. The respondents were also asked if they would be willing to pay a premium for such service, and 39% agreed to that. Respondents that buy fish at least once a week showed a greater willingness to pay a premium, than those buying fish once a month i.e. 42% compared to 28%.

Respondents were also asked about their preferences in regards to sustainability claims and how they affect their purchasing decisions. Most regarded sustainability as important and 46% told they were willing to pay extra for fish labelled as sustainable, as can be seen in Figure 11.

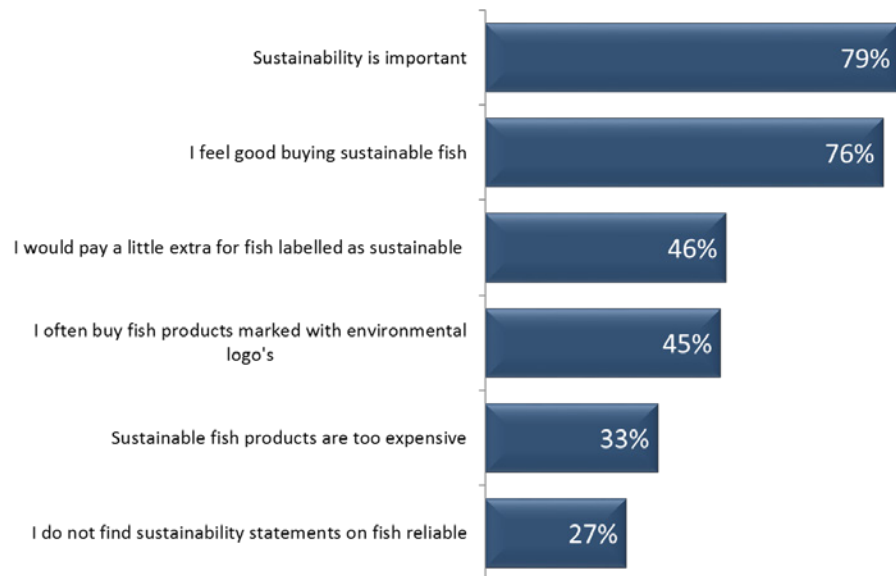


Figure 11: How do you rate your agreement or disagreement to the following statements? (Significant answers; strongly agree/agree)

The importance of environmental logos proved to be age dependant, where younger generations showed great interest, whilst 36% of the over 55 age group regarded sustainability important. The frequency of fish purchases did also have a considerable effect on how the respondents regarded the importance of sustainability, as can be seen in Figure 12

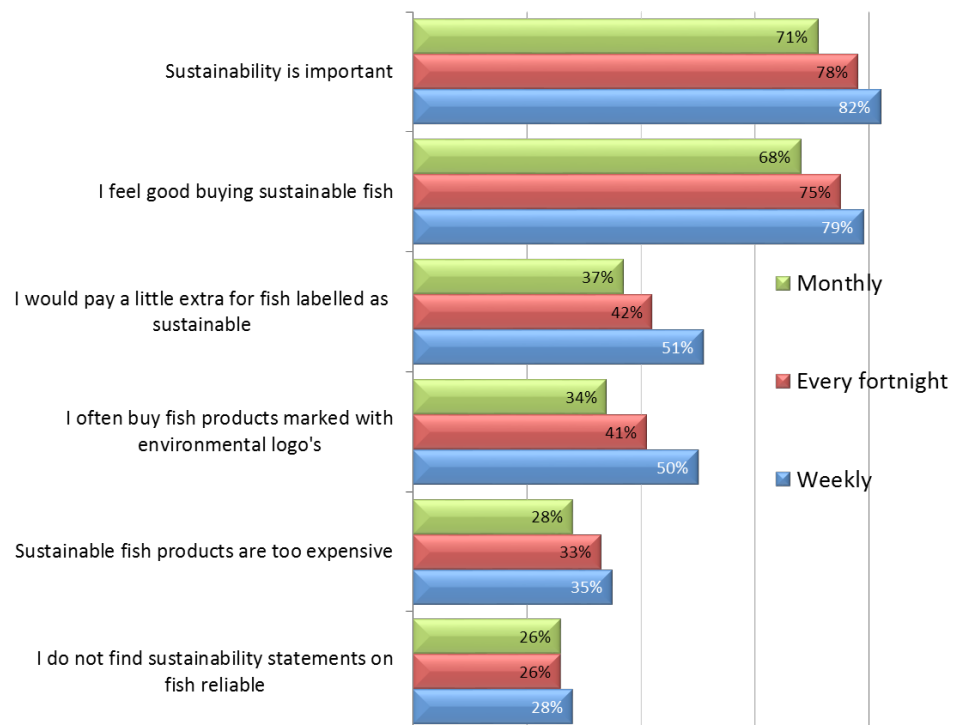


Figure 12: The rating of sustainability statements depending on frequency of seafood purchases

There was a correlation between frequency of fish purchases and preferences for sustainability. The more often the respondents bought fish, the more they valued sustainability and 51% of those that buy fish every week were willing to pay extra for sustainability. The challenge is though that these consumers want reliable and transparent information on sustainability, and they have a degree of mistrust in regards to many sustainability claims. They were therefore asked if they would consider statements on sustainability more trustworthy if they came from governmental bodies, but only half of the respondents could agree to that. They were then asked about their trust towards ecolabels and “ratings” given by environmental NGOs. The third party ecolabels did not seem to be considered particularly trustworthy, where 32% considered MSC trustworthy, 30% IRF and 24% FOS. The environmental NGOs however seemed to have more trust amongst the respondents i.e. Greenpeace with 49% and MCS with 45%, as can be seen in Figure 13.

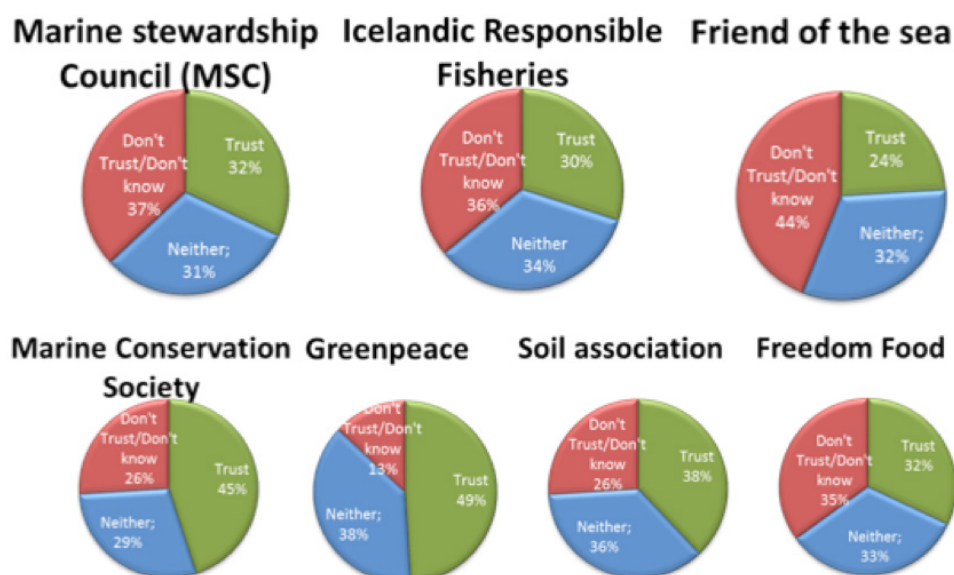


Figure 13: What degree of trust do you have in the following environmental organisations and logos?

These results showed that it is a challenge to obtain a trust amongst consumers. It was therefore regarded as an important message from the survey that differentiation parameters that rely on claims of any sort need to be backed up with facts that the consumer will trust and can relate to.

The survey more or less confirmed results and inputs from the desk study, focus group sessions and industry discussions. Key consumer needs and differentiation parameters had been identified and a number of plausible alternatives of meeting these needs suggested. A paper on branding concept with differentiation parameters was now produced, in order to summarise the already collected results, identify a methodology to build the branding concept and suggest business strategies to gain a new market position for whitefish from the N-Atlantic.

The branding concept with differentiation parameters

In November of 2012, when the WhiteFishMaLL project had focused at identifying consumer needs and key differentiation parameters for fresh and frozen cod and haddock in the UK market for almost a year, the project produced a draft version of a document titled “paper on branding concept with differentiation parameters”. This paper was a key document within the project and its context was revised iteratively throughout the project in order to ensure that the concept was solid and followed at all stages. The paper identified the methodology that would be used to build the branding concept and suggested business strategies to gain a new market position in the context of the concept. The draft document was discussed at a workshop (reported on in chapter 3.5) and then approved by the project participants and published as the project’s branding concept.

The creation of the branding concept was based on the framework of the brand asset valuator by Young and Rubicam (2012) and the four steps branding model, which identifies the four steps towards building a successful brand as follows:

1. What problems should we solve?
2. Which brand idea should solve these problems?
3. What signals do reflect our brand idea in the best way?
4. What associations do the signals send to the consumer – and are they the right ones?

In regards to what problems should be solved, the focus groups and survey had revealed consumer needs that could be summarised as two key problems:

1. Lack of trust in product information and lack of relevant information
 - Upstream information from value chain on:
 - i. Sustainability
 - ii. Selected product attributes
2. Need for a more personalised and trained service

The focus groups and the survey results had also identified a brand idea in the form of a “digital fishmonger”. This would be an ITC solution that could provide reliable information on the identified differentiation parameters and give consumers a sense of personalised buying experience.

The signals had also been established in the focus groups and the survey, where parameters such as date of catch, origin, fishing method, freshness, sustainability, health benefits and other favourable characteristics had been identified.

The associations the signals send to the consumers are then trust, transparency, connection to the industry and the full story behind the product and personalised buying experience. The branding concept was as results presented in the following figure.

Creating the brand

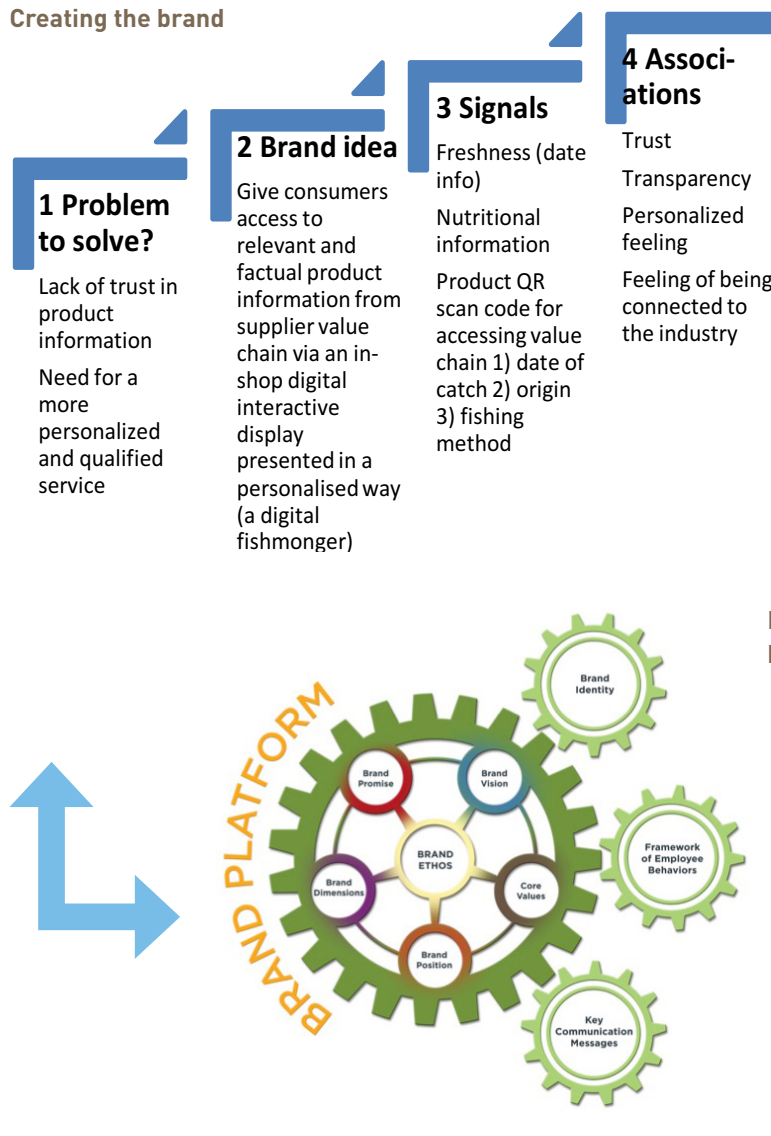


Figure 14: The branding concept with differentiation parameters

This concept was then presented and discussed at a workshop held in Reykjavík in beginning of December 2012, where the project participants evaluated the concept and decided on further progress within the project.

The Reykjavík workshop and decision on what solution to aim for

A workshop was held in the project on December 4th 2012, where all project participants met in Reykjavík to discuss the findings from the first year of the project, evaluate the branding concept and decide on how to proceed.

In addition to the project participants the workshop was attended by Sarah Gough from Sensory Dimensions and Dr. Martin Jaffa from Callander McDowell. Sarah Gough presented the focus group results and interoperated their meaning in relation to the branding concept.

Martin Jaffa is a Seafood market analyst, and he discussed the challenges that the branding concept would have to face in order to be successful.



Figure 15: The Reykjavík workshop was attended by all project participants

The workshop proved to be very productive. Its results were that the branding concept was approved and it was decided what solution should be explored further. The “digital fishmonger” idea was thought to be a solution that could solve the key consumer problems identified in qualitative and quantitative consumer studies. It was also decided that the “digital fishmonger” should be designed for smartphones and that QR codes should be used for accessing it. Important component that was to be explored was to have the information batch-based i.e. the information should be on the actual product in the consumer’s hand, as general information was not expected to gain the trust of consumers regarding some important differentiation parameters.

The workshop participants were confident that the extensive data already available within the traceability systems of the N-Atlantic cod and haddock value chains would allow for development and successful implementation of the *DigitalFishmonger*. The fact that few, if any, wild capture seafood supply chains in the world are as technologically advanced and collect as much data as the N-Atlantic cod and haddock chains, was considered to present opportunities that should be taken advantage of.

This marked the end of the identification of market demand (SO1) and differentiation parameters (SO2) and as results the project could start focusing on developing a prototype of the *DigitalFishmonger*.

4. Design of the *DigitalFishmonger* prototype

From the beginning of 2013 until the autumn, the WhiteFishMaLL project participants focused their efforts at examining data availability and analysing the applicability of automatically extracting the necessary data from the available sources, as well as exploring how to forward, store, generate and presenting the information (SO3). The concept was presented to the third and final focus group sessions in the spring of 2013, which confirmed that the *DigitalFishmonger* was a solution that could meet the consumer needs. The focus groups gave also valuable inputs into the design and setup of the solution. A prototype of the *DigitalFishmonger* was then produced and was available for demonstration in September of 2013.

Information components and data sources

A key reason why the *DigitalFishmonger* was regarded as a good opportunity for market differentiation for N-Atlantic cod and haddock was the fact that data availability is fairly good and there is a “good story” to tell behind the products. This meant though that the WhiteFishMaLL RTD team needed to analyse the available data within the chains, how relevant data could be extracted and forwarded, what additional data was needed and how it could be acquired, how and where the data should be stored and how it should be accessed. N-Atlantic cod and haddock value chains have in most cases extremely good internal traceability, where excessive amount of batch-based data is collected by individual FBOs and stored within each link in the chain. The external traceability, where data is shared between links, is however often lacking and focuses in many cases only on meeting minimum labelling and traceability regulations. These minimum traceability regulations have though been made stricter in recent years within the EU.

In 2000 the EC published a regulation on minimum labelling requirements, where species name, FAO catch area and production method needed to be made available on the packaging (EC 104/2000). In 2002 the EC then published a regulation on traceability for food, where “the ability to trace and follow food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution”, was made obligatory (EC, 178/2002 178/2002). These regulations relied on what has been called “one up-one down” approach; meaning that the ability to trace the lot applied to one link up and one link down in the value chain. If information or product recall was then necessary, each link had to be contacted.

In 2009 the EC published a regulation that made chain traceability obligatory i.e. “all lots

of fisheries and aquaculture products shall be traceable at all stages of production, processing and distribution, from catching or harvesting to retail stage” (EC 1224/2009). The adaptation to this regulation has been gradual, but essentially it has been in force for all fisheries and aquaculture products from January 1st 2015 (EC 404/2011). Another relevant EC regulation, is the regulation on labelling requirements for fishery and aquaculture products that came into force in December of 2014 (EC 1379/2013). As part of this regulation, labelling details for product packaging were made stricter i.e. to include for example catch method, production method, FAO fishing sub-area, the date of minimum durability, whether the product has been previously frozen and more.

These minimum requirements mean that each lot needs to be traceable throughout the value chain and that some basic information needs to be presented to the consumer on the product packaging. The results from the focus groups and the survey, as well as from other sources, showed though that this is not sufficient in order to facilitate market differentiation for cod and haddock products from the N-Atlantic. There are however traceability tools and data available now that have partly been developed in order to meet these regulations, such as WiseFish and the Danish SIF system. Some of these tools and data in catching, processing, logistics and marketing were analysed and considered as inputs for the *DigitalFishmonger*.

On-board information systems

In Europe, electronic recording and reporting system (ERS) is used to record, report, process, store and send fisheries data (catch, landing, sales and transshipment). The key element is the electronic logbook where the captain of a fishing vessel keeps a record of fishing operations. The records are then sent to the national authorities, which store the information in a secure database. These e-logbooks are basically an electronic edition of the paper based logbooks that have been used for decades.

The captain of the vessel enters information regarding the catch, by haul or days, depending on the type of fisheries. Catch reports are created with information on the catch volumes by species, catch location, date, weather conditions and other factors. Today, suppliers of seafood into the EU must also provide a catch certificate with each lot, in order to prove that their supply is not coming from illegal, unreported or unregulated (IUU) fisheries. The demand for these certificates will most probably further enhance the use of electronic logbooks in the N-Atlantic whitefish sector. The electronic logbooks create large amounts of data concerning the catch. It is therefore important for all parties in the value chain to ascertain how they can get value from the use of electronic logbook data.

When fish is processed on-board in freezing trawlers, information gathering is easy because there is only one stakeholder who is fishing, processing and labelling the product before freezing. So, most of the relevant information are stored in one system and are printed on the boxes, as seen in Figure 16.



Figure 16: Label from a box of frozen-at-sea trawled cod

The information however only covers information components from the vessel and does not contain information regarding where and when it was landed, how it was transported to the marketplace etc. Therefore information from other stakeholders have to be added to tell this product story from catch to customer.

When fish is landed fresh for processing many of the vessels are able to forward information that exceeds the data available within the electronic logbooks. This is particularly practiced in integrated value chains, where the processor for example owns the fishing vessels. Softwares such as WiseFish and TrackWell Maritime are design for this purpose.

Information systems in processing

Usually fresh fish is processed on land where there are many different Enterprise Resource Planning (ERP) systems used in the fishing industry around the world. In Iceland, the most common systems are the Wise system from Wisedynamics (formally known as WiseFish from Maritech), the Innova system from Marel and SAP systems. These systems vary greatly, but they all manage data from processing, inventory control, lot tracking, logistics and sometimes marketing. These systems are used to record usage of raw material/work in progress and all associated costs and maintain full product records including price, sales, and production history. These systems are usually the backbone of each company, connecting data from different sources and therefore making products and information traceable through the different processes involved.

After processing – the fish products are usually labelled in a similar manner as the ones frozen-at-sea. It is however usually not labelled with catching date, just processing date in Julian Day Calendar format, e.g. 99 day of the year is the same as 5. April. The labels include flight number and destination so there are more traceability information on these labels beyond the frozen-at-sea ones.

Still, with only these limited information on the boxes, information from aforementioned systems have to be accessed to complete the story of the product through the value chain.

Information systems in logistics

The logistics data and sales records are usually included in the ERP systems in use in the fisheries companies. Generally, they store information regarding the selection of mode

of transport (road, rail, sea or air), about loads (size, type, quantity, weight, height), about senders and recipients (name, organization name, address), start and end time (the date of dispatch of the cargo and the date of receipt of the load). These information are essential in order to fulfil traceability requirements and display the product story through the value chain.

Product information used for developing the prototype

When the WhiteFishMaLL RTD team started analysing the data availability for the *DigitalFishmonger* they were given access to all data within the value chains of one of the participating companies i.e. *Vísir hf.* in Iceland. The team found out that all relevant product information were compiled from various sources into their WiseFish system. This made the work considerably less complex, as it meant that the data necessary for the *DigitalFishmonger* could be extracted from one source. The necessary data components were therefore identified, extraction method developed, a format for forwarding the data as xml defined and a database for receiving and storing the data developed.

For security reasons it was decided that only the relevant data should be uploaded to a database hosted by Mátis. The alternative would have been to allow access to Vísir's computers each time someone uses the *DigitalFishmonger*, which would have included a severe security risk for Vísir.

Focus group III

In May of 2013, when the concept had been defined, data availability explored and possible approaches considered by the WhiteFishMaLL participants, the third and final focus group sessions were held. The focus groups included the same people and facilitator as before, but this time they were presented with the suggested solution and asked for input on the layout, design and content of the *DigitalFishmonger*.

The focus groups were introduced with the concept of scanning a QR code for with smartphones or tablets in order to accessing detailed batch-based data on the actual products in their hands. Majority of the focus group participants liked this approach, but some did though not own smartphones or had not yet downloaded a QR code scanner to their phones. The idea of having a tablet/touch screen at the fish counter was therefore suggested again. The focus groups were then presented with similar already available solutions, where product codes are printed on products and consumers can then enter the code into a web-page to get variably detailed information on the product. These included for example *ThisFish*, *followfish*, *TransparenSea*, *John West*, *Hermes AS* and *Terra Creta*. Web-sites containing sustainability recommendations from NGOs were also explored, such as the MCS *FishOnline*, *Greenpeace alternative fish guides*, *SeafoodWatch*, and *FishSource*. Some of the available options presented to the focus groups are shown in Figure 17.

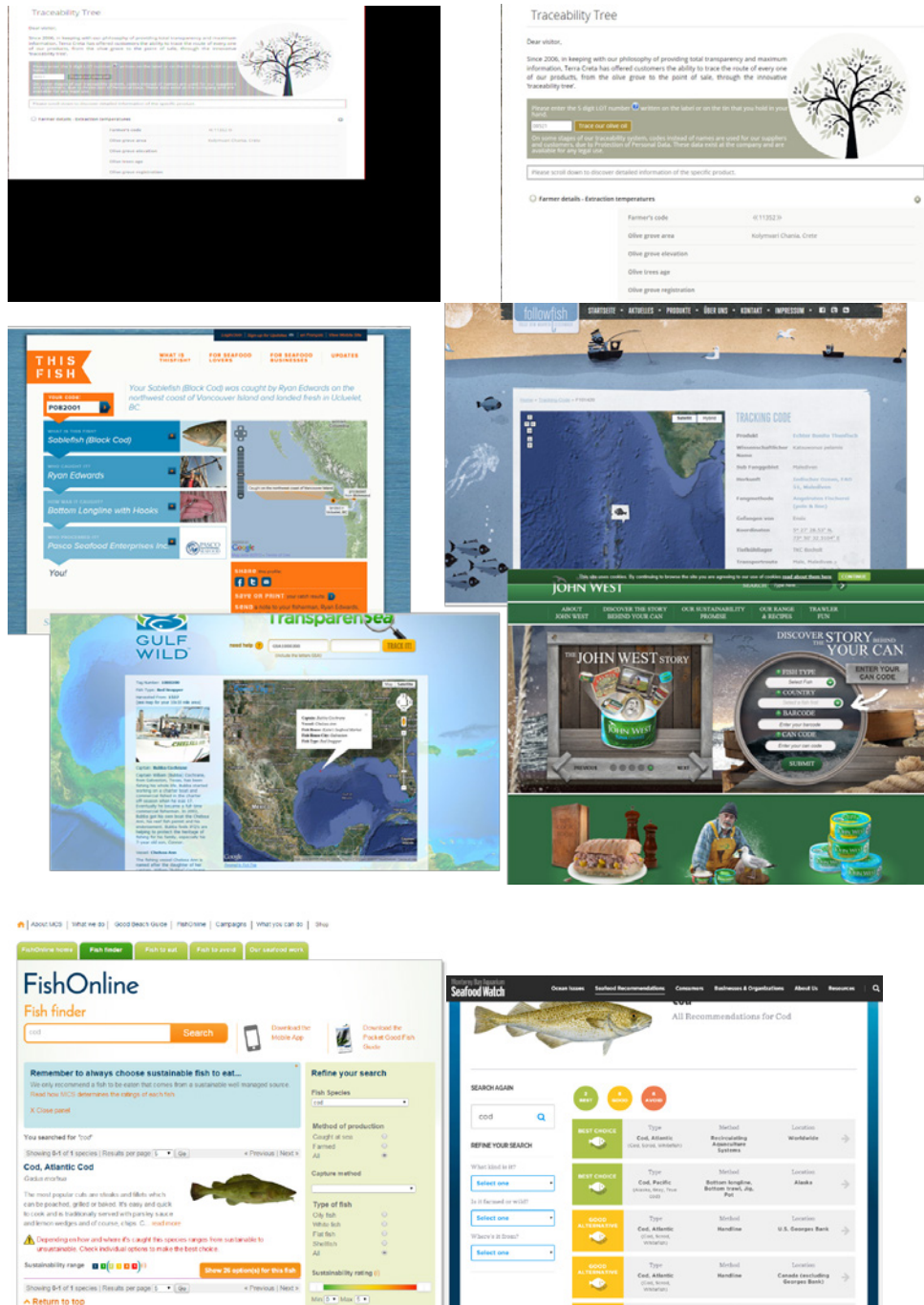


Figure 17: Available alternatives used to demonstrate to the focus group the concept and possible application

The general agreement from the focus groups was that these available sources were interesting, but could be improved. The method of entering a project code was thought to be off-putting and, the top layer details too excessive and difficult to find the information that each focus group member wanted. The main take-home message from the focus groups was to make the information readily available, but keep the top-line simple. Each user could then explore further the categories they are interested in. The focus groups came up with 12 categories that they thought would be most relevant, their focus groups suggestions can be summarised in the following figure.

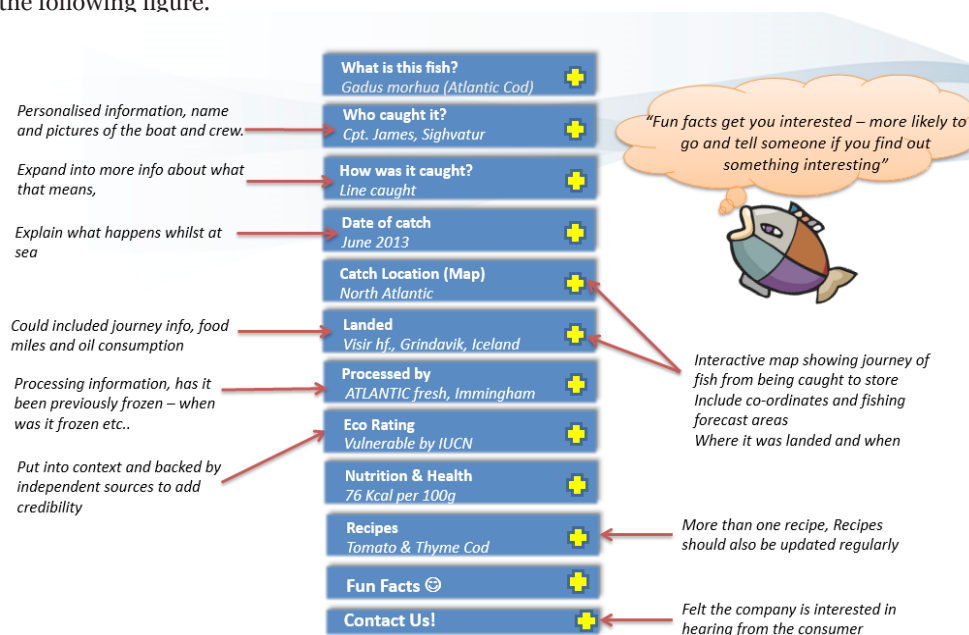


Figure 18: Suggested top-line design and key categories as suggested by the third focus group rounds

This set-up suggested by the focus groups was accepted by the WhiteFishMaLL participants and the RTD team began programming and designing the *DigitalFishmonger* from this specification.

The DigitalFishmonger prototype

When the programming of the *DigitalFishmonger* started it became clear that the top-layer could not include more than eight categories. The 12 categories suggested by the focus group would simply be too much for smartphone screens. The categories were therefore combined and presented as eight questions. The top- and second-layers of the prototype are shown in figure 19.

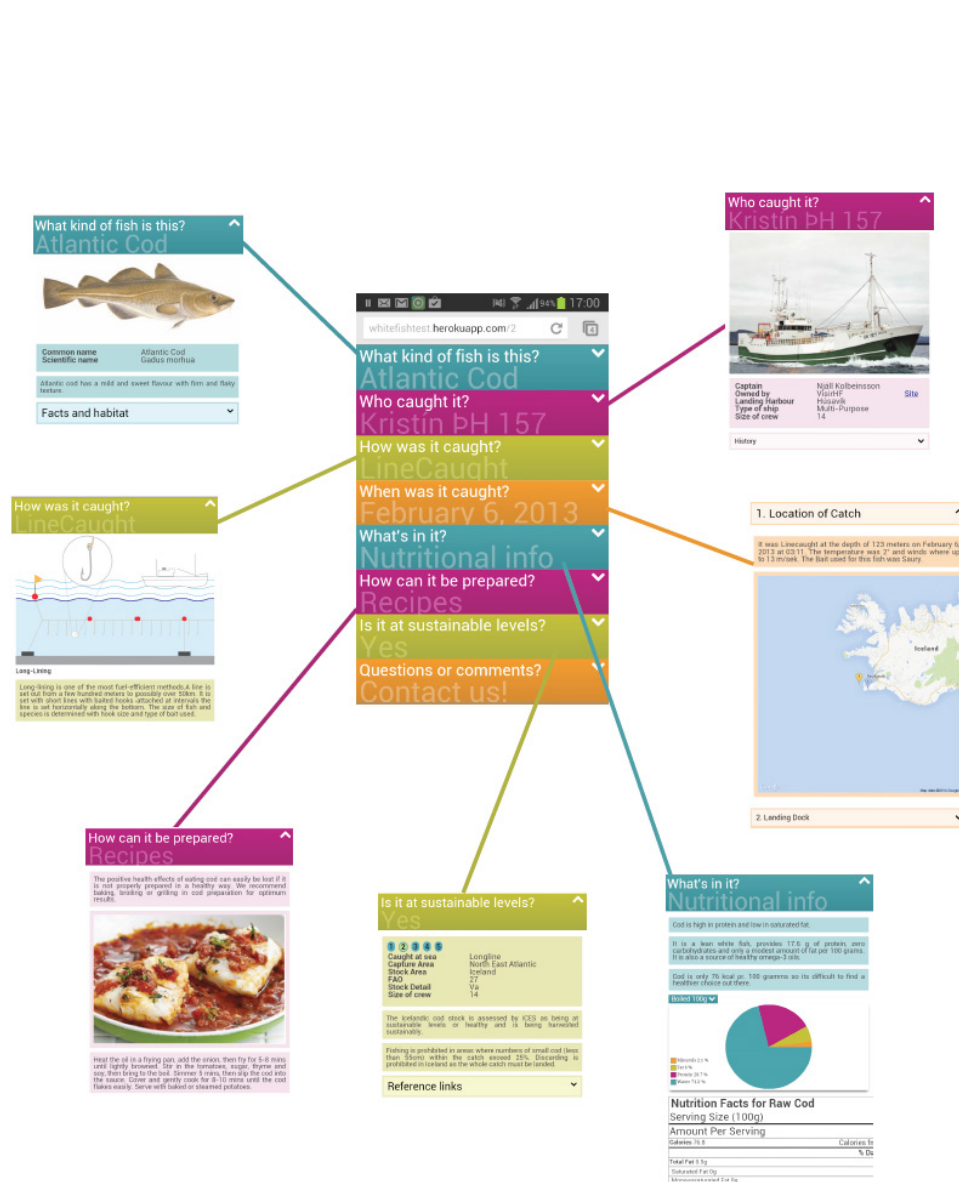


Figure 19: Top- and second layers of the prototype

Only parts of the data needed to be batch-based, which could then be linked to connected general data. For example if the batch contained cod, then the background data on the species, habitat, sustainability, nutrition and recipes would be already in the database. Same applies for example to the vessel and fishing gear, where only the vessel number and fishing ground needed to be forwarded, as details, figures and maps would already be available in the database. This minimised the required data that needed to be extracted and forwarded to the database.

The prototype was made for 10 batches of cod and haddock products from Vísir hf. and each got its own web-page that could be accessed by scanning a QR code that were presented as shown in Figure 20.

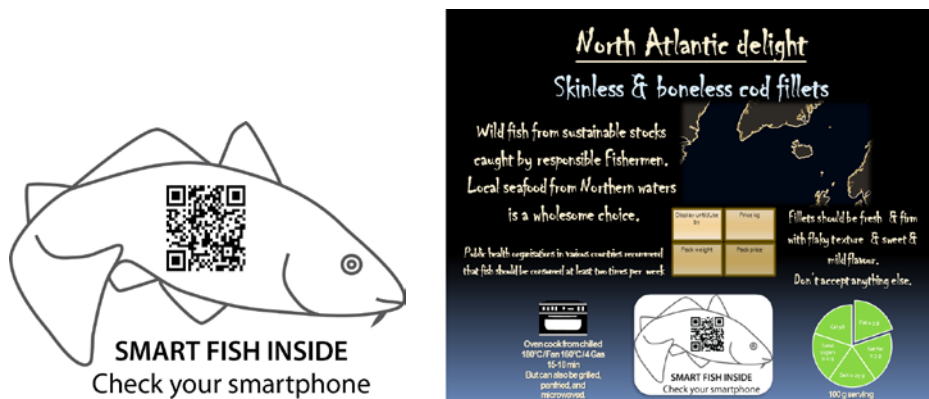


Figure 20: Presentation of QR code for product packaging in order to access the DigitalFishmonger

With the prototype ready the third specific objective (SO3) had been achieved and the work on the fourth specific objective (SO4) “development of communication channels and distribution systems” could commence.

5. The *DigitalFishmonger* presented to users and developed further

With the first version of the prototype *DigitalFishmonger* available in the autumn of 2013, the task of introducing it to the potential users, such as consumers and FBOs, could start. For the next year the project partners presented the prototype to potential users, received inputs on possible improvements and challenges associated with implementation. Issues such as target groups, communication channels and distribution (SO4) were considered within this phase of the project.

The Humber Seafood Summit 2013

The annual Humber seafood summit is held in Grimsby each year in September. The two day event draws interest from key people in the distributors, processors, foodservice and retail sectors of the UK seafood industry. Attendees are usually between 200 and 300 of the most relevant FBOs for giving input to the *DigitalFishmonger*. As a part of the 2013 Summit the WhiteFishMaLL project hosted a seminar where the *DigitalFishmonger* was demonstrated and its applicability discussed with the participants.



Figure 21: A WhiteFishMaLL seminar was held in connection with the 2013 Humber Seafood Summit

The seminar received a lot of interest and was attended by around 60 people in total. The WhiteFishMaLL partners had not anticipated such a turnout and were therefore unable to host all interested participants at once. The event was consequently ran twice, with around 30 participants in each seminar. The participants were distributors, wholesalers, processors, food service, retailers and environmental NGOs. Most participants applauded the *DigitalFishmonger* and thought it would be a valuable tool in gaining a market differentiation for cod and haddock from the N-Atlantic. There was a particularly great interest in the *DigitalFishmonger* amongst Fish & Chips restaurant owners at the seminar, which came as a surprise to the WhiteFishMaLL participants. That sector had not been considered particularly of interest for the project until then, but after the National Federation of Fish Fryers expressed their interest in testing the solution, the project partners realised the opportunity that the *DigitalFishmonger* could have in the Fish & Chips sector.

Not all feedback from the seminar was though positive. People responsible for seafood sourcing at Marks & Spencer and Tesco attended the seminar, and had a private meetings with the WhiteFishMaLL representatives after the seminar. They pointed out challenges associated with the *DigitalFishmonger* that they thought would make it difficult to implement the solution in a consumer facing manner in their stores. Majority of their sales are in their house-brands and they do not want to be forced to source only from suppliers that can offer data into the *DigitalFishmonger*. They also felt that if they would offer such a solution it would have to apply to all fish they sell. This resistance amongst retailers had not been identified before the Humber Seafood Summit and this challenge only became clearer as the project progressed.

The Marks & Spencer and Tesco people also pointed out that they did not necessarily want to let their customers know the date of capture of their fresh and frozen fish. People want to think that the fresh fish was caught yesterday and the frozen fish last month. They did however think that the *DigitalFishmonger* would be of value for them to use internally. They themselves, as well as wholesalers, distributors, secondary processors and fish counter employees could scan the QR code and see the product story.

The Icelandic Fisheries Conference 2013

The *DigitalFishmonger* was presented at the annual Icelandic Fisheries Conference in November of 2013. The event is attended by around 200 of the most relevant FBOs within the Icelandic seafood sector. The *DigitalFishmonger* received considerable interest, but there were obvious challenges identified by the FBOs, which they thought could make this solution counterproductive. Fresh fish from Iceland that is sold in the UK is either flown by airfreight or shipped by sea freight. By airlifting the fish can be in stores 2-3 days after capture, but the CO₂ emissions of the airfreight is however a negative property. Fish that is sent by sea freight has very low CO₂ emissions, but the fish is at least a week old when it arrives in the stores. The FBOs were therefore worried that providing information on date of capture and mode of transport would be a “lose-lose” situation. The problem they saw with the frozen fish was that most frozen fish is more than six month old when it is sold, which might be considered a turn-off by consumers.



Figure 22: The DigitalFishmonger was presented at the Icelandic Fisheries Conference in 2013

There were though also positive messages from the conference, as FBOs thought that the idea and design was good and could be used internally i.e. not consumer facing. They also suggested using only the general information part and removing components such as date of capture and transportation mode. The problem with that suggestion was however that these were the categories that the focus groups and survey respondents had placed emphasis on.

The North Atlantic Seafood forum

The North Atlantic Seafood Forum is the world's largest seafood business conference, and a leading executive meeting place for the seafood industry. The event is held in Bergen, Norway, every year in March, where around 600 delegates from more than 35 countries and 300 companies attend. The WhiteFishMaLL project was presented in an innovation competition at the Marine Innovation Day, which was part of the 9th North Atlantic Seafood Forum in 2014. The WhiteFishMaLL project was presented by a poster, one-page handouts and in an onstage presentation. There were over 20 projects presented at the event, but less than half of them were selected for onstage presentation. The fact that WhiteFishMaLL was selected for onstage presentation confirmed the relevance of the solution for the NASF target audience.



Figure 23: Valur N. Gunnlaugsson presenting the WhiteFishMaLL project at the 2014 North Atlantic Seafood Forum

The aim was to present the *DigitalFishmonger* and show its commercial potential in data gathering and dissemination of requested information by consumers. After the presentation, the project representative got a lot of input and questions from interested FBOs. The question was raised frequently if the solution could be adapted to other species than whitefish and when it would be ready for commercial distribution. Both of which are outside of the scope of the project.

The European Seafood Exposition

WhiteFishMaLL was at the European Seafood exposition in Brussels in May of 2014. The project hosted a conference, which was though unfortunately only attended by a handful of people. The aim had been to get an opportunity to present the *DigitalFishmonger* to a large group of FBOs at the conference, but the competition for the FBOs attention at the expo is extreme and WhiteFishMaLL did not succeed to gain enough interest. The few that however showed up at the conference did find the solution interesting and wanted to follow the project. Despite the disappointing turnout at the conference the WhiteFishMaLL participation at the Expo was of value. The project representatives had meetings with FBOs during the expo where the *DigitalFishmonger* was introduced and they got some good comments and interest from potentially important users. The introduction at the expo lead for example to follow-up meetings and conversations with Icelandic, ISI and TrackWell.

The Humber Seafood Summit 2014

WhiteFishMaLL was at the 2014 Humber Seafood Summit where the project was presented in a session titled “scanning the horizon: trade and technology”. The *DigitalFishmonger* got considerable attention and many FBOs in secondary processing, food service and Fish & Chips sectors did express interest in trying the solution when it was commercially available. Some of the secondary processors informed the WhiteFishMaLL representatives that they were having difficulties in providing accurate traceability information and that they were worried about meeting upcoming labelling requirements as results. They therefore saw the *DigitalFishmonger* as a tool to solving that problem.



Figure 24: WhiteFishMaLL was presented at the 2014 Humber Seafood Summit by the project leader, Jónas R. Viðarsson

The participation at the Humber Seafood Summit was interesting, as the project had also taken part in the event in the year before. Many of the FBOs were happy to be able to follow up on the project, and expressed their interest in getting more information as the project progressed.

The Icelandic Fisheries Exhibition

The Icelandic Fisheries Exhibition is a major event in the N-Atlantic seafood sector. The exhibition is held every third year and is attended by 12-15.000 people. The WhiteFishMaLL project and the *DigitalFishmonger* were presented at the Matis stand at the exhibition in September of 2014. The solution got considerable attention amongst the exhibition attendees, most of which thought the solution could facilitate market differentiation for N-Atlantic cod and haddock at demanding markets.



Figure 25: The DigitalFishmonger was demonstrated on a large LCD screen at the Icelandic Fisheries Exhibition

The most relevant FBOs that commented on the solution gave positive remarks, but were though sceptic that it would be in their best interest to give retailers and consumers “too much information”.

The Icelandic Fisheries Conference 2014

The *DigitalFishmonger* was presented at the Icelandic Fisheries Conference in November of 2014. This time two versions of the solution were presented i.e. the batch-based version and a general information version developed for Fish & Chips stores in pilot test (see later in this chapter). The FBOs that commented on the solutions thought the general information version would be more applicable for them, as they were worried that the batch-based version could include delicate information that would have counterproductive affects to disseminate.

Other outreach events

The WhiteFishMaLL project used many other means to introduce the project and its product, as well as getting input from variable potential users. WhiteFishMaLL was for example presented at the 2014 WEFTA (West European Fish Technologists Association) conference in Spain in June of 2014. Where seafood scientist got the opportunity to learn about the project and the *DigitalFishmonger*.

The project participants have also used every opportunity to meet with the industry, present the work and discuss progress and possible application or implementation. In June of 2014 the project got for example an opportunity to meet with the sales team at **HB Grandi** and 15 of their customers from the UK. The meeting was very fruitful and provided valuable feedback on the solution and possible implementation. Most of the FBOs at the meeting expressed their interest in trying out the *DigitalFishmonger*. Most of the FBOs at the meeting were Fish & Chips restaurant owners from the UK.

Because of the great interest the WhiteFishMaLL got from the Fish & Chips sector in the UK, the project went for a visit to Doncaster, Bradford and Grimsby in the autumn of 2014 to introduce the *DigitalFishmonger*, get feedback on possible uptake if the solution would be commercially marketed and to recruit partners for field trials (pilot tests). The WhiteFishMaLL representatives were joined by HB Grandi's frozen-at-sea fleet manager, which showed great interest in the project. HB Grandi's main distributor in N-Britain was visited, along with six Fish & Chips restaurants, fishmongers, secondary processors and wholesalers.



Figure 26: The DigitalFishmonger introduced to a Fishmonger in Doncaster and a fish & chips restaurant owner in Bradford



Figure 27: Article on WhiteFishMaLL in Fiskifréttir

The visit to Doncaster, Bradford and Grimsby was very encouraging, as most of the FBOs presented with the solution were positive and wanted to take part in the pilot tests. They did however point out the same challenges that the FBOs at the Icelandic Fisheries Conference had mentioned i.e. that some information could be counterproductive to show. This was in particular the date of capture, as the Fish & Chips restaurants are for example often serving fish that has been frozen for 6-12 months. Many consumers might interpret that as being too old. They also felt that it would be too much work to replace the QR code with every lot and suggested therefore a version that was more general, so the QR code would only have to be replaced once a month or less.

WhiteFishMaLL did also use the media to present the project, along with the social media already mentioned. The project and the *Digital-Fishmonger* were for example discussed in an article in the Icelandic fishing newspaper (Fiskifréttir) which has very good distribution amongst FBOs in Iceland (Vidarsson 2014).

Further development of the DigitalFishmonger

The input gathered from potential users within each link of the value chain confirmed the applicability of the first prototype of the *DigitalFishmonger*. Some minor improvements were made after receiving feedback from consumers and FBOs during this introduction and consulting phase. These improvements were merely aimed at clarifying already present messages and adding references. Contact and feedback information through Facebook and TripAdvisor were added, as well as informative explanations on freezing, thawing and storage life of frozen fish. Once that work had been accomplished, the project participants felt that the *DigitalFishmonger* was completed. It contained all the market differentiation parameters identified during the desk study, focus groups, industry interviews and in the survey. The methodology and practical implementation of extracting the necessary information, forwarding it and storing, as well as presenting it to the users had been successfully addressed. The *DigitalFishmonger* was therefore ready for pilot testing in real-life circumstances.

There was however one criticism that had continuously been pointed out by FBOs throughout the whole presentation and consultation phase. Some of them felt uneasy giving information on date of capture and wondered also if the content of the *DigitalFishmonger* could be more generalised, so that they would not have to replace QR codes with every batch. Restaurant owners that always source from the same vessels did for example suggest that they could present the fleet that supplies them with fish, rather than the individual vessel. This presented the WhiteFishMaLL team with a dilemma, as date of capture and other batch-based information on the actual fish in the consumer's hands had been identified as key differentiation parameters identified by the consumers in the focus groups, survey and other outreach tasks within the project. The WhiteFishMaLL partners decided though to make also a "passive" version of the *DigitalFishmonger*, in order to be able to explore that alternative as well as the batch-based one.

The "passive" version was tailor made for four Fish & Chips restaurants in Bradford and Doncaster that had committed to trying the solution out. These restaurants sourced all their cod and haddock from HB Grandi frozen-at-sea production and its distributor in UK, Warners Fish Merchants. The difference in this "passive" version and the batch-based version was as follows:

- The "Who caught it?" category included all three freezer-trawlers of HB Grandi.
- The "how was it caught?" category also included details on freezing and storing practices, as well as information on storage life and thawing of frozen-at-sea products. Emphasis was placed on informing that the fish is quick-frozen within few hours of capture and kept deep-frozen until arriving at the restaurant.
- The "where was it caught?" category covered all of the Icelandic waters and also showed how it was transported to the restaurant.
- The "what's in it?" category included nutritional facts on Fish & Chips and compared it to other fast food.
- Then came a new category, titled "who did prepare it?" where information on the Fish & Chips restaurant was presented.

Figure 28 shows the passive version of the *DigitalFishmonger* made for the Fish & Chips restaurant Fish Bits in Doncaster.



Figure 28: The passive version of the DigitalFishmonger made for the fish & chips restaurant Fish Bits

The specific objective 4 (SO4) of the WhiteFishMaLL project had been completed once these two version of the *DigitalFishmonger* had been developed. The project could then enter the demonstration phase, where the *DigitalFishmonger* could be tested in real-life circumstances.

6. The *DigitalFishmonger* demonstrated and evaluated

The final versions of the *DigitalFishmonger* were ready by the autumn of 2014. The project entered then the demonstration phase (SO5) where the solution was presented to FBOs and tested in real-life circumstances, as well as in a large quantitative consumer survey. The pilot tests and the consumer survey gave valuable results that were used for evaluation of the *DigitalFishmonger*'s performance and applicability (SO6). The results from the demonstrations and the consumer survey gave encouraging indications that the "product" would be a valuable tool for facilitating market differentiation and price premiums. The applicability is though likely to be dependent on the target users and complexity of the value chains.

Pilot tests in real-life circumstances

In order to test the *DigitalFishmonger* in real-life circumstances, according to Living Lab methodologies, the project got four Fish & Chips restaurants in the Bradford and Doncaster area to try the solution out for few hours; two of them then committed to test a modified version out for a longer period. Attempts were made to test the solution out in retail stores, but the *DigitalFishmonger* did receive resistance from the retail sector, as discussed previously in the report. Retailers were interested in testing the solution out internally, but did not feel comfortable making the *DigitalFishmonger* consumer facing. Since consumer acceptance was considered a key issue for evaluating the performance and applicability of the solution, it was decided to focus the pilot tests on chains where the *DigitalFishmonger* could be used as consumer facing. The value of using the mobile application internally should however not be underestimated.

First pilot tests

The batch-based version of the *DigitalFishmonger* was tested out in real-life in four Fish & Chips restaurants in August of 2014. The restaurants were The Blakely's in Brighouse, Mother Hubbard's in Bradford, Scawsby Fisheries in Doncaster and Fish Bits in Doncaster. The WhiteFishMaLL team, along with representatives from HB Grandi and Warners fish merchants, stayed at each restaurant for around two hours observing the customer's responses to the QR codes and the *DigitalFishmonger*.

It became apparent in these pilot tests that the interest and uptake was highly age dependant, the under 30 age group was very interested but the over 50 was not.

Large portion of the younger consumers scanned the QR codes and read up on the history behind their fish. When approached and asked about their impression, they were very positive

but did not have much feedback on if something could be improved or if this would affect their purchasing decisions. Concrete inputs were to show the people behind the fish i.e. crew of the vessels and to add information on what kind of oil was used for frying the fish. Few commented that they had not realised before that the fish had been caught eight months ago, which some thought was too long.

The over 50 age group showed very little interest in the solution and when approached it seemed that the main reason for little uptake were because of technological barriers. Few owned a smartphone and even fewer knew anything about QR codes.



Figure 29: QR code on takeaway packaging from Scawsby Fisheries

The results from these pilot tests were therefore that potential uptake is age dependant and that information on date of capture can be counterproductive. The main customer group at Blakely's are senior citizens, which meant that the *DigitalFishmonger* had little relevance for the owner. The other three restaurants had however a more diversified group of clients, and they were all willing to test the solution out further if it could be modified according to their wishes. Those wishes included making the "passive" version of the *DigitalFishmonger* (discussed in the previous chapter).

The second pilot test

The second pilot test started in September and continued until December. The Fish & Chips restaurants Mother Hubbard's and Fish Bits took part in the test by displaying the QR code in their stores, putting QR codes on takeaway boxes and using it for promotional purposes, such as shown in Figure 30.

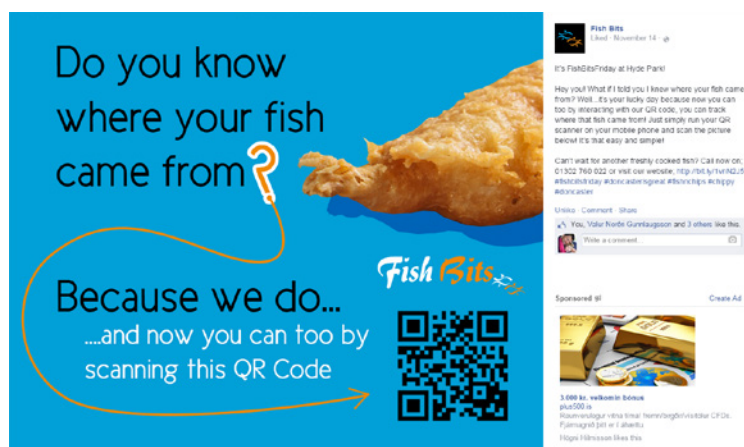


Figure 30: The DigitalFishmonger used by Fish Bits for promotional purposes

The uptake and customer feedback was observed by WhiteFishMaLL representatives for one day, after which the personnel at the Fish & Chips restaurants took over. The results confirmed what had been observed from the first pilot test, that uptake is age dependant, but interest amongst older clients increased if the information was printed out or made accessible in another format than through QR codes.



Figure 31: The owner of Mother Hubbard's testing the DigitalFishmonger

By using the “passive” version of the *DigitalFishmonger*, the Fish & Chips restaurant needed only two QR codes for the entire testing period i.e. one for cod and another one for haddock. The feedback given by the Fish & Chips personnel was encouraging, as they felt that interest amongst clients were considerable and it did not add much work for them to implement

it. The downside for the project was that they did not use the batch-based version of the *DigitalFishmonger*, which was really what the focus groups and the survey had called for. The project did therefore hire the consumer and market research company Redshift Research to perform a large online consumer study where the batch-based version was demonstrated.

The consumer survey

In November of 2014 the UK consumer and market research company Redshift Research conducted a survey on behalf of the WhiteFishMaLL project where the *DigitalFishmonger* was demonstrated to 1500 UK adults who buy fish at least once a month. The questionnaire was prepared in collaboration between Redshift Research and the WhiteFishMaLL team, with the aim to get reliable feedback on the applicability and performance of the *DigitalFishmonger*. Quotas were set to ensure reliable and accurate representation of the total populations aged 18 and older. Results were 95% statistically significant and the sample was selected from the Crowdology™ online panel, which ensured balance across regional, age and gender demographic factors, and is nationally representative of the UK population.

53% of respondents were male, the age distribution around 20% in the age groups 25-34, 35-44, 45-55 and 55-64, but only 8% were in the 18-24 age group and 12% in the 65+ age group. 65% of respondents purchase fish at least once a week and the rest at least once a month.

The results of the survey were encouraging, as they confirmed the applicability of the solution and indicated that the performance would result in market differentiation for cod and haddock products from the N-Atlantic.

The respondents were asked about how important they thought the categories in the *DigitalFishmonger* were. They were asked to rate them on the scale 1-10, the results are shown in Figure 32.

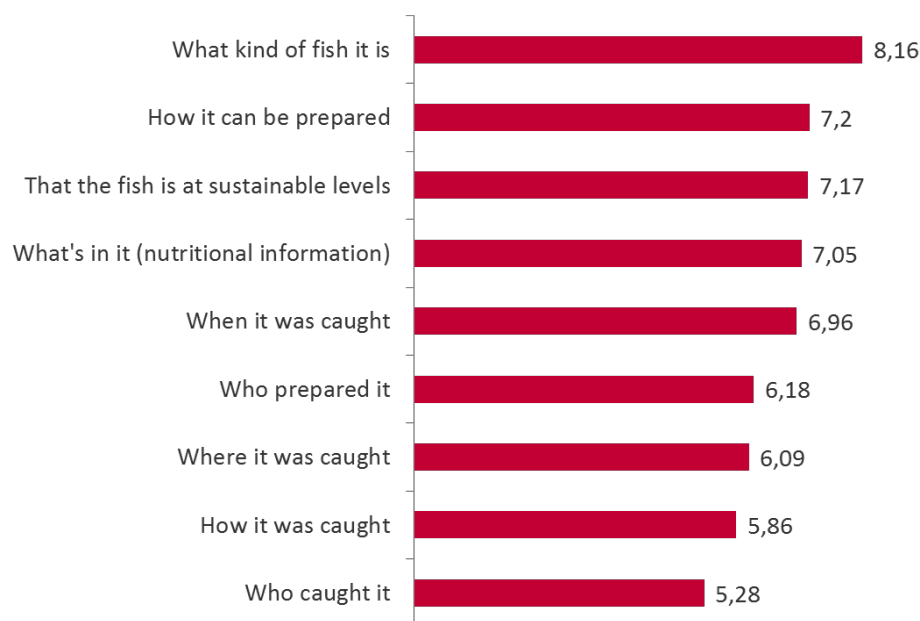


Figure 32: How important are the categories in the *DigitalFishmonger* on the scale 1-10 when making decisions to purchase seafood?

Respondents are, understandably, most concerned about what type of fish they are buying. They also think about how the fish can be prepared. These are both practical considerations, as it is unlikely people will pick up any fish without knowing what they may cook with it. However, after this, the sustainability of the fish is rated as most important when making a decision to purchase seafood. The results from this question indicates that the categories are relevant for people that are making purchasing decisions on seafood. Interestingly all the categories scored higher amongst women than men, which is noteworthy because women are responsible for buying food in majority of households.

The respondents were then asked whether environmental concerns affect what seafood they buy. Majority, or 56% responded that environmental concerns do affect their seafood purchasing decisions, 10% did not know and 34% said that this was not a factor in the buying decisions.

In order to get a sense of when information on date of capture becomes counterproductive the respondents were asked after how much storage they would be uncomfortable buying fresh and frozen fish. A third of respondents would feel uncomfortable buying fish that has been frozen for only 3 months and additional 36% once it has been frozen for 6 months. This means that almost 70% of respondents would consider majority of frozen-at-sea fish sold in UK Fish & Chips shops too old. Respondents seem even more conscious about their fresh fish, and how long ago it was caught, with 41% becoming uncomfortable buying fresh fish caught just 3 days ago and additional 39% feel that fish caught 6 days ago is too old, as shown in Figure 33.

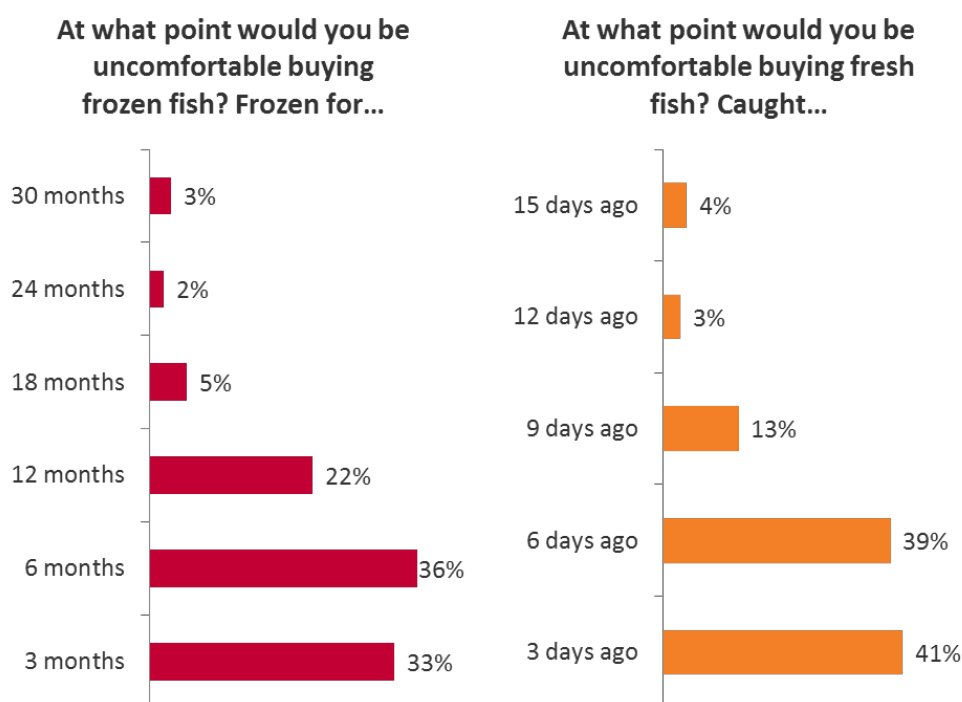


Figure 33: Majority of respondents feel that fish that has been stored frozen for 6 months is too old, and the same applies for fish that has been stored for 6 days

These results confirm the concerns that FBOs had expressed during the consultation phase. Majority of consumers are unable to interpret information of date of capture, as they do not have knowledge of what is a normal shelf-life of these products.

The respondents were next asked about if they own smartphones and use QR codes, which is a prerequisite for using the *DigitalFishmonger*. The majority of respondents have a smartphone, but of these just over a third have a QR scanner already installed. However, 29% of those who don't currently have a QR scanner said they are considering getting one.

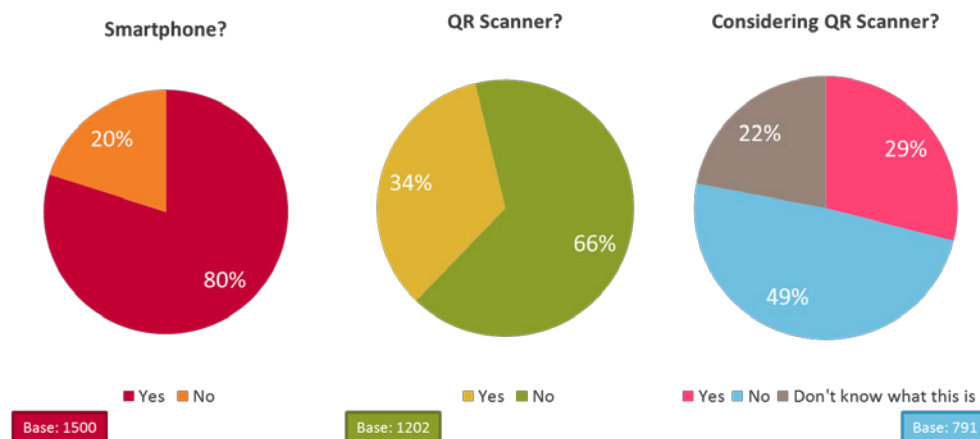


Figure 34: 80% of respondents have smartphones of which two thirds have a QR scanner set up

The positive message from these results were that most people have a device which has the ability to scan QR codes, the challenge will be to encourage those without a QR scanner to get one and use it. The survey showed that smartphone ownership and QR scanner usage drops as age increases.

The next questions focused on knowing if the respondents would choose seafood with information in the *DigitalFishmonger* available over other alternatives, and if they would use QR code to get this information. 55% of respondents would choose seafood which offers this information over alternatives. A quarter were undecided. However, slightly less (47%) said they would use a QR code to get this information. This is not such a huge disparity, and could almost certainly be addressed with an appropriate marketing campaign.

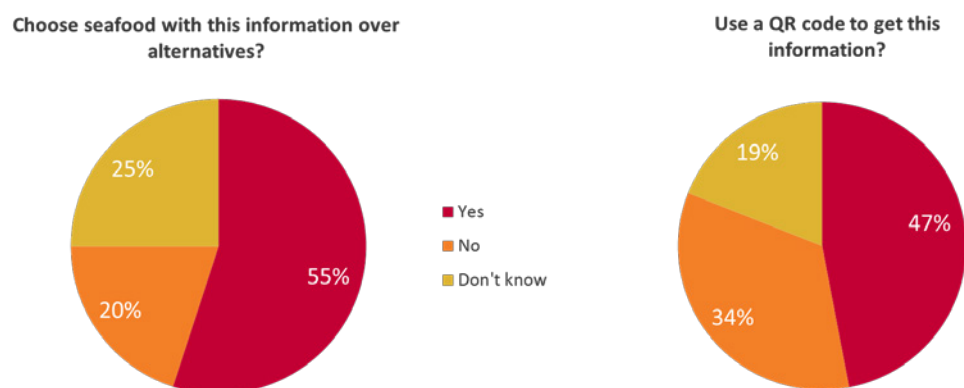


Figure 35: Over half of respondents would chose seafood with the DigitalFishmonger information over alternatives

Although the older age groups rated all the aspects included in the *DigitalFishmonger* as more important for making a decision when purchasing seafood, the youngest age group (18-24) year olds were more likely to say they would choose seafood which is able to provide this information over alternatives and use a QR code to access the information. This confirms what had been observed from the pilot tests. Possible solution could be to assist people with trying the solution out for the first time, having touch screens available at the counter or printing material from the *DigitalFishmonger* out on paper. In fact 53% of respondents said they would prefer printed material, whilst 44% said they would use the QR code. Two thirds said they would access this information in the store, which is where it would be most helpful in making decisions about purchasing seafood.

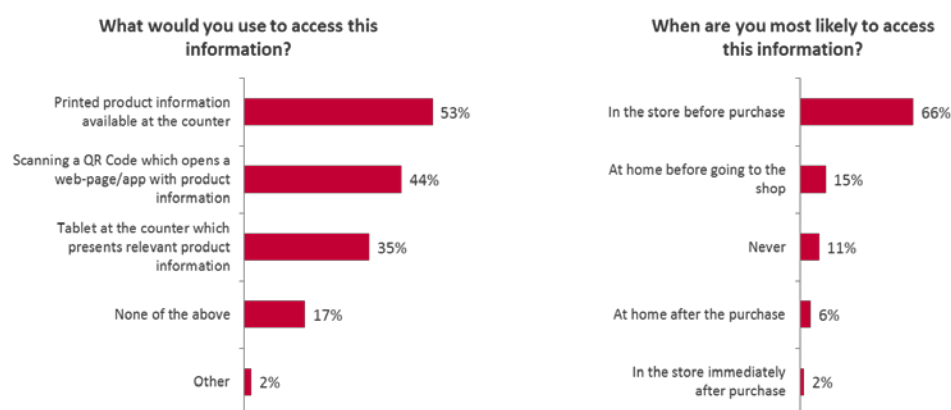


Figure 36: People have different preferences for accessing the information in the DigitalFishmonger, but they would like to have the data available in the store before making the purchasing decision

Younger people are more likely to choose smart phones or tablets to access the information, whereas as age increased, so does the likelihood of choosing 'printed product information'. This is not a big surprise, but does flag up the option of having several ways to access the information which appeals to all ages to maximise reach.

The next questions were aimed at getting information if the *DigitalFishmonger* would encourage people to buy fish, as well as if it would encourage people to buy sustainably caught fish. Half of respondents said that having this type of information available would encourage them to buy more fish in general, and 65% of respondents said it would encourage them to buy more sustainably caught fish.

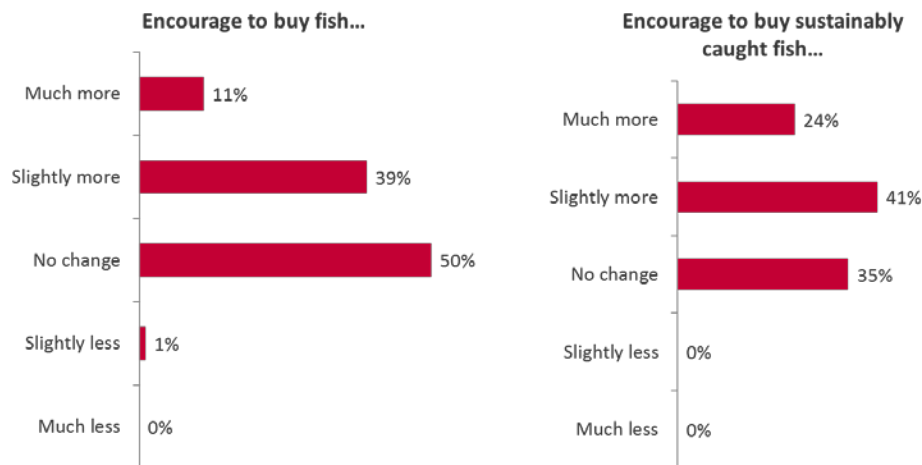


Figure 37: Half of respondents said having this type of information available would encourage them to buy more fish in general

These were very positive outcomes, and suggest that the *DigitalFishmonger* could have a significant impact on people's fish buying habits. Over three quarters of respondents also said they would be confident buying fish if they had this information available and about the same number of respondents said it would make them take more notice of where their fish comes from.

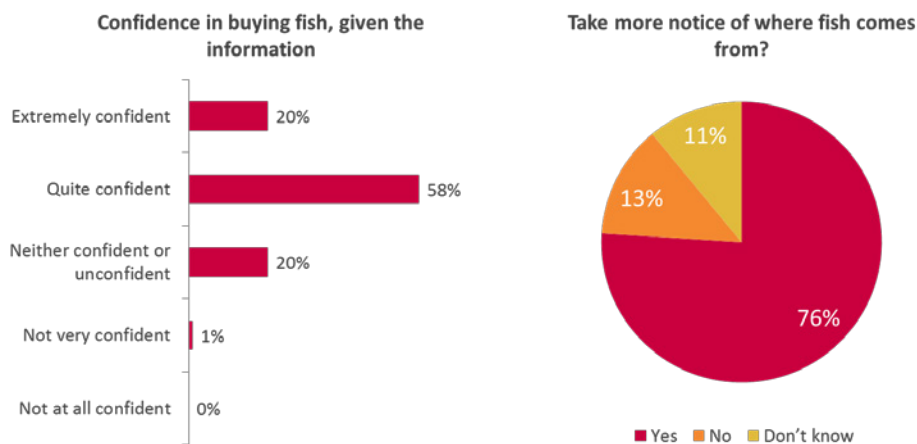


Figure 38: Almost 80% of respondents said they would be confident buying fish if they had the *DigitalFishmonger* information available and about the same number of respondents said it would make them take more notice of where their fish comes from

Again, these were very positive outcomes which showed that presenting batch-based facts about the product story increases confidence in the message the supplier is trying to send. For comparison the respondents were asked if they trusted known ecolabels, NGOs and governmental institutions to give reliable information. Amongst the ecolabels, only 12% trusted MSC to give reliable information and 3% IRF. Governmental institutions were trusted by 23%, ICES by 12%, Greenpeace by 18% and MCS by 24%.

The next set of questions were intended to find out if people are willing to pay a price premium for seafood accompanied by credible information on favourable characteristics. They were first asked if they would be willing to pay a premium for a seafood product with a

way to provide information on the characteristics of the product on a batch level i.e. not just general information, but information on the actual product that is in their hands. And if so, how much. A third of respondents said they would be willing to pay a premium, and of these, 90% would pay a 1-10% premium.

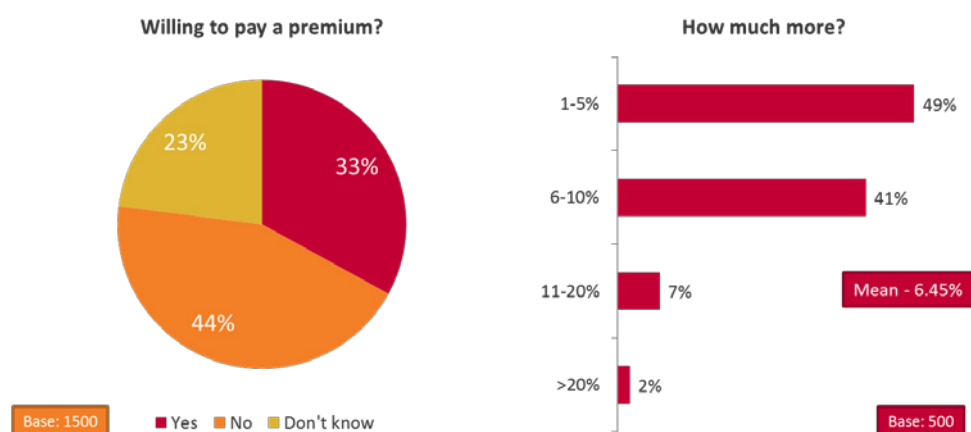


Figure 39: Third of the respondents were willing to pay a premium for seafood with product information on batch level

The fact that so many people would be willing to pay extra, supports the notion that the *DigitalFishmonger* provides valuable information which can inform people's purchase decisions. The respondents were then asked directly whether they would be willing to pay a premium for fish with the *DigitalFishmonger* solution. And if so, how much. There was a slight drop in those saying yes to that question and there were slightly more that chose 1-5% premium, rather than 6-10%, as can be seen in Figure 40.

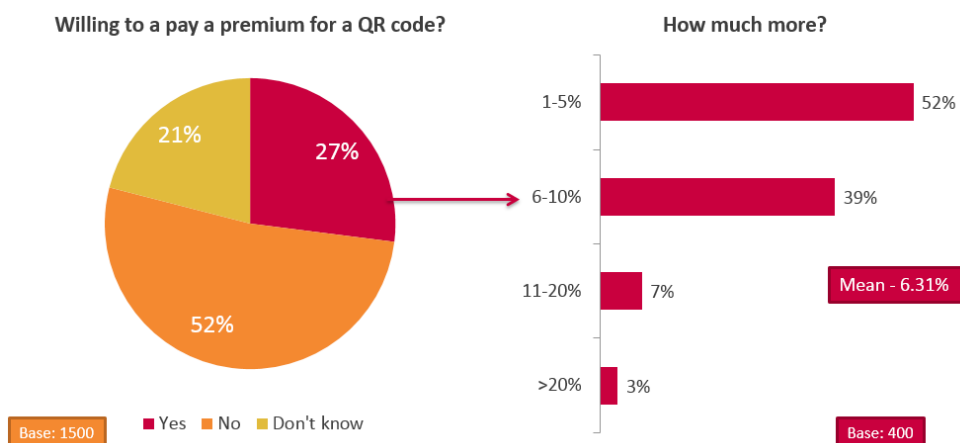


Figure 40: Roughly a quarter of the respondents expressed their willingness to pay a price premium for seafood accompanied by the DigitalFishmonger

It is to be expected that the uptake for a technical solution, such as the *DigitalFishmonger*, will be able to interest fewer people than when not specifying how the information will be presented. But the drop from 33% to 27% is not a huge one and the fact that more than a quarter of respondents are willing to pay a price premium at an average of 6.3% is very

encouraging. With the proper marketing it should even be possible to increase these numbers. These results from both the pilot tests and the survey indicate the applicability of the *DigitalFishmonger* and its positive performance in order to facilitate market differentiation for cod and haddock from the N-Atlantic. But the big question is though what economic effects it can have for the sector?

Economic effects of the DigitalFishmonger

There are number of ways to estimate the potential economic impact of the *DigitalFishmonger* for the N-Atlantic cod and haddock sector. It is for example possible to look at cod and haddock exports from selected countries and results from the last online survey. Those results suggest that 55% of regular seafood consumers in the UK would choose seafood with the information attached that the *DigitalFishmonger* can provide over other alternatives. The results also show that 27% would be willing to pay a price premium for the products and the average price premium is 6.3%. It is therefore tempting to calculate the results of a 6.3% increase in price for 27% of the cod and haddock export to UK from the project participating countries, but that would though probably be a bit exaggerated estimation. There were 26 thousand tonnes of cod and 8 thousand tonnes of haddock exported from Iceland to the UK in 2014, valued at just over 170 million EUR (Hagstofa Íslands 2015). A total of 6.3% price increase for 27% of those exports would have returned 2.9 million EUR in added export value. Similarly, there were 29 thousand tonnes of cod and 19 thousand tonnes of haddock products exported to the UK from Norway in 2014, valued at 150 million EUR (Norges sjømatråd AS 2015). A total of 6.3% price increase for 27% of those exports would have returned 2.5 Million EUR in added export value.

The interest from the Fish & Chip industry in the UK in the project came as a surprise to the project partners. This industry is of huge importance for the N-Atlantic whitefish industry, as it is valued at a staggering £1.2 billion a year (Seafish 2014). Cod and haddock from local sources, as well as from Iceland, Faroe Islands and Norway have been the main raw materials for this sector for decades, but they are now facing increased competition, particularly from Russian suppliers. Russian factory vessels that are catching cod and haddock in the Barents Sea have in recent years improved quality and adapted production methods in order to be able to supply the EU market with competitive quality and prices. It can therefore be of significant importance that the WhiteFishMaLL solution is currently in use at two Fish & Chips shops in the UK, strengthening the bonds between the fish suppliers from the N-Atlantic and the Fish & Chips industry. These shops will most certainly not be considering sourcing their fish from other suppliers that are unable to provide them with the value chain information requested by their customers, or disseminating them through the *DigitalFishmonger*.

Moreover, UK was only seen as test market for the WhiteFishMaLL project, so the project work and findings can easily be adopted to similar markets in EU or N-America. It is though recognised that some preferences and willingness to pay might differ slightly between markets, but there are always some market niches that the *DigitalFishmonger* and information transparency will appeal to.

With this evaluation of consumer preferences, applicability and performance of the *DigitalFishmonger* completed had the sixth specific objective (SO6) of the project been achieved. The seventh and final specific objective was to give recommendations on how Living Labs can enhance innovation in the marine sector, which is discussed in the next chapter.

7. Guidelines and monitoring report for starting and running a Living Lab project in the marine sector

Foreword

The WhiteFishMaLL project has been observed by external Living Lab experts with the aim to monitor the project on behalf of Nordic Innovation, give constructive input to the application of Living Lab in the project and evaluate its performance in that respect; in addition to producing guidelines for starting and running a Living Lab project in the Nordic Marine sector. These external experts are Anna María Pétursdóttir and Þorvaldur Finnbjörnsson. This chapter contains their report to Nordic Innovation.

Introduction

This chapter will mainly document the Living Lab part of the WhiteFishMaLL project and give overview of good practises in the Living Lab approach and its methodology. It will not go into Living Lab theories in detail, but will mainly document and give guidelines on how to establish and use Living Lab methodologies in the marine sector. Theories and alternatives for organizing Living Lab work that is described in the first part of this chapter will mainly serve as reference to the actual work in the WhiteFishMaLL project.

This chapter is divided in three different sections. The first section describes the concept of Living Lab, pointing out its structure, functions, methodology and approach. This section is fundamental in this report since it gives an overview of Living Lab best practise and methodologies. The authors of this paper did make a desk research on different theories used by Living Lab activities as well as giving examples of various approaches. This is based on large number of sources where an attempt was made to bring forward a holistic picture of the Living Lab approach.

The second section explains the objectives of the WhiteFishMaLL project, its structure and process. This is where description of the project is given as presented in original papers related to the application to the funding organisation. The changes made in the project are described here as well. The Living Lab approach as seen in the FormIT model is given here for the benefit of the reader who wants to follow the process in the project. This section also describes the methods and methodology used in the project by the project owners. It does not only summarize various quantitative and qualitative research methods, but also plays a

fundamental role in identifying possible methods of research and methods that might fit into the context of Living Labs. It is also an overview of the practical approaches of Living Labs and Open Innovation. This section contains as well an evaluation of Living Lab methodologies used in the WhiteFishMaLL project and presents the result from their application in the project. This section offers critical perspective, pointing out the strength and weakness of Living Lab methodologies use in the project and suggesting various factor of scalability, the usefulness of users' feedback.

The third and final section of the chapter includes an evaluation of the project in the context of its Living Lab implementation. This is done by comparing the Living Lab approach and established theories with the initial intentions and the changes made within the progress of the project. The external Living Lab experts' evaluation and conclusions are in this section.

The main objective of this chapter is to demonstrate how a Living Lab can be established in the marine sector in relation to innovation challenges.

The Living Lab approach, methodology and users

The key concept of a Living Lab is to turn users from being traditionally considered as merely passive subjects to whom new products or services are simply proposed, into active players contributing to the co-creation and experimentation of emerging ideas, breakthrough scenarios and innovative concepts (Molinari 2011).

In essence, the Living Lab concept refers to a set of quantitative and qualitative methodologies and tools for the co-creation and validation of innovation together with the end users in real-world environments. In these environments, people are taken across the different roles played during a normal day, and which typically require the use and support of different technologies. Compared with traditional test beds, where users are not necessarily involved and the laboratory setting is controlled, Living Labs place people at the very centre of the innovation process; thereby, innovation becomes human-centric, in contrast to technology-centric.

When running a Living Lab project the key challenges for the project designers is how to establish effective working relations between users and the designers, and to inject relevant theories and methods, unknown to the users, which need to be debated and assessed. Users are involved throughout the development process in a Living Lab project and they are active and steer the context and evaluation activities. Living Labs are commonly characterized as both a methodology that stresses user involvement in innovation projects and the organizations that focus on its use.

Living Labs methodologies

The basic idea of Living Labs is to gain access to ideas, experiences, and knowledge that users possess, based on their daily needs for support from products, services, or applications. The user centric approach in Living Labs consists of human beings, citizens and the civic society as a source of innovative ideas. Living Lab is built on cooperation with users to support creativity and an efficient interaction with a large population of people. There are two aspects important to consider when interacting with a larger population. One is the ability to capture the ideas and input from a larger population and other is the ability to evaluate and understand technology use in a specific context.

A number of challenges impact effective co-creation in Living Labs, one is the facilitator and the other is methodology used in the Living Lab process. Facilitators can play a crucial role bridging between the spheres of design and use, a fundamental disconnect or gap can otherwise occur. Living Labs are instrumented as a project that are scheduled and built

around comprehensive set of methodologies aimed to reach the predefined objectives of any Living Lab.

Most methodologies used in Living Lab projects are borrowed from qualitative research and anthropology e.g. ethnography and case studies. They are best viewed as a mosaic set of techniques selected on the basis of experiment to validate actual needs, rather than a strict protocol. Living Lab methodologies can be used in closed environments, but they probably make more sense when applied to open ones. Following are some alternatives in terms of methodology toolbox alternatives for Living Lab activities in terms of obtaining the users' needs.

- Data collection tools
 - o Observation
 - o Experimentation tools
 - § Experimentation scoping and planning
 - § Field experimentation
 - § Lab experimentation
 - § Longitudinal pilots
 - § Simulations.
 - o Survey
 - o Critical incident techniques
 - o Interview
 - o Questionnaire
 - o Standardized questionnaire or inventories
 - o Collection of research scripts
- User involvement tools
 - o Technology demonstration and experience
 - o Scenario development
 - o Focus groups
 - o Brainstorming groups
 - o Per-user group
 - o Nominal technique
- Product development tools
 - o Business analysis
 - o Expert assessment
 - o Idea book
- Observation Interviewing
 - o The focus group interviewing
 - o Informal conversation interviewing
 - o Standardized open-ended interviewing
 - o Approach interviewing
- Other methods
 - o Documents review
 - o Interaction analysis
 - o Experience sampling
 - o Live-story and diaries

- o Discussion forums
- o Social network
- o Chat rooms
- o Behaviour logging

Presenting those alternatives makes it less difficult to design the Living Lab exercise. It is though important to consider the alternatives and compare with the project objectives and aim at hand in order to come up with most promising set of methods to support the Living Lab exercise in question.

Methods and tools are meant to deal with how to organize and operate the Living Lab tools in order to achieve knowledge about the user and experience of users. The methods and tools to analyse the collected data have a vital role in the Living Lab process. Examples generally found in Living Lab literature are:

- User involvement
- Which type user, effort, expectations required
- Provide tools to have users involved
- Need for not noticeable methods
- Automatic data collection
- Different approaches to motivate different users and keep them motivated
- Knowledge on cultural and legal differences
- Need for low cost observation methods

Over the past years several methods and tools have been developed from Living Lab activities all over Europe. Those are for example the FormIT process, The C@R Workflow, The IBBT Research cycle and the technological Platform Model (Molinari 2011). No Living Lab project is alike because of the playground in which innovations grown and it is known that a Living Lab methodology is formed around each and every project in question. But what has been used and what is already known about Living Lab can be used as guidelines in specific projects. The number of guidelines that has been developed is formed from the best practice of many Living Labs in Europe.

User and stakeholder involvement and data collection tools

User involvement is one of the key elements of a Living Lab. The most important feature of the user-pool is the characteristics of its partners and finding out what the relevant experiences, methods and tools that Living Labs benefit from are. Later in this section an explanation will be made on how groups should be approached through different means, such as newspaper advertisements, social media, manpower companies or even other Living Labs.

User involvement

Research that has been conducted on the subject of user's role in innovation process has found that needs are highly heterogeneous and that users show a high willingness to pay for solution that is more closely related to their individual needs. That is why user involvement is one of the key elements of a Living Lab. As such the user should be a focal point of the operation of the Living Lab. There are two aspects relevant here. On one hand, it is important to perform the measurements of user activity as discrete as possible as the objective is to get a better

insight in normal day use of involved users. On the other hand, the involvement of users is an iterative process in collecting data, as well as interpreting the data. In this context observed issues related to the organisation, context and technology in preparation should be defined by the user-pool.

When considering and starting a Living Lab project the meaning of user involvement has to be considered and then define the user pool. In this process following topics have to be taken into consideration: *motivation of users, user incentives, identifying interest of participants, understanding users' behaviour and roles, selection of users (amount, type, diversity, context, etc.), managing the contact with user pool, exchanging contextual information between different cultures, ethical issues on trust, informed consent and privacy.*

There are many ways of attracting a group of people with given characteristics. The selection of users in user pool has to reflect the objectives of the project. Once the definition of the composition of the user-pool is ready, the motivation phase starts at the same time as the search for the right people. It is useful to propose individuals in the user-pool that are flexible and willing to change and have strong social competence and are willing to take part on voluntary bases. It is possible to reward the participation. Usually it is necessary to find a right gender balance and differences in age and background is valuable.

Once the characteristics are defined an advertisement campaign can start. It can take place in ordinary newspaper but also in magazines that are expected to be bought by the people the project is looking for. If for example a project coordinator is searching for housewives that purchase food for their home. It could be expected that they buy magazines containing articles about the home. Different alternatives are available such as social media through associations of different kind. Even commercial agencies of different kind can be of help. There are for example consumer and market research companies that have panels or "databases" of people that can be utilised to approach certain groups of people.

In order to define the most valuable group of users for a project, it is important to identify why project coordinator might want to include the group members in the project. There are many considerations such as that the user is the one who make it possible to reach specific project objectives. It could be a consumer of a relevant goods or services or perhaps a purchasing manager in a certain market. A knowledge of users' preferences is of the essence of any Living Lab project.

It is possible to differentiate the need of user involvement into three end-motives (Ståhlbröst and Bergvall-Kåreborn 2008):

Ethical approach:

- people have a right to influence their own matters
- users have a right to influence decisions affecting their private and professional life

Curiosity approach:

- users might want to learn more about the nature of participation in a project leading to decision making
- issues such as the location of knowledge and knowledge sharing
- different degrees and types of participation
- terms like cooperation, communication, and mutual learning between participants and contributors

Economic approach:

- project owner wants to involve the user in order to get the job done better
- involve innovation quality (effectiveness and efficiency), raising awareness of a project or process or even to accept an innovation

Further logic with user involvement in innovative processes is that the project owner identifies what and why an addition of the user to the project is important. In this case a number of advantages for involving user can be identified:

- users generates more ideas
- ideas from users are of more innovative character
- user often has different ideas and not foreseen in the definition of the project
- there is a positive correlation between user involvement and users attitude towards the end product
- users' become more positive to actually use the final product

This means that it is useful to involve users already during the idea generation stage where their ideas can function as inspiration to new ideas. Or a kind of catalyst that facilitate professional developers to think outside the box. Therefore a pre-user group could be established in order to have better discussion base for the Living Lab user and to produce a dialogue. This group could even have similar role as a Focus Group that often comes in later in the process.

When the aim of a study is to understand users' needs there is a need to harvest the potential that the users involvement holds. That is why it is important to know whom to involve, when to involve them and how to involve them. The most apparent users are those who directly interact with the objective with the aim of finalising a task, but there are other definitions as well. According to Eason (1987) it is possible to cluster users into three categories:

- **The Primary users.** They are likely to be frequent users of the objective.
- **The Secondary users.** They are likely to use the product or service in question, through some kind of intermediary or at least not directly.
- **The Tertiary users.** They are likely to be affected by the introduction of the objective or those affected by the purchase of the product or service.

User can also be identified as **Lead users** which are defined as those who are in the leading edge of an important market. **End users** are same as primary users or consumers. **Consumer and Customer** have a little different role, the *customers* are those who pay for the product, not necessarily meaning that the product will be used by that person, and a *consumer* is the person who both pays and uses the product. In the same household there is not necessary the same person deciding what to buy and who is the actual purchaser.

Involving users means giving them the opportunity to participate in the system development process. The degree of user's involvement can vary from project to project all depending on the content of the project in question. It is possible according to the experience of Living Lab operators to identify different types of users based on their different involvement in the decision making process according to Ives and Olson (1984). Following is a list of different user involvement. To choose members of user pools it is necessary to identify the involvement of different types of users (Ives and Olson 1984).

- **No involvement;** refers to the situation in which users are unwilling, or not invited to take part of the development.
- **Symbolic involvement;** refers to the situation in which input from users is requested but not used.
- **Involvement by advice;** in this category, users' advice is asked for with help of interviews or questionnaires.
- **Involvement by weak control;** refers to the situation in which users have the responsibility to leave the project whenever they want to.
- **Involvement by doing;** refers to the perspective that users are design team members, or official liaisons with the project team.
- **Involvement by strong control;** in this category, users might pay for new development out of their own budget, or the users' organizational performance evaluation is dependent on the outcome of the development effort.

There are other ways of differentiate degree of user involvement. That is to identify if the project is made **for** the user, is it made **with** him or is it made **by** the user (Bakker and Long 2000), (Eason 1987), (Kaulio 1998). The question here is the degree of user involvement and responsibility of the project owner.

- **Design for user** means that the innovation is developed on behalf of the user. Data about the users, general theories, and models of users' behaviour are used as a base for the design. This approach often includes specific studies of users, such as interviews or focus groups.
- **Design with user** has to do with a product development approach, focusing on user, utilizing data, user preferences, needs and requirements. In an addition includes a demonstration of different solutions or concepts for the users so they can react to the differing design solutions.
- **Design by user,** a product development approach is applied, in which the users are involved actively and partake in the design of their own product.

The possibility to attract people to a project is crucial for the success of an innovative project, since the value of an open process increases with the number of people involved in two different ways. First, larger group of people can contribute to a large volume of ideas, content, and feedback. Result is the possibility to improve the quality and variety of a product or service. This can be seen in many new ventures such as the technological development of the social media. Secondly, larger group of people has the potential to create a more noticeable notion or phenomena behind a product or service. To manage this it is very important to understand what motivates users to participate in these development processes and projects. Without this knowledge it is hard to improve methods for recruiting suitable people, retaining them and energising participants in a project. Motive is generally defined as something that stimulates, or drives, an individual to act in a certain way. The motive is usually a need or a desire of some kind. There should however be made a clear distinction between needs and requirements. It is proposed that needs are used in relation to people and requirements are used in relation to solutions, products and services.

Stakeholder involvement

The participation not only of the users but also of all necessary stakeholders along the value-chain can be seen as the foremost required element for the successful operation of a Living Lab. Testing in a live environment with real end-users and in co-operation with stakeholders from the entire value chain will help organizations evaluate their services and allow adjustments and corrections to be made well in advance of launch.

The Living Lab literature differentiates between the users and the stakeholders. Users are usually part of stakeholder group but not the entire group of stakeholders. EnoLL² defines five key categories of Living Lab stakeholders as:

- End-users
- SME's
- Corporations
- Public sector
- Academia

Additional list of stakeholders from the Living Lab Handbook (Ståhlbröst and Holst 2012):

- Users
- Policy makers
- Innovators
- Researchers
- Service providers

The benefit for the stakeholders is generated as follows:

Benefit for the end-user: The benefit for the end-user is that they are interested in influencing the future of solutions in question— joy and curiosity. They get credits which they can use to buy things cheaper. In the future they get something for a certain amount of credits, e.g. cinema tickets.

Benefit for the industry/SME: The industry gets access to the user community. Another benefit for them is the analysis of the results that is conducted by researchers who are interacting with the end-user to develop more successful products/services. The benefit for SMEs is the access to a network of content providers.

Benefit for the Public sector: The regional authorities are able strengthen the regional development (e.g. start-ups) and they gain from direct investments in the region. Another aspect for the regional authorities is the publicity they have with the promotion of the Living Lab.

Benefit for other stakeholders: The academia gets input for their specific research. They can do several studies within the Living Lab to validate their research and they get access to industry players, SMEs, etc..

2 The European Network of Living Labs (ENoLL) <http://www.openlivinglabs.eu/FAQ>

The structure of the WhiteFishMaLL Project and its Living Lab approach

WhiteFishMaLL was a three year research and development project funded by Nordic Innovation, which had the main objective to build a branding platform for whitefish from the North Atlantic that facilitates market differentiation in terms of sustainability and superior consumer benefits. A secondary objective of the projects was to demonstrate how a Living Lab can be established in the marine sector, dealing with a specific innovation challenges, where the solution is co-created, explored, demonstrated and evaluated with a user- centric approach in real-world environments.

The WhiteFishMaLL project has been described previously in this report, but the aim of this chapter is to focus on the application of Living Lab in the project from an observer point of view.

Key objectives with the Living Lab part of the WhiteFishMaLL project were to:

- Strengthen user-driven innovation in the Nordic marine sector by establishing a Living Lab and utilizing the Living Lab method
- Develop new, innovative and highly appreciated marine based products, services and/or concepts
- Increase product success rate and turnover of companies involved in funded Living Labs activities.
- Obtain experience from using Living Labs and user-driven innovation in the marine sector

The Branding Platform was initially defined is a specific document that describes the foundation of the brand and focuses on branding activities. The Branding Platform was to provide direction for management decision-making concerning brand related issues and activities, and provide a framework for the creation of branding elements. The objectives of the Branding Platform will not be dealt with in this chapter but is mentioned since it represents a vital outcome of the Living Lab activities.

Stakeholders in the WhiteFishMaLL project

There were relatively few stakeholder groups involved in WhiteFishMaLL project, and they had more or less been defined in the beginning of the project. Those were the **Fish Business Operators (FBO)** such as vessels, processing organisations and logistics companies. Next were the **Marketing Agents (MA)** such as consumers, retailers and wholesalers or distributors. In the third group were the **Technology Providers (TP)** like Fishery equipment providers, Information and Communication Technology firms and public relations agents. In the last groups is **Competence Centres (CC)** such as knowledge organisations in fields of biology, engineering, technology and economics.

Partners in the WhiteFishMaLL project

Partners in the WhiteFishMaLL are not the same as stakeholders. Partners are part of the stakeholders but the list of stakeholders is much longer. Partners are those who are involved in the application for Nordic Innovation funding and they have a leading role in the project specified in the description of the work. The partners of the project discussed the usefulness of the user-pools before they decided on which activities would be undertaking. Questions that were considered were like: *Who are the users, what is the user trying to achieve, what is the user doing.*

Users in the WhiteFishMaLL project

Originally defined users within WhiteFishMaLL were those that purchase whitefish from the N-Atlantic. These can be end consumers or buyers that later sell to end consumers, such as food service, fishmongers or retailers. The project partners decided in the beginning of the project to make the UK the ground for the Living Lab study. They had also decided that there should be three groups of users that would build the user-pool or user-pools, since they will have to be approached separately. These were:

1. End-users – who will form Focus groups and be subject to a large user surveys.
2. Retailers - retailers were defined as users and consumers. They have a different role than the end-users and were only to be contacted by specific meetings.
3. Wholesalers and distributors – were perhaps not necessarily meant to be a part of the Living Lab user pool but they are a vital part of getting products to the customer and has considerable effects on purchasing decisions.

At the start of the project a group of 30 UK seafood consumers were employed to take part in three different focus group sessions that should be operated at strategically selected points in the project. They were used to form three focus groups with 10 individuals in each and each should take part in three sessions. Two in the first year and one in the second year. It was proposed that a larger group of people would be utilized to be engaged rather than smaller groups. Reason for that is that a large group of people can contribute to a large volume of ideas, content and feedback with the possibility to improve the quality and variety of a product. It was also pointed out that large group of people has more possibilities of raising awareness of a product and can influence buying habits of still larger groups.

The establishment of the User-pool in the WhiteFishMaLL project

The user-pool in the WhiteFishMaLL project was of rather complex nature, as it contained individuals from variable groups, such as consumers, retailers, foodservice and wholesalers. The Living Lab experience is generally based on contacts with end-users, but not necessarily with members further down in the value chain. The WhiteFishMaLL user-pool was therefore rather broad compared to most other Living Lab projects. This called for different design of user-pool and project communication, than if the user pool was only build up by end-users. Individuals in the user-pool were approached through different means, such as social media, manpower- or other kind of consulting companies or even other Living Labs.

There were two main user groups in the WhiteFishMaLL project: The Market Agents (distributors, wholesalers, foodservice, retailers and consumers) and FBOs (vessels, processing and logistics). In addition the workflow involves four types of participants:

The methodology applied in the WhiteFishMaLL project

The Living Lab approach that was implemented in the WhiteFishMaLL project is somewhat based on the FormIT methodology. FormIT tries to put users at the centre of the process by involving them through different methods and tools, mostly qualitative. In FormIT, three states of product/service development are differentiated: *the design of concepts, the design of prototypes, and the design of the final system*. *The methodology evolves in spiral through these three stages* (Ståhlbröst and Holst 2012).

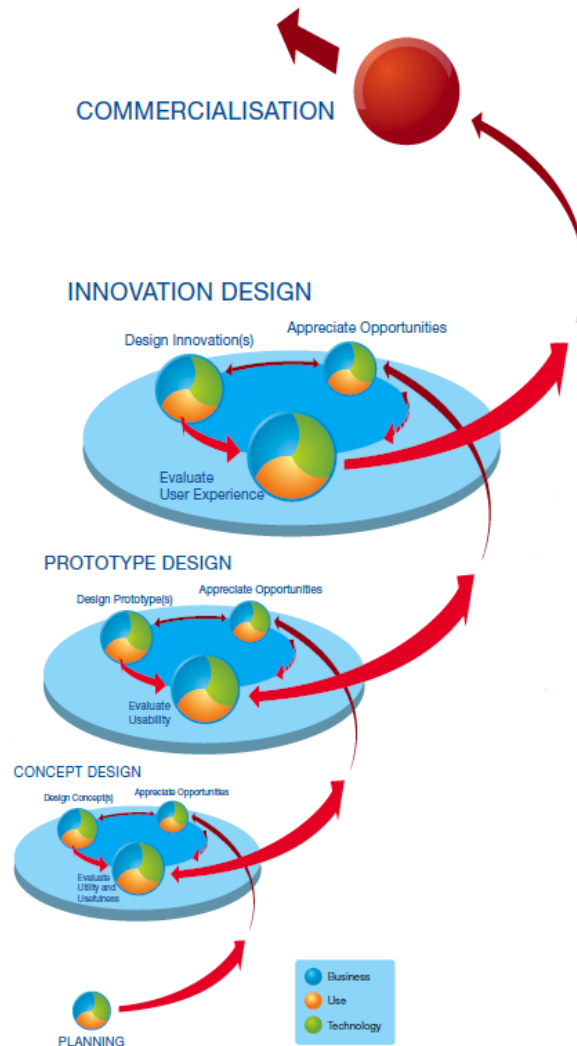


Figure 41: The FormIt methodology

In each stage within FormIt there is a three-step process that begins with the appreciation of existing opportunities in applying a new technology, process or product. Once the opportunities are clearly established, the process continues with a collaborative design of concepts, prototypes and the final system, depending on the stage. Real life environment validation is maintained through the whole process as much as possible in different phases as follows:

Cycle one: Concept Design

1. Appreciate opportunities
2. Design concepts
3. Evaluate Utility and Usefulness

Cycle two: Prototype Design

1. Appreciate Opportunities
2. Design prototypes
3. Evaluate Usability

Cycle three: Design of Final solution

1. Appreciate opportunities
2. Design concepts
3. Evaluate Utilities and Usefulness

This three-step process is repeated until the result is considered satisfactory. The approach can be seen as a spiral in which the focus and shape of the design becomes clearer, while the attention of the evaluation broadens from a focus on concepts and usability aspects to a holistic view of the use of the system.

A short comparison of the FormIT model and the WhiteFishMaLL model shows that the project owners have applied the main items of the FormIT model in the WhiteFishMaLL project objectives. The modified model takes into consideration the special objectives and aligned it the model, as presented in following figure.

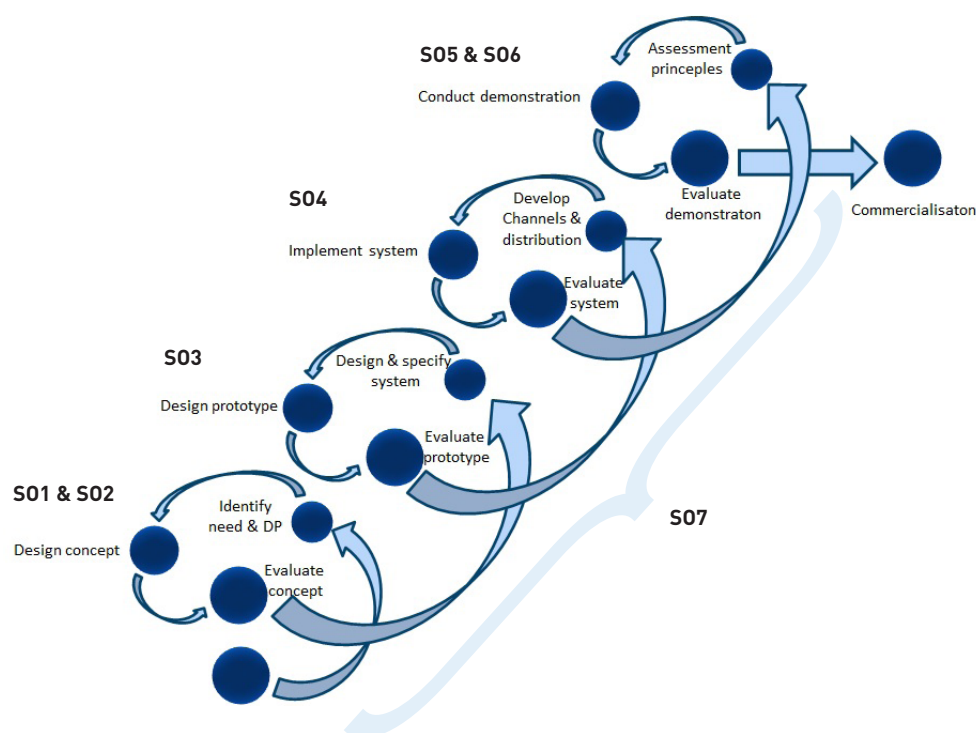


Figure 42: The WhiteFishMaLL project methodology

The WhiteFishMaLL project had two main objectives, as stated previously i.e. building a branding platform and demonstrating Living Lab in the Marine sector. To achieve these objectives the project had defined seven specific objectives (SO). They were to:

1. Identify market demand for differentiation

- What do consumers want?
- What matters to consumers, wholesalers and retailers?
- 2. Conceptualize differentiation parameters and indicators
 - Come up with ideas on how to meet the “needs” of the users
- 3. Design and specify information generation
 - What can we realistically deliver and how
 - Information on health benefits
 - Information on ingredients
 - Information on sustainable sourcing
 - Traceability
 - Cooking instructions / recipes
 - Packaging
 - Etc.
- 4. Develop communication channels and distribution systems
 - How to communicate with wholesalers, retailers and consumers
 - Packaging, advertisement, well informed fishmongers, internet solutions, etc.
- 5. Demonstrate brand stature and strength
 - Demonstrate/test our solutions in real-life
- 6. Evaluate consumer preference and whitefish business performance
 - Evaluating results
- 7. Recommend how Living Labs can enhance innovation in the marine sector
 - Can LL methodology work in the marine sector?

The main focus of the WhiteFishMaLL project was on fresh and frozen cod and haddock from the N-Atlantic on the UK market. This was not explicitly stated in the project design papers, but decided on by the project owners at the kick-off meeting of the project. This was done in order to decrease the complexity and workload of the project. The Living Lab activities in terms of user interactions were therefore also be limited to the UK market value chains. The “Identify market demand for differentiation” and “Conceptualise differentiation parameters and indicators”, was made with the two main user groups for this project: The Market Agents (distributors, retailers and consumers) and FBOs (vessels, processing and logistics). In addition there were other target groups involved, such as technology or competence providers. In regards to Living Lab, the users were the Market Agents (MA) that were co-creating a “brand” or branding platform for N-Atlantic Seafood together with Innovating Enterprises consisting of FBO’s and Technology Providers (TP), who are exploring opportunities together with Competence Centres (CC).

The planned workflow in the project was split up into three Living Lab sections that collectively progressed towards co-creating the WhiteFishMaLL branding platform; and its product i.e. the DigitalFishmonger. The three Living Lab parts of the project were A) Market Innovation, dealing with identifying market needs, where the market included the purchasers and the consumers; B) Process innovation, dealing with those that were to meet the market needs, such as suppliers and technology providers. C) Product innovation, dealing with getting the product/solution to market, demonstrating it, testing acceptance and evaluating results. The workflow is demonstrated in the following figure.

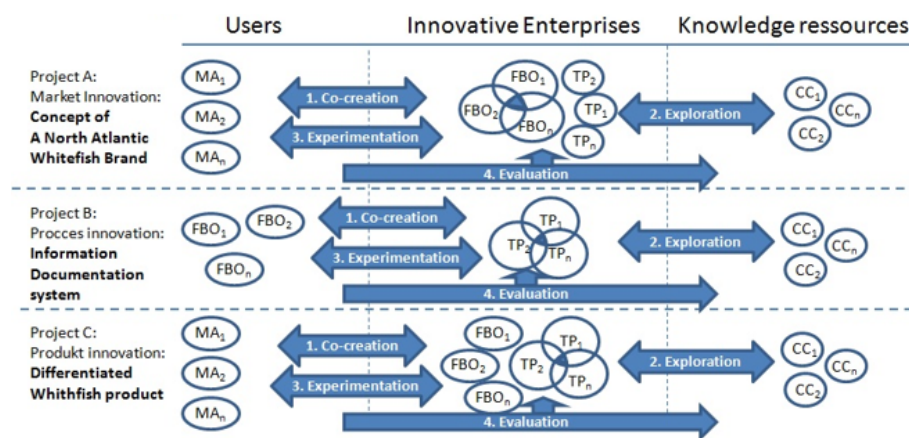


Figure 43: The Living Lab workflow within the WhiteFishMaLL project

The workflow of each Living Lab part included co-creation, experimentation, exploration and evaluation; which then feed information/results into the following Living Lab part. The project went through three iterative circles where results from one Living Lab part gave input to the next one. The following figure shows the iterative nature of the project towards meeting the overall and specific objectives of the project.

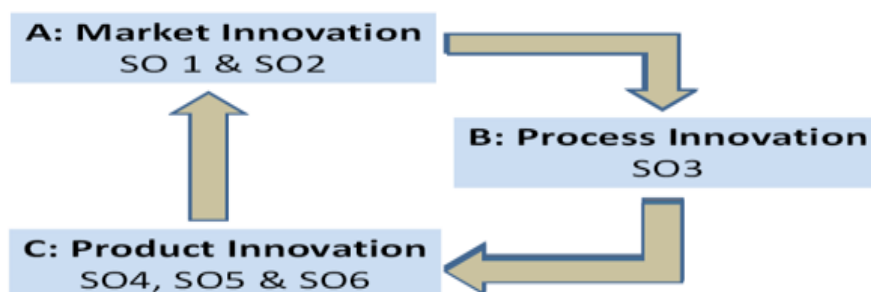


Figure 44: The iterative nature of the Living Lab parts of the WhiteFishMaLL project

The project produced 32 deliverables, then of which were of public nature and the remaining 22 were internal deliverables that were necessary to ensure successful progress of the project.

Methodology in Living Lab A, B & C

The first Living Lab part of the WhiteFishMaLL model dealt with the Market Innovation part. This included SO1, which is “Identify market demand for differentiation” and SO2, which is “Conceptualize differentiation parameters and indicators”. The Living Lab part A was split into four tasks, which were:

- WP A1: Hypothesis on market parameters: Identify the characteristics in different market user segments with respect on differentiation requirements.
- WP A2: Quantitative and qualitative market survey: Collect information on assumption about market parameters.
- WP A3: Analysis and recommendation: Analyse market information and recommend differentiation parameters and indicators.

- WP A4: Concept of parameters, attributes and indicators: Develop and evaluate potential differentiation concepts towards target user segments.

One of the most essential undertakings in this part of the project were focus group sessions conducted in the UK for establishing qualitative identification of differentiation parameters and the large user survey with 1,616 people that provided quantitative confirmation on the differentiation parameters identified in the focus groups. The industry interviews served also as valuable qualitative input into the project.

The Living Lab part B was aimed at process innovation, where the FBOs, TRDs, TP and other CCs contributed towards meeting the market demands identified in the Living Lab part A. This included solving SO3 i.e. “design and specify information generation”. The main tasks of this work were:

- WP B1: System design and specification: Design and specify the information generation system based on the concept developed in WP A4.
- WP B2: Data collection and visualisation: Identify and integrate information system components as specified by WP B1.
- WP B3: Implementation of documentation system: Implement the documentation system throughout the value chain.
- WP B4: Evaluation of system output: Assessment of the acceptable and practical implementation of the documentation system.

The iterative characteristics of Living Lab can be noticed in this process. The work in Living Lab B, WP B1 is related to Process innovation is of a different scope than the first on market innovation.

The Living Lab part C focused on product innovation, where SO4 “develop communication channels and distribution systems”, SO5 “demonstrate brand stature and strength” and SO6 “evaluate consumer preference and whitefish business performance” were addressed. Key tasks in this part were to get the product/solution identified in LLA and developed in LLB to market, demonstrate its applicability and evaluate performance. Important components of that work were good communication with FBOs, pilot tests providing qualitative indications on the applicability of the product/solution and a large consumer survey amongst 1,500 UK consumers giving quantitative information on the applicability and potential impacts of the product/solution. The main tasks of LLC were as follows:

- WP C1: Design product packaging & distribution: Co-create a clear, credible, appealing, distinctive identity of a branded whitefish product from the North Atlantic.
- WP C2: Develop market communication channels: Identify relevant value proposition and information & distribution channels based on input from WP B4 and WP C1.
- WP C3 Demonstrate product prototype with relevant market segments: Produce packaging /PR material and penetrate the target market segment.
- WP C4: Evaluation of market response and business performance: Assessment of brand stature & strength and economic analysis.

In the third circle of the interactive process of the project the final product(s) of the project were to be produced in LLC WPC1. The co-creation process was to come to its end there and that respect the red line through the project aiming for that point should be noticed clearly.

The Living Lab approach in the WhiteFishMall project – the user involvement

The three parallel Living Lab parts of the WhiteFishMaLL project i.e. LLA or market innovation, LLB on process innovation and LLC on product innovation required hands-on user involvement throughout the whole project. This was achieved through interviews, social media, webinars, and presentations at various events, newspaper articles, focus groups, consumer surveys and demonstrations in pilot tests. Due to the nature of the project the user involvement needed in some cases to be iterative, where technical solutions needed to be altered/improved in accordance with the users preferences. This is very much in the spirit of the FormIT model applied in the project.

The project workshop that was held in December of 2012 was a turning point in the project. There the project partners evaluated the results from LLA in respect to identified user needs and the available alternatives suggested by FBOs, TPs and CC to meet these needs. A decision was made to focus on a specific solution that would meet most of the identified needs and would benefit the entire N-Atlantic whitefish sector. The solution that the project aimed at developing was the *DigitalFishmonger*, which is a mobile application that provides information on seafood products by scanning a QR code with a smartphone or tablet. The contents of the *DigitalFishmonger* were intended to focus on the identified market differentiation parameters, in which the FBOs felt comfortable would demonstrate to users the superiority of N-Atlantic cod and haddock products. There was strong agreement among project partners on the importance of providing value chain information to retail staff, staff at fish counters, fishmongers, wholesalers and food service. Some participants however had doubts whether it would provide significant results when targeting end consumers, despite the indications provided by the focus groups, the survey and the other means of identifying consumer needs within the project.

A prototype of the *DigitalFishmonger* was developed in 2014 and was ready for demonstration in the autumn of that year. During the development phase the project needed considerable user input, which included giving feedback on progress and in particular feedback and inputs to draft prototype at the third focus group sessions in May of 2014.

When the prototype of the *DigitalFishmonger* was presented to FBOs at the Humber Seafood summit in September 2013 and at the North Atlantic Seafood Forum in Bergen in March 2014, there was a genuine interest in the project by the industry and results from the pilot test with consumers were waited by number of interested companies. Around 200 people across the UK seafood sector were present at the North Atlantic Seafood Forum in March 2014 and an audience of 60 people participated when the Project Coordinator presented the WhiteFishMaLL project in the Conference room. The audience comprised of UK processors, wholesalers, foodservice, retailers, fishery scientists and NGO representatives. The prototype was also introduced to FBOs in other venues, such as at the European Seafood Exhibition, The Icelandic Fisheries exhibition, the Icelandic Fisheries conference, in smaller meetings with individual FBOs and a gain at the Humber Seafood Summit in 2014. The interest amongst the FBOs in the project and the prototype was high and many expressed their interest in trying it out. There were however some concerns amongst FBOs that “too much” information could have adverse effects. Information on date of capture was considered particularly delicate.

The next step in the project where user involvement was needed was to introduce the *DigitalFishmonger* to consumers, by getting them to try it out and get their feedback in a

pilot tests during the autumn of 2014. This was done in cooperation with FBOs in the value chain of selected Fish & Chips restaurants the UK. Finally the user involvement ended with a large scale consumer survey where 1,500 UK consumers gave feedback on applicability and evaluated performance of the *DigitalFishmonger*.

Evaluation of the Living Lab approach of WhiteFishMaLL

The funding organization of the WhiteFishMaLL project, Nordic Innovation, decided that two experts with experience in organizing and working with Living Labs should be assigned to the WhiteFishMaLL project. The assignment of these external experts was to follow the project closely and make sure that the Living Lab methodology was applied in the correct manner. They were intended to give advice in respect to application of Living Lab methodologies, produce guidelines and evaluate the project.

Application of Living Lab methodologies within the WhiteFishMaLL project

Basic idea of Living Labs is to gain access to ideas, experiences and knowledge that users possess based on their daily needs for products, services or applications. This seems to be applied successfully in the project. Project partners have in general been quite aware of the characteristics of the Living Lab approach. To illustrate that they have accessed the consumer/user of the product in question, whitefish from N-Atlantic Ocean, to gain their views, needs and experiences. Besides that, they have made an effort of including number of stakeholders within the N-Atlantic whitefish sector for their view. It is important to obtain views and needs of stakeholders from the different levels of the value chain to design the best way of proceeding in a project such as this.

The alignment with theory and approach

Living Lab places people at the very centre of the innovation process. In projects such as the WhiteFishMaLL there is a challenge for the project partners how to establish effective working relations between users, other stakeholders and the project participants. WhiteFishMaLL applied a number of Living Lab alternatives for including users in the innovation creation. The project used for example focus groups, questionnaires, consumer surveys, pilot tests/demonstrations, meetings and conversations. There were however a number of additional alternatives which would have been of interest for the monitoring of the project to consider in terms of methods of obtaining information of views, needs and experiences. It is however necessary to assess the outcome of the project in terms of possibility of obtaining more or better information from users or consumers. In the view of the Living Lab experts, that data gathering has been quite satisfactory. This means that additional data would probably not have added much information to the project that it would be considered necessary to pursue that.

In Living Lab projects the meaning of user involvement has to be considered and a pool of users should be defined. By meaning of user involvement examples like motivation, incentives, interest of participants, understanding of user behaviour, selection etc. The project partners did make an effort of understanding the users and their involvement in the project. This is for example specifically mentioned in the focus group preparation documents from the contractor involved in running the focus groups. This was mentioned in the preparatory phase of the focus groups, but might have been considered as well during the interpretation of the results. Those interpretations were more of a technical nature than related to user need or preferences. The meaning of user involvement is a central matter in the Living Lab approach and should be seen in most levels of the project.

A selection of the group of users in projects with Living Lab approach, needs to reflect the

objectives of the project. It is evident that this is the case in the WhiteFishMaLL project. Objectives, or more precisely the role of the project, is to increase the share of whitefish from the N-Atlantic in the relevant markets. The project partners did take the objectives into account when selecting the group of users. That has been stated in the documentation from the focus group organizer and the surveys. The project owners might have considered what and why an addition of the users to the project is important. It could probably be read between the lines, but a statement of why this Living Lab approach is used might have been elaborated more clearly.

Involvement of end-user/consumer in the WhiteFishMaLL project is identified quite well by the project partners. The role of other stakeholders along the value chain and their involvement is perhaps less treated. But their involvement is still rather comprehensive and important, which gives the project increased dimension. Example is that the project owners made effort of meeting the stakeholders at trade fairs, such as in Brussels, Grimsby, Bradford, Doncaster, Bergen and Reykjavík. The meetings with the stakeholders are to be considered a useful and necessary complement to the user contacts. This is emphasized by the project partners as a part of Living Lab approach. At least in the case of this project the Living Lab experts quite agree. There is however a distinction between users and stakeholders. The former group is a subset of the latter, thus an important relation is noticed.

Evaluation of activities in light of the intentions and objectives

The WhiteFishMaLL project had two main objectives 1) to build a branding platform for whitefish from the N-Atlantic that facilitates market differentiation in terms of sustainability and superior consumer benefits; and 2) to demonstrate how a Living Lab can be established in the marine sector, dealing with a specific innovation challenge, where the solution is co-created, explored, demonstrated and evaluated with a user- centric approach in real-world environments.

A target of this evaluation is to find out if the activities within the project have been in harmony with the objectives. It is essential to make the main objectives clearly understandable. The words “demonstrate how a Living Lab can be established in the marine sector” are not explained adequately. The main problem as project partners see with the situation of the N-Atlantic whitefish sector is a weak marketing situation and they conclude that “there is a need to differentiate wild caught N-Atlantic cod and haddock in terms of sustainable production and consumer benefits.” This seems to be the main goal of the project, while the Branding platform and the Living Lab approach should be considered the main tools to reach a solution for that goal. It would have provided the reader more comprehensive picture to give the hierarchy of these problems, objectives and tools in order to show the big picture of the project. In order to perform a reasonable monitoring of the Living Lab content of the project, it would be important to draw more comprehensive picture of all the proceedings or the project.

Key objectives of the Living Lab part of the project were the following:

1. Strengthen user-driven innovation in the Nordic marine sector by establishing a living lab and utilizing the living lab method
2. Develop new, innovative and highly appreciated marine based products, services and concepts
3. Increase product success rate and turnover of companies involved in funded Living Labs activities.

4. Obtain experience from using Living Labs and user-driven innovation in the marine sector

Of these four key objectives only number two can be considered to be completely fulfilled, but the other three only partly completed. The project owners have made effort to utilize the Living Lab approach in the project. This has been a success in some ways, perhaps less in other. Success in terms of utilizing the consumer/user to guide the way, less success by not fully being able to provide the user with the technical solution the project did set in motion.

The following seven specific objectives were identified for the project:

1. Identify market demand for differentiation
 - What do consumers want?
 - What matters to consumers, wholesalers and retailers?
2. Conceptualize differentiation parameters and indicators
 - Come up with ideas on how to meet the “needs” of the users
3. Design and specify information generation
 - What can we realistically deliver and how
 - Information on health benefits
 - Information on ingredients
 - Information on sustainable sourcing
 - Traceability
 - Cooking instructions / recipes
 - Packaging
 - Etc.
4. Develop communication channels and distribution systems
 - How to communicate with wholesalers, retailers and consumers
 - Packaging, advertisement, well informed fishmongers, internet solutions, etc.
5. Demonstrate brand stature and strength
 - Demonstrate/test our solutions in real-life
6. Evaluate consumer preference and whitefish business performance
 - Evaluating results
7. Recommend how Living Labs can enhance innovation in the marine sector
 - Can LL methodology work in the marine sector?

Of these specific objectives some have clearly been fulfilled. For example number one and three, which have been put into the communication with the Living Lab participants of the project. Number two has to do with conceptualize differentiation parameters and indicators. It is not easy to see exactly what has been accomplished but if it means come up with ideas of how to meet the need, this has been met, at least partially. The objective of developing communication channels with actors in the value chain is not necessarily fulfilled even though the communication has been rather intensive. This has been more on an ad-hoc level rather than that channels have been established. The demonstration of the solution in real-life, as well as the evaluation objective have been partly fulfilled, but it would have been beneficial to include a larger user pool for the demonstrations than only the Fish & Chips sector. The consumer survey did though give valuable input to these objectives.

Results from the evaluation of the WhiteFishMaLL project

The WhiteFishMaLL project is split up in three main Living Lab parts. LLP A is on market innovation or the user need, LLP B is on Process innovation or the solution; and LLP C is for Product innovation or the test of the solution against the need of users. Four work packages are included under each of the parts. These work packages were carefully designed in advance of the project proceedings. The definition did contain deliverables, division of work and responsibility and line of work. This setup proved to be effective in ensuring successful progress within the project, as each of the 3*4 work packages contributed to the final solution of the project.

The Living Lab experts were provided with the papers the project owners sent in with the application to the funding organisation. The Living Lab approach was clearly demonstrated in those papers. It was however more difficult to get a clear picture of the foreseen process and work to be undertaken during the project. The project owners did make choices during the project that could be interpreted as a response to user need and the views of the stakeholders along the value change of the product. The Living Lab experts find this approach rather positive instead of having to stick to the initial plan if there were better alternatives to be utilized. Changes in a project proceedings is certainly complicated and have to be well documented.

The solution the project has introduced based on user need is the *DigitalFishmonger*, where users can obtain relevant information on products by scanning a QR code with their smartphones. The *DigitalFishmonger* is based on feedback from focus groups, consumer survey and communication with FBOs. Those Living Lab participants did reveal a need for information about seafood products and this technical solution is appropriate for that use. The project partners retained outside experts in consumer and market studies to oversee the focus groups and the consumer studies, which facilitated a highly professional approach in implantation of these tasks and provided important views of user needs and preferences.

The project partners became aware of challenges with the *DigitalFishmonger's* implementation as the project progressed, such as the dilemma of publishing sensitive data on date of capture and the fact that retail owners are hesitant of taking a revolutionary technical information provision into their stores. That is not really part of this evaluation of the usefulness of Living Lab as a tool for marine projects. The project did utilize the contacts with users on many occasions, they build their solution on user need and preferences. Challenges regarding uptake of the developed solution due to outside influence are not the most relevant topic of the Living Lab experts in the project. But on the other hand it was a request of the users in the focus groups to include date of capture.

Project owners did test the pilot product during latter period of the project. This was done during trips to UK where several businesses were consulted and during longer periods where the FBOs reported on uptake. The project partners defined the Living Lab participants as not only the users or consumers, but also the businesses in the value chain of N-Atlantic whitefish. Testing of the solution were made among the latter group.

Our final view of the project is that the project partners made an effort to get the view of the users or consumers of whitefish from the N-Atlantic Ocean. An attempt was made to design a technical solution to the needs and preferences provided by the users. The solution was tested and introduced to the whole value chain of the solution, although it met with some unforeseen difficulties in regards to large scale uptake.

It is also the view of the Living Lab experts that a Living Lab approach is a very useful tool to utilize in projects within the marine sector. In this particular project a team of Living Lab experts, was assigned to monitor the proceedings of the project in order to see if user involvement would be of value. The monitoring of an ongoing project, or a part of project, is

rather difficult due to length of the project and the work load. It seemed to be burdensome to include monitoring personnel into the everyday work, which meant that they could have difficulties of following the necessary proceedings of the project.

Conclusions of the Living Lab experts

The WhiteFishMaLL consortium hired experts on Living Lab approach and development in order to monitor and evaluate the application of Living Lab in the project. The project was well defined from the start but took some turning as the project developed due to unforeseen circumstances. The role of the experts in Living Lab were not to evaluate the outcome of the project, rather follow the process and verify that the proceedings were according to general approaches of Living Lab.

The project coordinator and other partners did run this project with good knowledge and methodological skills. The changes in emphasis and work were fairly well justified and the Living Lab approach were followed as expected. A complex task as to facilitate more demand for whitefish from the N-Atlantic, with number of different stakeholders on all levels of the value chain of business, is not easy to foresee. The project owners were well prepared for their conclusions after having collected data from desk research, interviews with stakeholders, surveying and performing Focus Group sessions with end-users, which were indeed well organised. Having to deal with stakeholders from all the value chain from fisheries to final consumer is a delicate task that they did perform with success. Outcome of the project was valuable knowledge that will be possible to build on future research and development.

It is the opinion of the Living Lab experts, in light of their instructions, that the consortia has done a good work following the path they were supposed to do. It is also probable to expect impact of the project within some years.

8. Conclusions and discussions

The primary objective of the WhiteFishMaLL project was to build a branding platform for whitefish from the North Atlantic that facilitates market differentiation in terms of sustainability and superior consumer benefits. To achieve this meant identifying key consumer needs and finding applicable ways of meeting those needs. A secondary objective of the project was to demonstrate how a Living Lab can be established in the marine sector, dealing with specific innovation challenges, where the solutions are co-created, explored, demonstrated and evaluated with a user-centric approach in real-world environments. This really meant applying Living Labs to meet with the main objective, and using that process to demonstrate how Living Lab can be applied in the Nordic marine sector.

The structure of the project was designed according to Living Lab methodologies. Users and variable stakeholders within the value chain of N-Atlantic cod and haddock products sold in the UK, identified consumer needs and market differentiation parameters, and then co-created a solution to meet with the identified consumer needs. The identified consumer needs addressed issues such as distrust in information on product packaging regarding various product properties, origin, sustainability, quality and product history. A solution capable of meeting those needs was then co-created with users and stakeholders, such as consumers, retail, foodservice, wholesalers, distributors, processors, fishers and technology providers. The solution was a mobile application called the *DigitalFishmonger* that is capable of disseminating facts on the product's history on a batch-level.

One of the more challenging tasks in the project was to find out what information consumers want to see regarding the product in their hand, which they are considering to purchase. What attributes are of utmost importance to the general consumer and how can the N-Atlantic whitefish sector meet those demands?

In the beginning of the project the branding platform, which was to be the cornerstone of a successful marketing strategy, had not been clearly formulated. The whole purpose of applying the Living Lab approach was to leave it to the users to spot market needs and identify market demand for differentiation. The users were then to be active in co-creating the solution that would meet their needs.

In order to identify consumer perception of whitefish products from the N-Atlantic, fish consumers and other stakeholders in the value chain have been approached from different angles through direct interviews, focus group sessions and large quantitative consumer surveys. Furthermore, the project outcome and development process has been open to everyone with interest in these matters through open webinars and workshops. The main conclusions reveals consumer willingness to buy whitefish products from the N-Atlantic, given certain communication parameters and product attributes. These consumer needs have been met with the primary product of this project, the *DigitalFishmonger*.

Tests in real-life circumstances, as well as controlled demonstrations and consumer surveys have shown that consumers in general have been satisfied with the setup of the

DigitalFishmonger. They have found it easy to navigate and been satisfied with the level of information granularity in the version they have tested. There has however been a dilemma between the level of detail of information that the customers seek and the information that some stakeholders in the value chain like Fish & Chips shops owners or the retail sector are willing to give away.

In the project focus group sessions in UK; the participants asked for detailed information on batch/catch level, including date of capture, but the Fish & Chips shop owners, as well as other FBOs, think that it could put customers off to see that the fresh fish is really over a week old and the frozen fish 5-7 months old, or even older – although the fish has still good quality attributes.

In order to give consumers and other stakeholders access to the aforementioned information, data gathering to a web based mobile database or repository has to be performed beforehand from all the various systems in use in the value chain. It is important to have all the relevant data in a centralized database in order to speed up the data access for consumers and to be sure that relevant and correct information are linked to each batch number.

In order to try to accommodate both the suppliers that want to give detailed batch-based information and those that only want to give general information, the *DigitalFishmonger* has been developed into two versions i.e. a “passive” general information version and an “active” batch-based version. The “passive” version is not really an innovative product, only a different format of providing old-style general information. The innovative part is the “active” version that provides batch-based information. It is the believe of the project participants that this batch-based version, or something similar, will provide innovative companies, with a good story to tell a competitive advantage in demanding markets in the near future.

This project has been unique in many ways. The huge industry and consumer interest has put kind of positive pressure on the consortium to come up with an innovative solution on how to meet consumer demands for increased value chain transparency. The Living Lab approach has also broaden the RTDs usual scientific approaches to things and put the user needs ahead of their usual approaches. Far to often researchers and technology providers spend time and effort on solving problems that the users do not really recognise as problems, or develop solutions that the users are not interested in using. The Living Lab approach facilitates that users are involved in the whole process, from identifying the users’ needs to co-creating the solution. This has been the fact in the WhiteFishMaLL project, which makes it an excellent showcase of how Living Lab can be successfully applied in the Nordic Marine sector.

WhiteFishMaLL has made an effort of including different types of users and stakeholders in the project. This has been extremely important and efficient, as different links in the value chains of cod and haddock from the N-Atlantic have united in co-creating the solution which is the *DigitalFishmonger*. One aspect of this stakeholder involvement is the huge interest in the project by FBOs, which can be seen in the number of conferences and other industry events where the project has been introduced. A comprehensive dissemination has been one of the cornerstones of the project’s success.

A key finding of the project is the gap which is between consumer needs regarding availability of information and what the suppliers are actually willing to give. This gap between consumers, retailers and foodservice sectors is of fundamental interest to many stakeholders and policy makers. How can this gap be approached? Through stricter labelling regulations or by some industry concession declaring that they are willing to increase value chain transparency. It is now up to the retail or others at the end of the chain to disseminate those information. Either way – the interests of consumers are well documented and published in this project. It is now up to the N-Atlantic whitefish sector to take the next steps. They have all the material, they

know now what the consumer wants in order to pay premiums or choose their product instead of product from competitors.

The N-Atlantic fishing and processing industry has all relevant information currently stored in their traceability systems, it's only a matter of setting those information free...

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Abstract: WhiteFishMaLL, which stands for North Atlantic Whitefish Marine Living Lab, was a three year research and development project that ran from beginning of year 2012 until early 2015. The primary objective of the WhiteFishMaLL project was to build a branding platform for whitefish from the North Atlantic that facilitates market differentiation in terms of sustainability and superior consumer benefits. The project had also a secondary objective, which was to demonstrate how a Living Lab can be established in the marine sector. This meant applying Living Lab approaches to meet with the main objective, and using that process to demonstrate how Living Lab can be applied in the Nordic marine sector. The structure of the project was designed according to Living Lab methodologies. Users and stakeholders within the value chain of N-Atlantic cod and haddock products sold in the UK, identified consumer needs and market differentiation parameters, and then co-created a solution to meet with the identified consumer needs. The solution was a mobile application called the <i>DigitalFishmonger</i> that is capable of disseminating facts on the product's history on a batch-level. This report gives a holistic view of the progress of the WhiteFishMaLL project, how it was set-up in accordance with Living Lab methodologies and run with the aim of including users and key stakeholders in co-creating a solution that would meet with the users' needs. The report also includes guidelines for starting and running Living Lab projects in the marine sector, as well as an evaluation report on the application of Living Lab methodologies in the WhiteFishMaLL project from the viewpoint of external Living Lab experts that monitored the project on behalf of Nordic Innovation.			
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WhiteFishMaLL

North Atlantic Whitefish Marine Living Lab

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