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Report of the Workshop on Methods for Stakeholder Involvement in Gear Development (WKMSIGD)

22-24 May 2018

BSAC and ICES HQ, Copenhagen

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Executive summary

The workshop was held on 22-24 May, 2018 where the first day consisted of a stakeholder workshop held together with the Baltic Sea Advisory Council (BSAC) at their facilities in Copenhagen and the remaining two days at the ICES HQ in Copenhagen. A total of 39 participants from 11 countries across Europe attend the workshop.

To address ToR a, a stakeholder workshop was held together with the BSAC. Different stakeholder groups (fishing industry, scientists and managers) were asked to a) identify the roles of the different stakeholder groups and b) define the risks and problems associated with a more inclusive framework.

To address ToRs b-d, the remaining two days were devoted to presentations of the different initiatives established throughout Europe to increase the involvement of the industry in the identification, development and testing of selective gears, discussions around the pros and cons of different facets of the initiatives, and finally the collation of this information into the following report.

Key recommendations include:

- Stronger leadership from the regional groups is warranted.
- Greater coordination of all ongoing national science-industry gear development initiatives is needed, especially those initiatives that have common fisheries or face similar problems.
- More effort needs to be devoted towards having effective gear solutions implemented into legislation/ encouraging their uptake.
- The relaxed implementation and uncertainty surrounding the implementation of the landing obligation has reduced the drive by the industry to develop and test gears. If more clarity were made around the regulation, the exceptions, its implementation and workability of the whole landing obligation, the situation may be different.

1 Introduction

Research aimed at incorporating the fishing industry into the management framework has been conducted for many decades (e.g. Vedsmand & Nielsen. 1995; Armstrong et.al. 2013; Kraan et.al. 2014; Stephenson et.al. 2016). The incorporation of the fishing industry into the development, testing and implementation of fishing gears is something which has increased within the European Union since the revision of the EU common fisheries policy (CFP) in 2013. This increase in the fishing industry being more involved in the development and testing of new and modified gears occurred primarily due to the shift from landings quotas to catch quotas and the risk of a larger suite of problems for the industry to face.

Currently, several countries have established initiatives which aim to have the fishing industry to develop the gears they perceive better suit their fisheries. The involvement of stakeholders in the development and testing of fishing gears can help to alleviate some of the mistrust and non-compliance currently observed, provide incentives to fish selectively, and help the European Commission in making adequate impact assessments to their proposals.

The initiatives established are currently coordinated nationally, where their structures, incentives, data collection methods etc. often differ from each other. To be able to use such types of initiatives to help facilitate the landing obligation and the proposed reformed technical measures these initiatives should ideally be coordinated at a regional level. This workshop aims to define how to obtain the most out of these initiatives.

2 Background

2.1 Development of fishing gears

Fishing gears are typically developed on board either commercial or research vessels where the selectivity of the gear in question is either obtained as absolute estimates (covered codend and paired gear methods) where selectivity parameters L50 (the length at which 50% of a given size class is retained in the codend)) and SR (=L75 − L25) are obtained or as relative estimates (catch comparison/ alternate haul methods) where the selectivity of the test gear is documented in relation to an alternative (typically a legislated alternative used as a baseline). Both of these methods require that the catch is length measured to ensure that the data obtained are population independent.

To understand what factors influence selectivity, the parameters know to influence the selectivity of a gear are typically modified and tested in a stepwise fashion in normal scientific gear trials. This makes it possible to dissociate what each of the different parameters is doing and what their contribution to the overall selectivity is.

2.2 Involvement of the fishing industry in fishing gear development

The development of fishing gears in Europe has traditionally occurred in a top–down structure where managers have typically identified a problem (e.g. the need to reduce catches of a given size or species) and involved scientists to help find a solution which addresses the problem. This development process has typically involved the fishing industry to varying degrees. However, despite their involvement, their incorporation in identifying the problem and in proposing possible solutions has typically been limited, which has led to cases where successful modifications which have addressed the problems have been negated in commercial practise (e.g. Krag et al. 2016).

2.3 Involvement of the fishing industry in management

Traditionally, the fishing industry has been rather detached from the management process. Managers have characteristically identified problems within specific fisheries, for example, a need to reduce catches of cod in the North Sea. The managers then usually request the assistance of scientists to find appropriate solutions which can resolve the problem, for example, the introduction of large mesh panels in demersal trawl fisheries to reduce the capture of cod.

As part of the reformed European Union (EU) common fisheries policy (CFP) of 2013, regionalisation was introduced, where the regional groups of member states (e.g. BALTFISH in the Baltic Sea, Scheveningen group in the North Sea) main objective is to promote cooperation among fisheries administrations and other key stakeholders in developing sustainable fisheries. The regional groups have also been given the mandate to propose regulatory changes within certain defined areas (including technical measures) to the European Commission, which then can implement these proposals through delegated acts (normally after scientific evaluation by STECF). Through regionalisation, involvement of the industry in the management framework has consequently increased.

2.4 The changing management framework within the European Union and what it means for gear selectivity

Apart from the regionalisation, another important change made to the EU CPF in 2013 was the introduction of the Landing Obligation (LO), whereby the entire catch of quota-regulated species is to be landed irrespective of whether it is over or under the

Minimum Conservation Reference Size (MCRS). The LO is being phased-in since 2015 and will be fully implemented in 2019. This shift means that once a species quota is fished up catches must cease. Thus, the species has the potential to choke the fishery. Therefore, as certain species begin to choke the fishery fishermen will need to find alternative gears which reduce or avoid the catch of those species. Consequently, the number of gears available to fishermen to suit the quota compositions available to them throughout the year will need to increase. Furthermore, in countries which have Individual Transferable Quotas (ITQs), vessels within the same fisheries may have very different quota combinations which will further increase the need for a larger number of gear solutions available as no one solution will suit all. The landing obligation is thereby intended to create an economic incentive for fishers to avoid catching what has traditionally been discarded, and thus become more selective in their fishing practices.

2.5 What are the benefits of incorporating the fishing industry into gear development

The involvement of fishermen in fishing gear selectivity projects has previously been shown to provide valuable experience-based knowledge (McCay et al., 2006; Johnson et al., 2007; Armstrong et al., 2013). Involving the industry in identifying the problems and the subsequent testing of potential solutions helps incorporate them in the entire development process while also shifting the burden of proof onto the industry (Veiga-Malta et al., 2018). Furthermore, it provides for a development period where promising solutions can be identified and tested in a commercial setting before carrying out a scientific test. Having the industry to develop and test different ideas also means that numerous gears can be tested in parallel. Moreover, having the industry involved in collecting data is a cost-effective solution since it avoids the need for scientific staff on board during development periods (Roman et al., 2011; Uhlmann et al., 2011).

2.6 What are the benefits of incorporating the fishing industry into management

The involvement of fishermen and fisheries representatives in the management process has increased since the introduction of advisory councils with the 2002 reform of the CFP. The implementation of the current CFP and introduction of regionalisation can further increase industry involvement. This more direct link between the decision-makers and those who are affected by them facilitates that the problems observed in the fisheries are taken up directly with those who can introduce management tools to help resolve them.

3 Stakeholders workshop

The objective of the stakeholder workshop was to gain feedback from the different stakeholder groups (fishing industry, scientists and managers were present at the workshop) regarding the risks and potential problems associated with a more inclusive framework, while gaining insight into how the different stakeholder groups perceive their role and the role of the other stakeholder groups.

To facilitate the process, participants were asked to a) identify the roles of the different stakeholder groups and b) define the risks, potential problems, and problems already encountered. Stakeholder were divide into their respective groups and asked to first identify all stakeholder which need to be involved, and then to rank these participants based on their participation and influence (Figure 1). Additionally, participants were asked to identify what could pose a risk or what some of the problems are/may be with a more inclusive framework and to prioritize these based on their probability of occurring and the associated consequence (Figure 2).

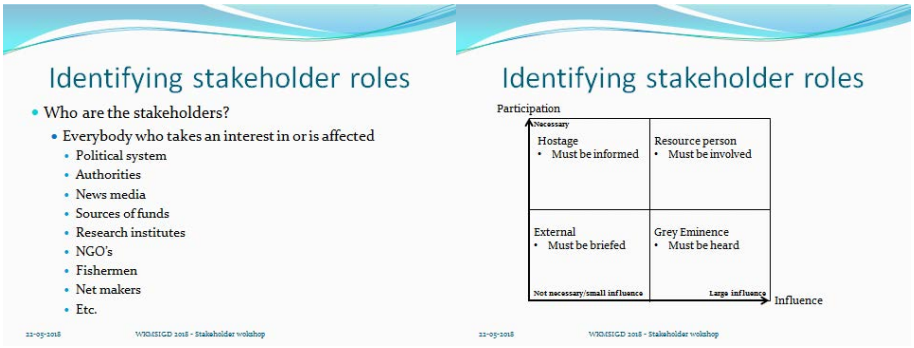


Figure 1.Identification and ranking of stakeholders roles in a more inclusive framework.

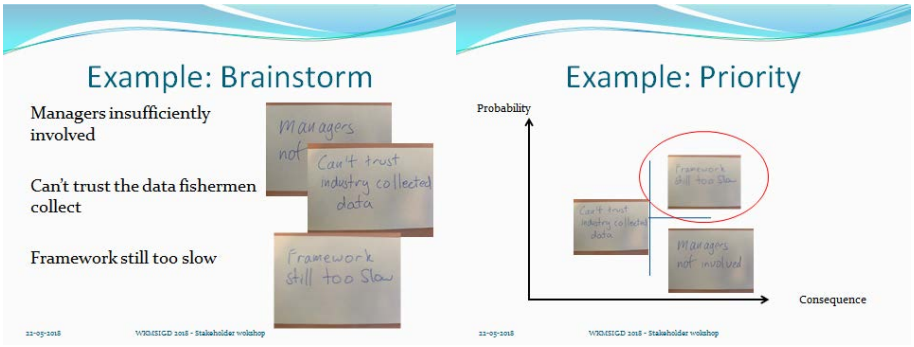


Figure 2. Identification of risks and problems and their priority.

The stakeholder groups which were identified as being the ones who should have the largest participation and influence were the fishermen and fishermen's representatives. Both the industry and scientists considered them to have the largest participation and influence in the more inclusive system (Figure 3). The perception of managers however, was that the fishing industry should have a high participation while their influence in the system should be less.

The largest divergence of perspectives across the three stakeholder groups was for the policy-makers and managers. Managers were of the perception that policy-makers and managers are those who should have the largest influence and participation. Industry however, considered policy-makers and managers should have little influence and

only moderate participation. Scientists were of an alternative perspective, where policy-makers and managers should have a large influence while little participation.

Scientists were perceived by all three stakeholder groups to be relatively important in a more inclusive framework, though having less participation and influence than the industry.

The industry identified industry related funding to be an important stakeholder in a more inclusive framework, needing both a large participation and having a large influence. Public funding bodies on the other hand were identified by the industry to have only moderate participation and little influence. Managers also identified funding bodies to be important stakeholders, though having a large participation and influence compared to the industry.

Netmakers and gear technicians were identified by both the industry and scientists as also being important stakeholder to consider in a more inclusive framework.

All three stakeholder groups considered non-governmental organizations not to have a large participation role in the framework; however, opinions regarding their influence were divided. Industry felt that NGO's had little influence on the framework while scientists felt they had a large influence. Managers on the other hand considered NGO's to have a moderate influence.

Some of the diverging perspectives may have been due to the way different groups and individuals interpreted the task, where some focused on how things currently are while others focused on how they would like it to be in the future.

Figure 3. Ranking of stakeholders roles by the a) Industry, b) Scientists, c) Managers.

The risks which were identified as having the largest consequence and probability of occurring were the risk of insufficient funding to facilitate gear development, the regulatory framework and the lack of responsibility from managers, lack of/ bad decision-making (e.g. creation of a long list of gear specificities rather than a short list of baselines), the lack of sound scientific data, compliance with the regulations and the fact that NGOs have too much input in the process. These risks which were categorized as having the largest consequence and probability of occurring were then used in the following exercise to understand how the risks can be addressed.

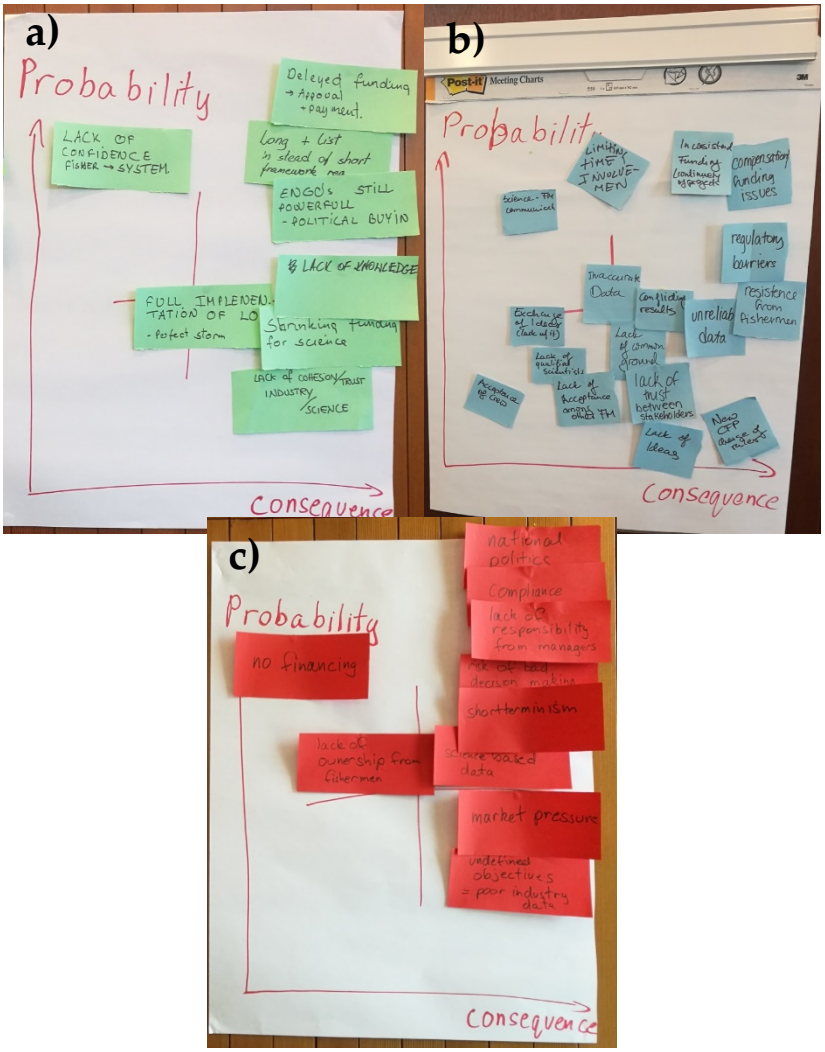


Figure 4. Ranking of risks and problems by the a) Industry, b) Scientists, c) Managers.

How to counter risks/problems

The risks which were considered as having the largest consequences and probability of occurring were grouped into 6 different categories (Figure 5) and participants asked how best these risks could be counteracted and if no solution possible what could be a plan B (Figure 6).

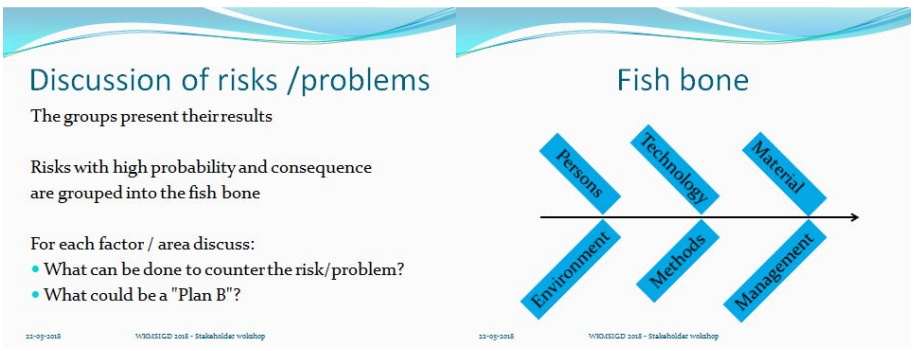


Figure 5. Identification of solutions to potential risks.

The largest majority of the risks which were defined as having the largest consequence and probability of occurring were related to management, while a few of the risks were also associated with the methods used and persons involved.

For the risks related to management, to resolve the issue of compliance participants suggested changing the rules and increasing the number of gears which are available to the industry. A more clearly defined framework regarding roles and responsibilities as well as a more informed dialog across stakeholders were highlighted as potential ways which could help increase responsibility among managers. A better dialog across stakeholders was also put forward as a way to increase knowledge dissemination. To reduce the risk of bad decision-making, participants suggested implementing a more bottom up approach and feedback loops into management. Having a series of baseline regulations was suggested as a possible way of avoiding overly long and complex regulations. Basic university and industry funding were ideas which were put forward to reduce the risk associated to shifting funding opportunities.

When it comes to the methods and the associated risks, a lack of science-based data and delayed funding/approval were highlighted as risks with a large consequence and probability of occurring. Greater collaboration across scientific institutes, as well as the peer-review process (e.g. STECF), were proposed as ways to reduce the risk of a lack of science-based data. Ensuring national funding as well as establishing initiatives such as GITTAG, Fast-Track and the secretariat for selective fishing were highlighted as ways which could reduce the risks associated with delayed funding/approval.

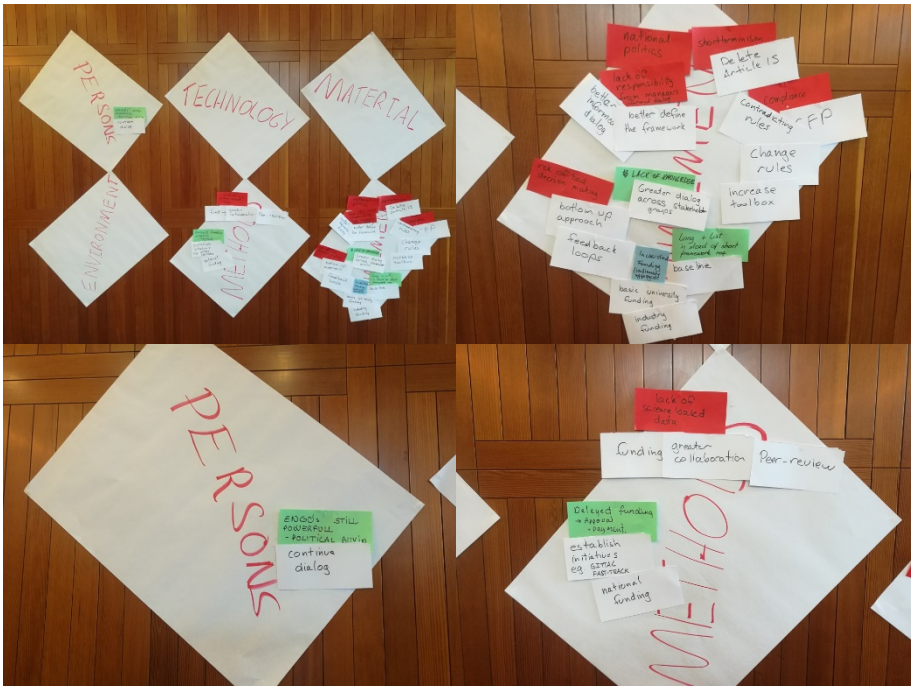


Figure 6. Categorizing risks and identification of possible ways to counteract them/ define a plan B.

4 Review initiative structures

4.1 Sweden

What:

- Gather new ideas from fishermen and netmakers
- Avoid unwanted catches (mainly choke species)
- Comply with the LO by creating a tool-box of usable gears

How:

- Commercial fishing trials
- Self-sampling
- Structured process
- Nationally funded
- Collaborative project led by Science for:
- Guidance on self-sampling
- Proposal design
- Protocol design

Limitations:

- Buy-in of the fishermen. They are more prone to make it work if the ideas come from them
- Lack of drivers (diminished interest from the initial phases of the LO – loss of momentum)
- National focus

Strengths:

- Guaranteed full cost coverage during trials.
- Strong collaboration between partners
- Data collection options well defined and understood
- Readiness in addressing and granting derogations

The initiative and the projects finished during the first stage (2014-2017) are summarised in Nilsson et al. (2018).

4.2 The Netherlands

What:

- Innovation for LO
- Sustainable development
- Partnership scientist-fishermen
- Efficiency improvement

How:

- Cooperation fishermen – netmaker to design gears
- Cooperation with Science to test models
- Commercial fishing trials
- Scientific trials
- Self-sampling
- Structured process

Limitations:

- Documentation of gear development

- No funds for economic risk coverage
- Loss of trust. The majority of fishermen don't trust the process due to past problem with funding

Strength:

- International cooperation on gear technology and trials
- Opportunity for development - time for Self-sampling and feedback
- Fishermen with time and dedicated to the sampling

4.3 Scotland

What:

- Collaborative partnership fishermen – industry – government – gear technolo-gists – science
- Being compliant with the LO in an economical viable way
- Scoping projects to trial
- Innovation to existing gear
- New gear configuration and types
- Data collection and analysis

How:

- Project funded by EMFF overseen by industry with the buy-in of the government
- Structured process
- Outreaching activities to reach the fishermen and encourage them to come out with project
- Development trials
- Observers on board (often with gear technology expertise)
- Scientific trials

Limitations:

- Lack of support from Science partner (initial engagement dropped down in progress)
- Lack of appropriate initial development for missing engagement from gear technologists
- Lack of drivers (changed from the initial phases of the LO – loss of momentum)

Strength:

- Government support in industry leading the work
- Readiness in addressing and granting derogations
- Possibility of chartering vessels (economic coverage)
- Support of an existing – well established industry lead On-board observer scheme
- Building a suite of gear and selectivity devices to help the different requirements of the fleet segments (no one solution for the whole fleet)

4.4 Denmark

What:

- Dealing with the LO
- Identify and develop effective selective gears

- Slimming and fast-tracking the process from design to use of the gear
- Allow industry to come up with ideas

How:

- EMFF funded project
- Structured process
- Incentives for gear coverage
- Derogations
- Two-stage of sampling. Data collection once the gear is satisfactory
- Chartering vessel and provision of scientific quota
- Science led cooperation with Fisheries associations

Limitations:

- Focused too much on science with the risk of making fisheries not viable
- Objective is too wide
- Potential misalignment between objectives and achievable outcome

Strength:

- Support from scientific bodies, ensuring rigour of results
- Involvement of the industry in all phases of the project
- Effective communication
- Dissemination of findings

4.5 Italy

What:

- Renew of technology
- Reduction of impact on the sea bottom and benthic communities
- Finding a level of communication with fishermen
- Improve energy efficiency
- Identifying an alternative for boat seine

How:

- Gear technologists involvement in gear/vessel design/assessment
- Engagement with fishermen communities

Limitations:

- Lack of trust
- Artisanal scale
- Traditional approach and lack of willingness to change
- Lack of incentives
- Lack of mediation between fishermen and science

Strength:

- Collaboration with international projects
- Collaboration with compliance
- Direct involvement of manufacturers

4.6 France

What:

- Enhance selectivity
- Enhance quality of fish caught

- Increase survivability of discards
- Reduction of fuel consumption
- Reduction of the impact on the sea bottom
- More effective buy-in for decision-makers
- Improvement on knowledge of long-term effects

How:

- EMFF and industry funded
- Structured process
- Science – gear technologists- POs collaboration
- Experiment in the field

Limitations:

- Administrative burden for fishermen
- Potential misalignment between objectives and achievable outcome

Strength:

- Funds availability
- Short-term economic benefits
- Communication
- Training

4.7 Belgium

What:

- Technical innovation in beam trawling to reduce bycatch and improve survival
- Collect results to support an application for a Survivability exemption under the LO

How:

- EMFF funded project
- Trials on RVs
- Trials on Commercial vessels
- Science led project
- Steering group NGOs, POs, Government

Limitations:

- Possible loss of commercial catch
- Complicated net design
- Competition for the use – if successful
- Shaming – if unsuccessful
- Lack of agreement on the actual need for improvement

Strength:

- Communication
- Dissemination

Conclusions and considerations

The majority of the initiatives are currently focused on increasing the selectivity of the gear as a consequence of the implementation of the LO. Historically, innovation in gear

design arises in response to specific regulatory challenges faced by the industry but often led, or guided by science.

It is evident that collaboration and an effective communication between science, fishermen and management is vital for the success of any project. Funding is not an issue per se but has the potential to become a problem if timing does not coincide with the ideal time frame for testing the gears or if they cannot be used for compensation in case catch losses during gear development are not covered (impact on individual income).

The various projects highlighted patterns of failure and success.
Success depends on all stakeholders contributing but also on a certain level of trust and willingness to collaborate. The strongest results are achieved when (ideally):

- Fishermen and netmakers can come up with practical ideas;
- Government is not over regulating;
- Rigor of data collection, analysis and dissemination can rely on practical science;
- Communication among the party is truthful and open (based on trust);
- Realistic and clear objectives are set;
- Clear, dynamic and well set out process is agreed;
- Clear policy drivers are identified;
- Appropriate incentives are made available;
- Appropriate funding is made available;
- Project coordination is facilitated by someone capable of successfully connecting the involved parties.

Failure may arise due to:

- Lack of understanding of the process (the lack of knowledge can be related to an ineffective communication, to a lack of interest and engagement among the stakeholders involved or to an over-complication of the process itself);
- Unclear or overambitious objectives;
- Lack of projection (or interest) in long-term effects;
- Historical mistrust;
- Lack of investment;
- Mismatch between current drivers and practical availability of resources (sometimes when the driver is strong, funds or resources are not available; when they become available the momentum is lost or changed);
- Mistakes in the process that jeopardize the buy in of the stakeholders;
- Project results are not properly taken forward by managers.

5 Stakeholders roles

Stakeholder roles varied somewhat between the initiatives. In most cases, industry had a major role in putting forward ideas and initiating projects (Sweden, Denmark, Netherlands and Scotland). In these initiatives, scientists, supported by industry representatives, normally write the project proposals. In other countries, scientists and managers together with the industry initiate project ideas together (France and Belgium). In initiatives with an initial trial and development phase, fishers and netmakers are often responsible and often collect self-sampling data for pre-evaluation of the gear. Scientists often take a more supporting role through this project phase. During the evaluation stage, scientists are responsible for steering the trial fishing and sampling. Analyses and reporting is in most cases done by the participating scientists, although examples of a larger PO role at this stage exist in some initiatives (Netherlands, Scotland).

Other important stakeholders such as managers and NGO´s are normally not directly involved in the projects themselves but often (managers) or sometimes (NGO´s) take part via project- or steering committees, or are briefed during and after projects are finished.

6 Incentive structures

Various types of incentives for the industry and individual fishermen (skippers, owners and in some situations all crew members) to be involved in the development of fishing gear have been used in the initiatives evaluated. Two different groups of incentives have been identified. At the collective/general level, incentives are generally based on pressure incentives from management or markets and are often an external framework for the projects. At an individual/group level, incentives can be formed by the social structure within and around the fisheries and finally the type of positive incentives, which the initiatives can create for the individual skippers for participating in the different phases of gear development trials. Both are important to take into consideration when setting up initiatives, as they not only promote stakeholder involvement and engagement but also increase the uptake of the results.

The collective level – framework incentive structure for the projects

The main incentives at the collective level are considered as regulative pressure for individual fishers and groups to participate in development of gear e.g. to avoid bycatch and discards of cod in relation to the cod recovery plans in the North Sea. The most recent regulative incentive is the implementation of the landing obligation, which has been a general driver for participation in projects in most countries. This is a collective level incentive as well as an individual level incentive, where fishermen are willing to invest time and risk loss of catches to develop gear that can solve their challenges of adjusting to the landing obligation. The strengths of this incentive depend on the fishers' interpretation of the consequences of implementation of the regulative regime, e.g. the degree of efficient control of the landing obligation.

Other collective or group regulative incentives have been seen, e.g. Natura 2000 regulation requiring low impact gear to be able to fish in the areas (NL). Other collective pressure incentives of market or natural type have been seen; to be able to fulfil conditions formulated in market certifications (e.g. MSC certification for brown shrimps as in the Danish Fast track project), reduction of fuel costs (France), or to solve new environmental challenges, e.g. seals (Sweden).

Some management regulations create unintended disincentives for participating in development and use of e.g. selective gear. An example from Sweden demonstrates this in relation to a shift from short-term (weekly-monthly) quota rations to individual yearly quotas in 2017. Awarding an individual share of the quota was based on their track record of previous catches. By demonstrating a selective fisheries track record, some fishers have lost fishing rights. This has created some scepticism towards developing and using new selective gear, and therefore also a disincentive for participating in gear development trials.

The social structure of a specific group of fishers, the fleet segment or the local community can make up incentives or disincentives for the individual fishermen to participate in development trials. In some contexts being innovative is seen as a positive characteristic, which will encourage participants of the group to participate in development trials, in other contexts such innovative behaviour is seen as threatening the tradition and possible demonstration of dysfunctionalities in the present practice. In the latter case, the social values tend to discourage participation in gear trials. Despite the social values, most project holders have experienced individuals participating in gear development trials driven by an internal interest in innovation, to test their ideas

or to con-tribute on behalf of their future fishery and the environment. These individuals can be valuable (and stubborn) participants if activated for the gear development initiatives (e.g. in Denmark and Sweden).

These possible collective incentives (and disincentives) are important to notice in the planning and operation of the initiatives, but can be regarded as framework conditions for the initiatives regarding stakeholder participation as well as for the use of the developed gear.

The individual/group level incentives for participation in gear development projects

While general framework incentives create a common pressure on the whole industry or groups within the industry for adjusting to the new conditions though gear development, the initiatives should establish incentives for the individual fishermen to participate. These incentives should handle the tension between the collective interests in development and the individual burden of the development cost (time spent and possible loss of catches).

Participating in gear development initiatives might give a first mover advantage of knowing how to handle the new gear, but will generally have higher cost for the vessel in form of time spent and possible loss of catches. As the developed gear is available for all and not only for the participating fishermen, the project related incentives are sup-posed to cover the economic risk for the fishermen participating in the projects.

Different types of incentives for coverage of economic risks for fishermen involved in the initiatives are used. Below they are summarized according to the different development stages and their pros and cons described in Table 1:

Stage 1: trial and error development
In most of the initiatives, fishermen involved are compensated for material, e.g. the cost of adjusting the gear or new devices (grid etc.), either by fishermen themselves or netmaker. This is a positive incentive for participation, though some fishermen regard this as of minor importance compared to the other risks/cost in the total development process.

Some initiatives also compensate (some) hours spent on the design and alterations of the gear. When trialling the nets at sea, Swedish fishermen get a compensation for the loss of catches, e.g. based on a guaranteed daily income (from which the value of catches is withdrawn). Alternatively, when fishing in a twin-rig setting, catch losses could be compensated by comparing the catch in the test-gear with that obtained in the traditional trawl, however this is current not use in any of the initiatives. Providing a guaranteed daily income is not possible under the EU funding rules. The Swedish projects are based on national funding, which enable such support.

In Denmark and Netherlands, guarantee for the economic risk is not provided. This is on the notion that the gears which proceed to the commercial trial stage should be only those gears which fishermen are interested in using in their fishery.

Stage 2: Commercial trials
In Sweden, fishermen are being compensated for loss of landings, as described above. A similar compensation system is in place in Belgium while in the Netherlands fishermen receive money for hours spent for extra work on board e.g. with self-sampling. This does not (always) compensate for the profit loss.

It was a general experience from the initiatives, that the lack of guarantee/compensation for risk of loss of catch and for time spend could result in a lower willingness for the fishermen to continue development and adjustment of the test-gears, especially at the commercial sea trial stage. Some would stop using the test-gear after a few hauls if they showed considerable loss of catch, although experience shows that even minor adjustments can change catch pattern considerably and continued experimentation *could* reveal the expected better performance. In Denmark, lack of compensation were partly based on an argument that "nets should not cause catch loss otherwise they will not use the nets anyway" and that fishermen co-funding leads to a higher degree of engagement from the fishermen. The Danish project has not yet concluded on this effect versus the lower willingness to continue using even a low performing test-gear.

Scientific quota has been used for compensation in Sweden on one occasion on a larger pelagic vessel where pecuniary compensation involved too large sums for the project. Scientific quotas have previously been used in a results based management project in Denmark during the commercial development stage but led to fishermen becoming involved in the project simply for the additional quota rather than the possibility of improving their gears performance.

Stage 3: Scientific Sea Trials:
During this phase, scientist/technicians are conducting scientific tests of the gear, e.g. in the form of a comparative catch composition trial. In most of the initiatives (IT, DK, BE, SWE, SCO, NL) the scientific test has taken place on a commercial vessel rented for the project. In Germany, the scientific test typically takes place on board a research vessel. In the Netherlands, tests take place on board commercial vessels, but there is no compensation for loss of catch or time spent at this stage of the project. The Dutch tests are dependent on the willingness of the skipper to adjust the fishing practice according to the needs for the scientific test. This tends to limit the opportunities for elements of the testing, e.g. testing different variations of the gear, or test it in areas with high/low appearance of target species or of unwanted bycatch. The skipper will have an interest in going for the areas with best chance for a high CPUE only.

Table 1. Pros and cons of the different incentives offered during the different trial stages.

Stage	Incentive	Pro/cons
Trial and error dev.*	Compensation for material, e.g. cost of purchase/ change/ adjustment of gear or new devises (all) Compensating fishermen for hours spent (Most, not NL and DK) Compensation for income losses i.e. (SE)	Cost of gear payed by the project. A positive incentive. Fishermen often regard this cost as minor. Compensation for economic risk is an important incentive for participation. Not possible for EMFF funding – alternative means: National/private. Possible consequences: * Fishermen lose interest/ possible good concepts are thrown away in a preliminary stage * Fishermen co-financing creates higher engagement + more critical towards low performing concepts
Commercial sea trials	Compensation for income losses (SE, BE) No compensation (DK)	Compensation - See above

	Compensation for hours spent (NL) Provide scientific quota (SE)	Compensation for hours spent increases interest – Does in most cases not cover for all economic losses. Use of scientific quota provides the possibility of testing gears on large vessels (pelagic fisheries) where compensation is not possible.
Scientific Sea trials	Commercial vessel is rented/ guaranteed daily income (value of catches reducing project payment) (France, Sweden, Denmark, Italy) No compensation (Netherlands)	During scientific trials the focus is only research when vessel is rented for that purpose. When researchers join a commercial cruise without compensation there is a high risk of conflict between commercial targets of fishermen and scientific goals of the trip.

*** Where applicable- some initiatives do not separate the trial and error development phase from commercial sea trials phase. The difference between them is generally the level of documentation demands from the industry participants.**

Conclusions

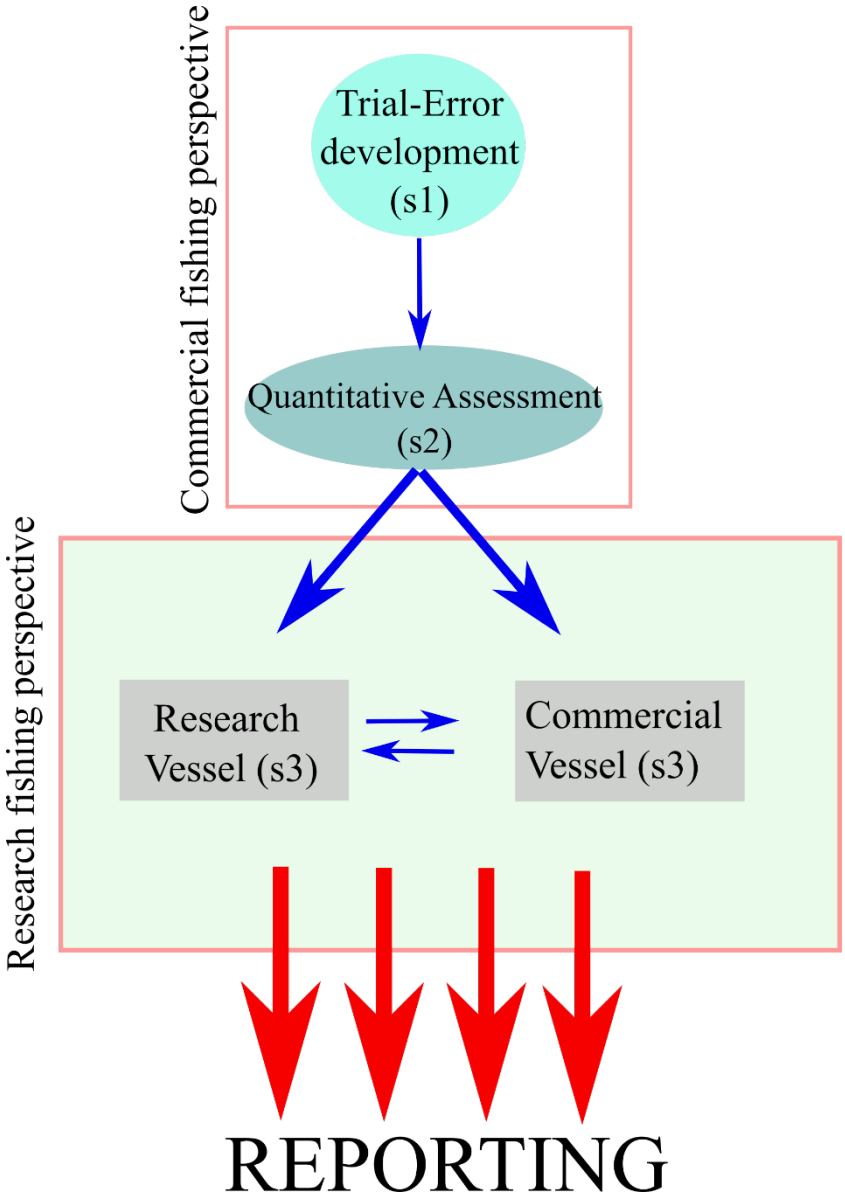
The framework incentives from management, market etc. as well as social and individual incentives should be recognized by the initiatives and if possible used in a constructive way (talk to social values of innovativeness or encourage innovative individuals).

As there is a freerider/firstmover cost tension between collective incentives and individual incentives, it is the general experience that the economic risks for the fishermen should be covered in every stage of the trial. The main argument is that there can be individual development costs as even a good concept is not perfect when you start testing. Without compensating there is a risk that good concepts are being thrown away in an early stage. Gear development is never plug and play, sometimes it takes months, years for a concept to work, and the individual fishermen risk to lose interest.

- Compensation for cost of adjusting gear to test new elements is generally used and can be recommended, though it is a relative small investment compared to the risk of loss of catch.
- Compensation for loss of catch is also generally recommended. Various models have been seen. A balanced model that encourage the fishermen to take ownership in the adjustment and to continue testing/adjusting despite of low performance should be chosen. A general model is not available at present.
- Scientific quotas can be used as an incentive; however their use is best restricted to scientific sea trials to avoid incentivising large catches instead of focus on the intended gear evaluation. Their use can also be beneficial in large pelagic fisheries when monetary compensation involves too large sums for the project.
- Especially in the stage 3, scientific tests, compensation/renting the vessel is of importance as the interest of the fishermen (optimizing catch/catch value) can counteract the scientific need of systematic tests, possibly also in areas/situations with low catch opportunities.

7 Data collection: Type of data and methodologies

A review of the initiatives presented during the meeting show variation in the methodologies used when evaluating the selective performance (size and/or species selectivity) of the gears. However, it was identified a common trend towards adopting multistage strategies requiring the involvement of different stakeholders with different degree of involvement among stages. Examples can be found in initiatives from Sweden, Denmark, Netherlands, France, Italy, Belgium, Scotland and England. Often three stages in the development and testing of a gear in the field could be defined in the initiatives, of which two involved industry as the primary actor and the last stage was focused on scientific trials. Not all initiatives had a clear distinction between trial and error development and quantitative commercial data collection tough. A general scheme comprising the three different stages in the development and testing of a gear in the field has been defined as it follows:'



This scheme is used to identify the type of data and the data collection strategies required for each of the identified stages.

Stage 1: Trial-error development of the gear

This first stage is used for the development of the gear concept. Development is carried out based on a trial-error approach and under a commercial fishing perspective. Fishermen/netmakers develop the gear concept based on their own experience and perceptions of fishing performance, but also obtain input from scientists, who have access to a large bibliography describing fishing technologies applied worldwide. Data collected during this stage should be done on a voluntary basis. Forcing the fishermen to systematically collect information might reduce flexibility in the development process.

Type of data of interest at this stage:

- Track changes in the gear:

  (+) A description of the gears, vessel size and power

  (+) Logbook

  (+) Anecdotal evidence

  (+) Pictures & video recordings and or flume tank tests.

- General comments and perceptions for preliminary assessment of concept potential

Stage 2: Commercial sea trials: preliminary assessment of gear performance

After the identification of a gear that the industry perceive as promising from stage 1, further assessment is usually done by comparing catches from the test gear and a reference gear (usually the legislated gear). This stage is still conducted under commercial fishing perspectives. However, the input of scientists in relation to fishing activities increases in relation to Stage 1.

Type of data expected: In addition to the data described in stage 1, this stage should provide:

- Catch data: Normally including catch volumes (weights) by species and size fractions from individual hauls, and ideally individual fish lengths by species and catch fractions (mandatory at stage 3 but valuable at stage 2).

- Operational information: This information should include a description of gear operation during the trial, the sea state at the time of the trial, and the fishing grounds where the trial took place. Ideally, information on the dynamics of the gear (provided by gear sensors) should be also obtained.

- Economic data: This information is necessary to assess the economic viability of the gear. Economic data includes detailed operating costs and sales data paired with catch volumes (weights) for revenue calculations. Key operating costs include, but are not limited to: fuel, crew, quota, ice, bait, and fishing boxes. Sales values by species and size grade are also required for revenue calculations. Together the cost and revenue calculations can be used for a financial assessment.

Sampling methodologies: Two main sampling methodologies have been identified:

- Self-sampling schemes: Advice on how to conduct the self-sampling should be provided by the scientists before the data collection starts, in order to obtain unbiased and precise statistics in subsequent analyses of the catch data. This advice involves for example the minimum number of fish to be measured, or aspects of the fishing activities to be controlled (for example in twin trawls

configuration, even distribution of hauls with the test gear mounted in both trawls, in order to avoid potential side effect)

- On-board observers: Catch sampling is conducted by on-board observers, trained by researchers to follow a specific methodology adapted to the type of data required and the fish sorting/processing on-board. The observer provides direct advice to the fishermen on how can they help to obtain unbiased and precise statistics obtained in subsequent analyses of the catch data.

Information collected at this stage should be used to decide if the tested gear(s) is/are selected for the next stage (Stage 3) of development and testing. Relevant information at this stage could be also used for final reporting.

Stage 3: Research sea trials

This stage should be conducted under research perspectives: Fishing behaviour, catch sorting and in general all phases involved in the fishing process should be oriented to follow a given experimental design, predefined by the researchers with the aim of obtaining quality catch data. Commercial vessels are the preferred platform to use at this stage in industry-science gear development trials; however, fishing research vessels may also be used. The benefits of using commercial fishing vessels at this stage is a better reproduction of commercial fishing conditions and thus ensure better representativeness of results. Using fishing research vessels on the other hand facilitates the implementation of more complex experimental designs, and enables the participation of different stakeholders during the sea trials.

Type of data expected: In addition to the catch and operational data described in stage 2, this stage should provide:

- Gear description: Full technical description of the gear(s) being tested should be obtained at this stage (as latest). Ideally, the documentation should include fishing gear engineering details, technical drawings illustrating the constructive details of the gear, and illustrations showing the intended performance of the gear (especially for designs addressing multispecies selectivity).

- Multimedia data: Including data to better describe the constructive characteristics of the gear (pictures), the mechanical behaviour of the gear during towing (gear sensors) or fish behaviour during the catch process with special focus on interactions with the device being tested (Underwater Video Recordings).

Sampling methodologies: A standard experimental design approved by ICES should be implemented for the quantification of the fishing performance / selectivity properties of the tested gear. Ideally, the selected experimental design should quantify the selectivity properties of the gear, or the partial selectivity of the device(s) applied in the test gear. The main experimental design used in the different initiatives is the catch comparison method, where the test gear is compared to a standard gear (typically a legislated gear). The alternate haul method has also been used when direct catch comparisons were not possible. Alternative experimental designs that might be applied at this stage include the covered codend, trouser trawl and paired trawl (two vessels in "parallel) methods. The methods used in the different initiatives as well as the pros and cons of the different methods are described in Tables 2 and 3, respectively.

Table 2. The different data collection methods used in the different initiatives and sampling stages.

Country	Initiative	Industry sampling stage (Stage 1 & 2)		Science sampling stage (Stage 3)	
		Methodology	Type of data	Methodology	Type of data
Denmark	Fast-track	Catch comparison methods. Data collection performed by fishermen.	Length data from a subsample of the catch, weights of subsamples of the catch, and weights of total catches of each gear. Underwater videos.	Catch comparison trials under commercial conditions with scientists collecting the data.	Length data, total catches weights from each gear, and sample weights (when subsampling). Description of fishing operations. Underwater videos.
Sweden	The Selective Fisheries Secretariat	Methodology can differ depending on the project, but normally catch comparison methods. Data collection performed by fishermen.	Weights per size classes of the landings, discard weights, and records of changes to the gear.	Catch comparison trials under commercial conditions with scientific technicians collecting the data.	Length data, total catches weights from each gear, and sample weights.
Netherlands	Several initiatives led by the industry	Ad hoc sampling schemes. Catch comparison method. Data collection performed by fishermen.	Typically document landings and a subsample of discards (weights), and changes to the gear.	Catch comparison. Scientific technicians/ scientists collecting the data.	Length data, and catch weights. Underwater videos.
Scotland	GITAG and Fisheries Innovation Scotland	Catch comparison methods. GITAG-observers sample during trial.	Catches by species (weights) and length data.	Ad hoc sampling schemes. Catch comparison trials with scientific technicians collecting the data.	Data requirements being set by Marine Scotland. Catch comparison method. Underwater videos.
Belgium	Combituig	Ad hoc sampling schemes. Catch comparison method used preferably. Data collection performed by fishermen.	Landings and discards weights, and changes to the gear.	Catch comparison. Scientific technicians/ scientists collecting the data.	Length data, and catch weights. Underwater videos.
France	Several initiatives led by	No industry sampling stage.	No industry sampling stage.	Initials tests in flume tank	Underwater videos, description of

	the industry or scientists			and with numerical simulations. Preliminary scientific tests onboard commercial vessels. Repeated tests in commercial conditions using catch comparison. Data collection performed by scientific technicians.	fishing operations, weights of landings and discards, and length measurements of a sample of the catch.

Table 3. Types of data which can be collected when using different methodologies and their associated pros and cons.

Methodology	Type of data	Who	Pros	Cons
Catch comparison trials under commercial conditions	Length and weights (discards and landings) data	Fishermen collecting data	Allows for the direct comparison between standard and new gear selectivity, population independent data, **involves fishermen in the entire process of gear development.**	Does not provide absolute selectivity parameters for the new gear, **collecting length data can be time consuming – high subsampling is needed, risk that some data are not collected – protocol not followed.**
		Observers collecting data	Allows for the direct comparison between standard and new gear selectivity, population independent data, **observers know the sampling protocols and are trained in collecting scientific data.**	Does not provide absolute selectivity parameters for the new gear, **observers follow a task and do not adapt the protocol if needed.**
		Scientists collecting data	Allows for the direct comparison between standard and new gear selectivity, population independent data, **scientist are able to adapt protocol in situ.**	Does not provide absolute selectivity parameters for the new gear, **scientists onboard are expensive.**

	Only weights (discards and landings)	Fishermen collecting data	Allows for the direct comparison between standard and new gear selectivity, less time consuming to collect than length data, **involves fishermen in the entire process of gear development.**	Does not provide absolute selectivity parameters for the new gear, population dependent data.
		Observers collecting data	Allows for the direct comparison between standard and new gear selectivity, less time consuming to collect than length data, **observers know the sampling protocols and are trained in collecting scientific data.**	Does not provide absolute selectivity parameters for the new gear, population dependent data, **observers follow a task and do not adapt the protocol if needed.**
		Scientists collecting data	Allows for the direct comparison between standard and new gear selectivity, less time consuming to collect than length data, and **scientists are able to adapt protocol in situ.**	Does not provide absolute selectivity parameters for the new gear, population dependent data, **scientists onboard are expensive.**
	Underwater videos	Fishermen/ Observers/ Scientists collecting data	Allows for direct observations of the gear performance during fishing operations.	Can be difficult to obtain videos with the right angles and clear images.
Catch comparison trials under scientific conditions	Length and weights (discards and landings) data	Observers collecting data	Allows for the direct comparison between standard and new gear selectivity, population independent data, **observers know the sampling protocols and are trained in collecting scientific data.**	Does not provide absolute selectivity parameters for the new gear and can be expensive, **observers follow a task and don't adapt the protocol if needed.**
		Scientists collecting data	Allows for the direct comparison between standard	Does not provide absolute selectivity parameters for the new gear

			and new gear selectivity, **population independent data, and scientists are able to adapt protocol in situ.**	and can be expensive, **scientists on-board are expensive.**
	Only weights (discards and landings)	Observers collecting data	Allows for the direct comparison between standard and new gear selectivity, data easier to collect, observers know the sampling protocols and are trained in collecting scientific data.	Does not provide absolute selectivity parameters for the new gear and can be expensive, observers follow a task and don't adapt the protocol if needed.
		Scientists collecting data	Allows for the direct comparison between standard and new gear selectivity, data easier to collect, and scientists are able to adapt protocol in situ.	Does not provide absolute selectivity parameters for the new gear and can be expensive, population dependent data, scientists on-board are expensive.
	Underwater videos	Observers collecting/ Scientists collecting data	Allows for direct observations of the gear performance during fishing operations	Can be expensive to obtain the cameras and can be difficult to obtain videos with the right angles and clear images
Covered codend trials under commercial conditions	Length and weights (discards and landings) data	Fishermen collecting data	Provides absolute selectivity parameters for the new or modified gear, population independent data, involves fishermen in the entire process of gear development.	It is impossible to use for most commercial vessels and affects the commercial activity, collecting length data can be time consuming – high subsampling is needed, risk that some data are not collected – protocol not followed.
		Observers collecting data	Provides absolute selectivity parameters for the new or modified gear, population independent data, observers know the sampling protocols and are	It is impossible to use for most commercial vessels and affects the commercial activity, observers follow a task and do not adapt the protocol if needed.

			trained in collecting scientific data.	
		Scientists collecting data	Provides absolute selectivity parameters for the new or modified gear, population independent data, and scientists are able to adapt protocol in situ.	It is impossible to use for most commercial vessels and affects the commercial activity, scientists on-board are expensive.
	Underwater videos	Fishermen collecting/ Observers collecting/ Scientists collecting data	Allows for direct observations of the gear performance during fishing operations	Can be expensive to obtain the cameras and can be difficult to obtain videos with the right angles and clear images
Covered codend trials under scientific conditions	Length and weights (discards and landings) data	Observers collecting data	Provides absolute selectivity parameters for the new or modified gear, population independent data, observers know the sampling protocols and are trained in collecting scientific data.	Expensive (more?)
		Scientists collecting data	Provides absolute selectivity parameters for the new or modified gear, population independent data, scientists are able to adapt protocol in situ.	Expensive (more?)
	Underwater videos	Observers collecting/ Scientists collecting data	Allows for direct observations of the gear performance during fishing operations	Can be expensive to obtain the cameras and can be difficult to obtain videos with the right angles and clear images
Ad hoc sampling schemes			More versatile and potentially able to be used with all gears	Can hamper the comparison of the different datasets
Preliminary analyses: Flume tank			Can provide useful preliminary data on the hydrodynamic performance of the gear	High cost and scheduling time and difficulty of the repeated tests
Preliminary analyses: Numerical simulations			Can be a useful tool to predict the selectivity of a gear and plan the trial	Can have uncertainty associated and input parameters may be inadequate

The final reporting of the performance observed by the innovative gear should be mostly based on the outputs provided by Stage 3, although data from stage 2 can be valuable for the broadening of the results from the scientific trial.

Most national initiatives reviewed had a strong bias towards gear development in demersal trawls. However, several projects within the Swedish initiative focus on development of passive fishing gears such as pots and traps. Typically these projects involve cooperation with a single or few fishermen who uses small boats, sometimes completely open and with lack of space. There are therefore certain limits to the ability to collect data compared to the normal situation on-board trawlers. Without the possibility of having scientists on board, the data collection is often limited to self-sampling by involved fishermen. Typical data collected is weight or number per species divided into wanted and unwanted catches. Normally the experimental set-up is designed to compare catches of one (or few) test gear with catches in a control gear. Furthermore, the restricted documentation possibility often limits the possibility to test several different gears and sometimes effects of small gear changes are not separated properly. One possibility that has been used is mobile phones for documentation of catches, deviations, etc. as well as data transmission. New technologies such as data loggers for documenting fish time, depth and position reinforce the collection without being particularly burdensome for the participating fisherman. Video studies can also be performed to study both fish behavior and catches, which significantly increases the possibility to evaluate the gear.

8 Communication and dissemination

How it is (based on presentations):

1. *Advertising trial initiatives to industry*

In most countries projects and funding for gear development opportunities are advertised to industry through word of mouth, POs, articles in fishing newspapers, designated information meetings, and websites. Housing information solely on websites was found to be ineffective without additional supporting avenues of communication. In the Netherlands, POs are responsible for submitting funding applications directly to the EMFF and contact scientists themselves for project support once their funding has been improved. Harbour visits and social media have also proved an effective means of communication for Denmark's Fast Track program.

2. *Communication during development*

All projects highlighted that constant communication and strong feedback loops between fishermen and scientists during the gear development process are important to the successful progression of the project. In most cases managers were only involved at the beginning (planning meetings) and informed of the results at the end of the trials/ project (received scientific reports and presentations).

3. *Disseminating results*

Projects in every country produce formal scientific reports of gear trial results which are shared primarily with management and the steering committee overseeing the project. These technical reports are often written in the countries' native language or English and published online. Some countries have explored other methods of dissemination including short factsheets, presentations to fishermen, managers, and regional groups shortly after the completion of the trial. Often these summary documents are written in the countries' native language. In some cases, as in the Netherlands, POs are in charge of communicating and disseminating results themselves. In Denmark the Fast Track project has also explored using Facebook, articles in fisheries newspapers, and phone calls to share results and collect feedback on the project.

How it should be:

Initiation and early development stage: To initiate a project, ideas should be actively shared between science and industry to increase the number of ideas available for development. Communication and support to industry during the application process could also improve industry engagement and ensure that fishermen are fully aware of the project and funding parameters. Workshops or informal training before and during the initial stages of the project could also help ensure that everyone involved understands their role and the roles of other stakeholders. These workshops could be attended by scientists, fishermen, netmakers, observers and possibly managers (if applicable).

Gear development and trial stage: For projects that are science-driven, scientists should try to engage fishermen more in the sampling and data collection so that they can carry out self-sampling in the future. Strong communication and feedback loops between scientists and fishermen during the trial period should continue.

Disseminating results: Scientific reports should be accompanied by short factsheets, presentations and articles in fishing newspapers to make results more accessible to industry. Platforms like GearingUp and DiscardLess factsheets should be utilized to

gather trial results together for reference and help facilitate communication and collaboration among different initiatives, particularly those that face similar selectivity issues (e.g. Netherlands and Belgium beam trawlers). Other ways to improve communication with stakeholders include incorporating more media in outputs (e.g. images and video footage), and investigating the possibility of a project newsletter to keep stakeholders updated on project development.

9 Funding of initiative

Three main sources for funding are found in the initiatives; EMFF, national funding and industry self-financing (Table 4). Funding by EMFF needs 25% national co-financing. Co-financing has been solved differently between initiative's; national funds, research quota or by the industry. All public funding is normally strictly regulated and need tenders if the amount reaches a certain level.

Table 4. Type of funding in the different initiatives

Initiative	EMFF	National	Industry	Research quota	Individual fisherman
Belgium	X	X	X		X
Denmark	X			X	X
England	X	X			X
France	X	X	X		X
Netherland	X	X	25%		X
Scotland	X (75%)	X (25%)	X		X
Sweden		X		X	
Italy	X	X			X
Germany	X	X			X

9.1 Pros and cons of different funding

EMFF funding

Pros

- To fund scientific and administrative staff.
- To fund gear and hardware.
- Demand on sharing results.
- In the long run, the most sustainable resource.

Cons

- Administration burden.
- Decisions can take a long time.
- Difficult to fund fisherman for losses during sea trials.
- Rule not more than 5% of the fleet capacity.
- Need of longer term funding.
- Need to solve the 25% co-financing in a convenient way.

National funding

Pros

- Low administration burden.
- Relative easy to fund everyone (including losses for participating fishermen).

Cons

- Tendering process needed with risks (if tender is won by a non-participating bidder).

- In the Swedish example just 1 year project (due to government funding rules).

Industry funding

Pros

- Awareness of how you spend your money.

Cons

- The industry doesn´t want to spend that kind of money on research.
- Afraid to, in the end, have to pay it all.

10 How are individual projects decided upon?

Sweden: A program committee comprised of representatives from the management agency (Swedish Agency for Marine and Water Management) and the Agrifood agency (Swedish Board of Agriculture). Project proposals are written by SLU and industry representatives and presented to the program committee by SLU-scientists. The steering committee has a priority list as basis for decisions (priority on mixed fisheries in the Skagerrak/Kattegat, Baltic cod trawls and alternative fishing gears). Program committee meetings are held quarterly.

Denmark: Fast-track: Project ideas are presented to a steering committee comprised of scientists within the fisheries technology group at DTU Aqua and fisheries representatives (DFPO). Additional support is requested (e.g. netmakers) on an ad hoc basis depending on the fishery and complexity of the proposed idea. For those projects which are approved, dispensation from the technical regulations is applied for by DTU Aqua.

Netherlands: The fishery organizations (POs) normally apply for funding for individual projects after open national calls (EMFF). POs write proposals and normally subcontract scientists in the projects (innovation projects). Mainly the POs formulate the idea to test further. Research institutes can also be project partners (partnership projects). A committee at RVO (agency) decides on funding of projects.

Scotland: In the current GITAG-framework, applications are presented to the project manager which will work with the fisherman to refine the project for presentation to the management board. The management group then approves/rejects projects (rejection is very rare). The management group is comprised of representatives from industry organizations (SFF and SEAFISH) and Marine Scotland. The management group is supported by an advisory group, involving also skippers and POs. These are key to providing both advices and expertise to the project as well as disseminating outputs back to industry.

France: There is no formal structure but project ideas are normally formulated in ad hoc constellations involving scientists and fishery organizations/POs in response to national calls (both for industry funding and EMFF). Both sides can initiate projects. A steering committee comprised of partners and funders is formed when a project is formulated.

Belgium: The project has just started but plans to invite ship owners and fishermen to brainstorm ideas. Scientists write the proposal for examination by a group of science and industry representatives, ILVO and Redercentrale (ship owners).

Best practice

Ideally science-industry initiatives for gear development should have access to a dedicated set of available funds for easier and faster financing of individual proposals (such as in Denmark, Sweden, Belgium and Scotland). In other cases, there is no such platform but projects are instead created on a more ad hoc basis and funding applied for individually and from different funding sources case by case (i.e. France and the Netherlands). This is a more cumbersome and time consuming process than if an ini-tiative platform has the in house mandate to approve ideas. Funding decisions should be taken by a group consisting of relevant stakeholders and should be based on transparent objectives and priorities.

11 Future work to improve methodologies

A new framework regulation on technical measures is currently being negotiated in the EU. The Commission proposal contains baseline measures that are thought to establish selectivity standards for each regional sea basin. The baseline standards stems from current technical rules for example regarding mesh sizes and selectivity. The baselines would be applicable unless regional proposals for changes are accepted and adopted into union law (as delegated acts). Such regional proposals would need to demonstrate that the proposed changes deliver similar (equivalent) conservation benefits in terms of for example exploitation pattern and habitat protection to those they are intended to replace. STECF (2017) reviewed how such equivalence could be interpreted and evaluated and also provided guidance on the data needs, procedures and metrics for determining equivalence.

The report concluded that the methods for determining equivalence between fishing gears are well established and direct (see chapter 7 of this report for a brief overview). The guidance presented can be a useful tool for regional groups, to identify risks, avoid unnecessary evidence collection, and assist the evaluation of proposed alternative technical measures. STECF (2017) also stresses that new measures need to be an improvement or at least an equivalent to the baseline. Furthermore, in line with the best practice recommendations of WKMSIGD presented in this report, STECF points out that direct inclusion of stakeholders is strongly recommended in the process of the development of alternative technical measures. The quality of the proposed new measures benefit from direct inclusion of stakeholders in the development process within the regional groups. Within this process an assessment of the socio-economic impacts should also be conducted.

12 International collaborations. How can we increase cross initiative collaboration to ensure that the modifications which successfully meet their objective/s are taken up by the industry/implemented efficiently?

Informal agreements between countries with similar fisheries should be established, where scientists/industry will be given the possibility to participate either in the setup of the trial and/or on-board as part of the trial Such collaboration should be factored into the application process when applying for funding as this can be difficult to achieve once funding has been obtained and the deliverables outlined Nevertheless, an active dialog across the different initiatives and countries with similar fisheries should be maintained to avoid the same things being tested repeatedly while also helping advance the uptake of promising developments transnationally.

The use of GearingUp and DisacrdLess factsheets are good tools to use as a first instance to disseminate what is being done in the respective initiatives/ countries. These tools have been structured in a way which is suitable for all stakeholders (from fishermen to scientists), which may increase the dissemination of the trial results. Furthermore, effort is being made to have trials translated into several languages, where the GearingUp tool is currently available in French and English.

Another way of increasing international collaboration and knowledge dissemination is to bring skippers from different countries together to do practical things over a few days. Scotland has tried to organize these kinds of workshops in the past under the Scottish Industry Discard Initiative (SIDI) project. Unfortunately, the EMFF funds couldn't cover the travel of the participants, which was the biggest expense, so the organisation couldn't continue. The structure of the meeting though was very interesting and might be used in future initiatives. Similar topic group meetings are currently being organized in Denmark, where each meeting will focus on a specific fishery or group of fisheries with a specific issue. For example, reducing catches of whiting in demersal trawl fisheries or the development of selectivity devices in the brown shrimp fishery.

In the UK, the Discard Action Group (DAG) was set up by Seafish in 2009 to facilitate an integrated, interdisciplinary, and co-operative dialogue among stakeholders from across the UK and Europe. DAG meets twice each year, bringing together representatives from the catching sector, environmental non-governmental organizations, legislators, regulators, gear technologists, scientists, retailers, foodservice and, where appropriate, the media, to discuss work being done across the industry relating to discard reduction. The Discard Action Group Terms of Reference can be found here. Past minutes and presentations from DAG meetings can be found here.

Another alternative to increase cross-initiative exchange and facilitate international collaboration would be to set up a topic group within the existing ICES community (for example a WGFTFB topic group or possibly follow-up workshops like WKMSIGD). This would necessarily mean a more time-limited collaboration form but may be suitable and timely given the multiple national initiatives with limited collaboration among initiatives and the full implementation of the EU landing obligation from 2019, which might strengthen the attention on the development of alternative gears and the need for a more concerted focus.

13 Conclusions

Considerable effort has been made over the past few years to have the fishing industry take on a large role when it comes to the development, testing and documenting of alternative fishing gears. The initiatives developed across Europe which aim to facilitate this stem largely from the introduction of the landing obligation. The initiatives established in the respective countries have made considerable headway towards solving some of the problems which may arise once the landing obligation is fully implemented. However, greater effort is needed to coordinate the work at regional levels.

With the regionalisation initiated by the reformed CFP in 2013, regional groups of member states got more initiative power over technical regulations as part of temporary discard plans in accordance with the basic regulation (Reg (EU) No 1380/2013). Also, the multiannual plans for the Baltic and North Sea (and the coming revised technical framework regulation) provides mandate for alternative gear specifications via regional proposals. Most of these regional proposals so far have however focused on exemptions from the landing obligation (de minimis and high survivability) while examples of proposals for new gear alternatives have been scarce. In addition, coordination between regional groups regarding changes to technical regulations seems to have been non-existent. A stronger leadership from the regional groups is therefore warranted. A raised ambition for regional managers would also be helped by a better coordination of all ongoing national science-industry gear development initiatives (see chapter 12).

The lack of drive by the industry to develop and test gears is largely due to the relaxed implementation and uncertainty surrounding the implementation of the landing obligation. If more clarity were made around the regulation, the exceptions, its implementation and workability of the whole landing obligation, the situation may be different.

The lack of drive to develop and test alternative gears may also be related to the fact that they have spent considerable effort and time in developing solutions that work in the past and haven't ended up seeing things transpire into the fisheries.

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Annex 1: List of participants

Name	Institute	Country (of institute)	E-mail
Michael Andersen	BSAC Demersal WG chair, Danish Fishermen PO	Denmark	ma@dkfisk.dk
Bertil Andersson	HKPO Sweden (Sea and Coastal Fisheries PO)	Sweden	bertilvg30@hotmail.com
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Rikke Becker Jacobsen	Aalborg University	Denmark	rbj@ifm.aau.dk
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Kenny Coull	Scottish White Fish Producers Association (SWFPA)	Scotland	Kenny@swfpa.com
Inger Dahlgren	Swedish Agency for Marine and Water Management	Sweden	inger.dahlgren@havochvatten.se
Soren Qvist Eliasen	Aalborg University	Denmark	se@ifm.aau.dk
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Hans C Nilsson	SLU Aqua (Swedish University of Agriclutural Science)	Sweden	hans.nilsson@slu.se

Emilio Notti	Institute of Marine Sciences (ISMAR)	Italy	e.notti@an.ismar.cnr.it
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Annex 2: Agenda

Day 1 – Stakeholder workshop

The objective of the stakeholder workshop is to gain feedback from the different stakeholder groups (fishing industry, scientists and managers) regarding the risks and potential problems associated with a more inclusive framework, while gaining insight into how the different stakeholder groups perceive their role and the role of the other stakeholder groups.

- What are the objectives of these initiatives?
- What can these initiatives achieve?
- What are the risks and problems already encountered?
- What are the roles of the different stakeholder groups?

Day 2 – Review of initiatives

Review current knowledge and experience in involving stakeholders in the development of fishing gears (presentations from the different initiatives). The objective is to provide an overview of the different initiatives which have been established to increase stakeholder involvement in gear development.

- Background and Aims
- The development process
- The documentation process
- The approval process

Day 3 – Best practice document

Develop an advice and best practice document to help identify incentive structures, self-sampling methods, ways for facilitating stakeholder involvement, and information transfer between initiatives. Furthermore, the best practice document should outline how to improve the methodologies current employed while also identifying how these initiatives can facilitate the landing obligation and the proposal of the new technical measures.

Day 1

10:00 **Welcome to the Stakeholder Workshop (Jordan Feekings, DTU Aqua)**

10:15 **Overview of the objectives of these initiatives and what they aim to achieve (Daniel Valentinsson, SLU Aqua)**

10:45 **Manager's perceptions on a more inclusive framework (What is the manager's role in the system? What they can facilitate? What is the process they have to follow? What is the timeline?)**

Sonja Feldthaus (Ministry of Foreign Affairs, Denmark)

Dominic Rihan (Ireland's Seafood Development Agency (BIM), Ireland)

Swedish Agency for Marine and Water Management, Sweden

11:30 **Industry's perceptions on a more inclusive framework (What is the industry's role in the system? What they can facilitate? How do they develop gears?)**

Michael Andersen (Danish Fisherman's Producers Organisation, Denmark)

Durk van Tuinen (Nederlandse Vissersbond, Netherlands)

Peter Olsson (Swedish Fisherman's Producers Organisation, Sweden)

Kenny Coull (Scottish White Fish Producers Association, Scotland)

12:30 **Lunch**

13:30 **Introduction to Risk analysis (Jordan Feekings and Søren Qvist Eliasen)**

13:45 **Risk analysis**

Identify the risks and problems already encountered with the new method as well as identify the roles of the different stakeholder groups.

14:45 **Presentation of the identified risks**

Group presentations on the risks and problems encountered, and the roles of the different stakeholder groups.

15:30 **Coffee Break**

16:00 **Discussion**

How to align perceptions from different stakeholders and identify where improvements can be made.

17:00 **Adjourn**

Day 2

09:00 **Identify how the different initiatives can facilitate the landing obligation and the proposal of the new technical measures. A summary of what we got out of day 1.**

09:45 **Presentation of initiatives involving stakeholders in development of fishing gears**

Sweden –Hans Nilsson (SLU Aqua)

Netherlands – Josien Steenbergen (Wageningen Marine Research)

Scotland – Malcom Morrison (SFF).

10:30 **Coffee Break**

11:00 **Presentation of initiatives involving stakeholders in development of fishing gears**

Denmark - Jordan Feekings (DTU Aqua)

England – Tom Catchpole (CEFAS)

Italy – Emilio Notti (ISMAR)

France – Marie Morfin (IFREMER)

Belgium – Heleen Lenior (ILVO)

UK - Ana Witteveen (Seafish)

Poland - Krzysztof Stanuch

12:30 **Lunch**

13:30 **How to improve the methodologies current employed. Define the current shortcomings of the initiatives and develop a plan on how to resolve these.**

Review initiative structures, stakeholder roles, incentive structures, data collection methods and types.

16:00 **Coffee Break**

16:30 **International collaborations**

How can we increase cross-initiative collaboration to ensure that the modifications which successfully meet their objective/s are taken up by the industry/implemented efficiently?

17:30 **Adjourn**

19:00 **Dinner**

Day 3

9:00 **Plenary presentations from the day prior (summary of initiatives).**

9:30 **Plenary presentations from the day prior (How to improve the methodologies current employed).**

10:00 **Plenary presentations from the day prior (International collaborations).**

10:30 **Coffee Break**

11:00 **Develop an advice and best practice document to help identify incentive structures, self-sampling methods, facilitating stakeholder involvement, and information transfer between initiatives**

12:30 **Lunch**

13:00 **Review report and draft of recommendations in plenary**

15:00 **Official closure**

Annex 3: WKMSIGD terms of reference for the next meeting

The **Workshop on Methods for Involvement of Stakeholders in Gear Development 2 (WKMSIGD2),** chaired by Jordan Feekings (Denmark) and Daniel Valentinsson (Sweden), will meet in Lysekil, Sweden, TBD 2020 to:

Address problems encountered in specific fisheries through increasing transnational collaboration.

Identify whether gears developed within the different initiatives should be taken forward to regional groups for possible implementation.

WKMSIGD will report by August 2020 to the attention of the SCICOM and ACOM Committees.

Annex 4: Minutes from Stakeholder Workshop

ICES WKMSIGD 2018 Stakeholder Workshop
Methods for Stakeholder Involvement in Fishing Gear Development
hosted by the BSAC

Tuesday, 22nd May 2018
Danish Agriculture and Food Council
Axelborg, Axeltorv 3, 1609 Copenhagen

DRAFT REPORT

Day 1 – Stakeholder workshop

Jordan Feekings, DTU Aqua, the moderator of the meeting welcomed all participants. He said that the objective of the stakeholder workshop is to gain feedback from the different stakeholder groups (fishing industry, scientists and managers) regarding the risks and potential problems associated with a more inclusive framework, while gaining insight into how the different stakeholder groups perceive their role and the role of the other stakeholder groups. He underlined that direct involvement of stakeholders can help to alleviate some of the mistrust and non-compliance currently observed, provide incentives to fish selectively, and help to achieve several of the aims of the EU's Basic Regulation (notably the landing obligation) and of the current proposal for a new technical measures framework regulation (he highlighted greater flexibility and increased stakeholder involvement). He underlined that the top-down approach in the management is slow and inflexible. The new technical framework is expected to give fishermen increased flexibility and better possibilities to modify their fishing gear, whilst at the same time ensuring full accountability of what the fishermen catch.

Overview of the objectives of these initiatives and what they aim to achieve

Daniel Valentinsson, SLU Aqua (Swedish University of Agricultural Science) gave an overview of the initiatives and what they aim to achieve. He mentioned, among others, the ILVO projects in Belgium, the Fast Track project in Denmark, work in the UK with CEFAS (Centre for Environment, Fisheries and Aquaculture Science), the Scottish GITAG project (Gear Innovation and Technology Advisory Group), and the Secretariat for Selective Fishing in Sweden. He said that these initiatives and many more will be thoroughly discussed during the next two days of the workshop.

Industry's perceptions on a more inclusive framework (What is the industry's role in the system? What they can facilitate? How do they develop gears?)

Michael Andersen, Danish Fishermen's Producer Organisation presented his personal view on a more inclusive framework and the industry's role. He underlined that fishermen and scientists should work together against the bureaucracy in the management. The willingness of managers is missing to find solutions imposed by the EU regulations. He noted that all stakeholders, namely fishermen, scientists and managers should know their role in the development of the fishing gears. There is certainly a need to have a fast track procedure in the management / policy to facilitate the implementation of new solutions.

Durk van Tuinen, Nederlandse Vissersbond (Fishermen's Association) presented the gear innovations in the Dutch demersal fleet. The biggest challenges concerning selectivity are encountered in the sole and nephrops fishery. Many initiatives have been undertaken by fishermen to improve the implementation of the landing obligation. With regard to implementation of new, more selective gears, the main problems are the slow legal process of adoption, financing, the long process of testing due to the weather conditions as well as involvement of fishermen in their professional activities.

Peter Olsson, Swedish Fishermen Producers Organisation presented the Swedish industry's perception of the process of gear development. Several initiatives have been undertaken by the Swedish fishermen, who are willing to work on the development of new gears. He mentioned, among others the selective "Norden grid" in the prawn fishery and a flyshooting method tested in a project carried out in co-operation with the Swedish University of Agricultural Science. This fishing method is seal-proof and could replace the gillnets. Financial support from the Swedish government had facilitated the work.

Kenny Coull, Scottish White Fish Producers Association stated that the SWFPA supports many industry-led initiatives such as the Gear Innovation and Technology Advisory Group (GITAG) with the aim of testing selective methods of fishing which help to address potential problems relating to the Landing Obligation. It participates in the Independent On-board Observer Scheme. The work done during the past phases allowed, amongst other things, to gain and maintain fishing opportunities (Scottish Conservation Credit Scheme). He underlined that the new EU technical measures framework regulation should be simple, inclusive, relevant and effective.

Manager's perceptions on a more inclusive framework (What is the manager's role in the system? What they can facilitate? What is the process they have to follow? What is the timeline?)

Sonja Feldthaus, Danish Ministry of Foreign Affairs stated that the CFP sets a framework for regionalisation, with a number of rules and regulations which have to be followed. The Baltic multispecies multiannual management plan is the key element, where regionalisation can apply with regard to technical measures. The Commission has the power to establish regional measures through delegated acts, in particular under multiannual plans and temporary discard plans, based on joint recommendations submitted by BALTFISH. STECF is asked to make an evaluation of the proposed measures. National regulations have to be observed with regard to delegated acts. She pointed to the challenges of regionalisation, one of them being the fact that BALTFISH is an informal structure, with a rotating presidency and no secretariat. The lack of a secretariat was highlighted as one of the major shortcomings of the regional groups under their current setting, and something which was also highlighted by Dominic Rihan as a problem for the Scheveningen group and in the North Western Waters.

Karin Linderholm, Swedish Agency for Marine and Water Development stated that special tasks on selective fishing have been given to the Agency by the government, in order to co-ordinate the initiatives aimed at developing and testing new fishing gears. The Swedish government provides the funding for these initiatives, regulated by a bottom-up approach. Fishermen come up with ideas for selective gears, and project plans are prepared in co-operation with the industry and science. Individual fishermen should be guaranteed funding during the projects. Continuous dialogue between fishermen, scientists and managers is crucial to facilitate the implementation of new gears.

Dominic Rihan, Ireland's Seafood Development Agency BIM underlined that the decision-making process in the CFP framework is rather slow, hindered by tonnes of

legislation. Even the fast track procedures are not sufficient to improve the implementation process. The technical measures framework regulation should be adaptable and responsive. Brexit will complicate the implementation process even more.

In the course of the discussions, some participants drew attention to the fact that managers do not allow fishermen to have more responsibility. Attention was drawn to the first draft of the technical measures regulation, which gave a lot of flexibility to fishermen. The amendments introduced during the political discussions have eliminated this flexibility. There was a strong call to deregulate the technical measures and leave the responsibility to the fishermen. There is a need to continue the dialogue between managers, scientists and fishermen, based on regionalisation. It was underlined that gears are specific to a region or even to local needs. Representatives of the industry said that the gears currently allowed in the cod fishery make the implementation of the landing obligation impossible. They urged the managers to take into account the advice coming from the industry (e.g. through the BSAC). The current construction of BALTFISH does not help. The exchange of information is difficult (it has no website) and effective functioning relies on the proper handover to the next BALTFISH presidency, to ensure continuity. There should be more discipline among the Member States in submitting data and observing deadlines. The need to establish a permanent secretariat of BALTFISH and other regional bodies was underlined. It was also noted that BALTFISH spends a lot of time on issues which are beyond the scope of regionalisation, such as for example the fishing opportunities. BALTFISH should focus more on the landing obligation and technical measures. It was underlined that regionalisation is certainly a step in the right direction. However, the process can be improved by turning the informal regional groups into permanent bodies. The role of the Advisory Councils as bodies providing advice on fisheries management was also brought up and the need for a proper consultation process underlined.

Risk analysis

Jordan Feekings and Søren Qvist Eliasen presented the risk analysis process to identify the risks and problems already encountered and to identify the roles of the different stakeholder groups.

The participants were split up in 3 groups, consisting of fishermen, managers and scientists. The groups discussed and noted the risks and problems as well as the roles of different stakeholders. These were then presented to the meeting. Perceptions of the different stakeholder groups were noted with a view to identifying where possible improvements can be made.

The managers identified fishermen and policy makers as the groups, which should have the highest influence and participation in the gear development process. NGOs and retailers were identified as the groups, which should have low participation. Lack of funding and lack of ownership were mentioned as potential risks.

The industry identified fishermen and scientists, including gear technologists, as the groups which should have the highest influence, and NGOs as the group with the lowest influence on the process, due to the fact that the knowledge on gear technology is highly specialised. Lack of funding as well as lack of trust were mentioned as potential risks.

The scientists identified fishermen as the group which should have the highest influence and participation in the gear development process. Lack of understanding between scientists and fishermen was identified as a potential risk.

The moderator drew attention to the synergies and differences among the three stakeholder groups. All groups qualified funding, regulatory barriers and lack of accurate data as potential risks. The lack of trust between the stakeholders could also have huge consequences. Lack of formalized regional bodies was also mentioned. The need to improve the dialogue and flexibility in spending the resources were also brought up.

The meeting did not conclude on the risk analysis and what could be improved, because it was so engaged in the discussions.

The workshop continued on 23rd and 24th May to review current knowledge and experience in involving stakeholders in the development of fishing gears (presentations from the different initiatives) and develop an advice and best practice document to help identify incentive structures, self-sampling methods, ways for facilitating stakeholder involvement, and information transfer between initiatives.