DCF Métier Workshop: Sub-group of the RCGs - North Sea and Eastern Arctic and North Atlantic

22 - 26 January 2018

DTU Aqua, Lyngby, Denmark

Executive summary

The DCF métier workshop took place in DTU Aqua, Lyngby on 22-26 January 2018, and was attended by 27 participants from 13 nations. It was initiated by the RCGs who identified a need for a workshop dedicated to issues related to assigning DCF métiers to transversal data.

To build on existing work, reports and publications from previous work on métier assignment were summarized and legal definitions were reviewed. It was noted that métiers provide building blocks for describing fisheries for many different purposes.

The approach taken by each participating nation was presented and is summarized in this report. It clearly shows the large variety of methods used. A general flow chart was developed illustrating the process and inputs for assigning métiers to fishing trips.

Common issues encountered when assigning métiers to transversal data were identified and described, and where possible, best practices were recommended. It was agreed that a trip could have several métiers where the vessel was polyvalent. The assignment of the target species assemblage turned out to be the most problematic issue as it is defined as the fishing intention. However, many nations did not have that information directly available, and needed to estimate it from the landing composition. Other issues like trips traversing areas with different métier definitions and trips with no catches were also discussed.

The small-scale fleet is characterized by being data-limited, and it was concluded that alternative methods need to be adopted for assigning métiers to trips from this fleet. This could be based on a variety of data sources like questionnaires, adapted declarative forms, sales notes, fishing calendars, licenses etc.

When assigning métiers to fishing trips, reference lists are useful for grouping gears and assigning species into species groups. This includes the RCG list of approved métiers. The workshop looked at how some nations currently group gears and species and for species cross referenced groupings using the ISSCAAP codes developed by the Coordinating Working Party on Fishery Statistics (CWP). It was agreed it would be useful to have Common reference lists in a publicly available repository.

Different options for maintaining list and metadata were evaluated. As ICES RDB (Regional Database) is currently maintaining the list of RCG approved métiers, it was agreed that this should be the source of the métier list, as long as it remained publicly available. For reference tables, method- and métier descriptions and scripts, it was suggested that a GitHub under the ICES RCG's would be preferable due to the flexibility that it offers.

Harmonisation and standardisation are needed for the procedure and rules used to define the métiers (common approaches and reference tables following DCF standards) in order to improve the interoperability and compatibility between data. This workshop is a first step to move in that direction.

1 Introduction

1.1 Participants

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1.2 Terms of reference

The workshop was arranged under the RCGs for the North Sea and Eastern Arctic and North Atlantic but the terms of reference extend to all regions and participation from Member States prosecuting fisheries in these areas is anticipated.

The Metier workshop (as below) to:

1. To review current algorithms and processes used for allocating a trip to a métier based on transversal data.
2. To understand and document the problems, issues and anomalies arising from métier calculation in different Member States.
3. To provide standard guidelines for determining or allocating a trip to a métier or multiple métiers and how to aggregate the data.
4. To provide and reference metadata for the key inputs to métiers (gear, mesh and species/species groups) and how they are aggregated.
5. Evaluate standard format/or suggest appropriate existing format (transversal data) for input into métier algorithm and develop a standard R /SQL/SAS/ script and pseudo code for métier calculation.
6. To define a strategy for storing and maintaining metadata (methods and tables) that define the métiers.

1.2.1 Adoption of the Terms of Reference and structure of the report

This métier workshop aimed to build on previous work and had a practical focus to describe the methods developed for assigning métiers to transversal data (e.g. logbook and sales notes data), to guide on best practice in the practical issues encountered when assigning the métiers and to provide common reference tables.

In this report, first a background of the métier work is given in section 1.3 on why the workshop was established, summarizing the previous work on the métiers, métier definition, why we need the métiers and the RCG's (Regional Coordination Groups) role in standardizing the métiers.

For ToR 1, a summary of how each member state present at the workshop practically assigns the métier to transversal data is given in section 2 in order to describe the different approaches taken by different nations and the differences in available input data.

ToR 2 and 3 were combined to understand and document the problems and issues in métier assignment and to provide some guidelines on best practices on practical issues that member states encounter when assigning métiers to transversal data. This is described in section 3.

For ToR 4 the workshop looked into lists of gear codes and how they are grouped, species lists and how they are assigned into species groups and the list of métier codes that have been maintained and agreed at the RCG's.

A data exchange format was suggested for ToR 5 (but not used during the workshop), and scripts were not developed, as the situation in different member states turned out to be very different. Instead a flow-chart was developed illustrating the necessary steps for assigning métiers to fishing trips.

A suggestion on how to store and maintain metadata in a repository for ToR 6 (a combination of ICES RDB and a GitHub site) is described in section 6.

1.3 Background

The métier workshop was recommended by the RCM NA, which met in September 2017, who strongly recommended that a data compilation workshop should be held to: standardise the processes that use trip based transversal data to allocate métiers; consider criteria for aggregating data for different end-users (JRC, ICES and other RFMOs), and to investigate a framework for managing métier and fleet descriptions when needed.

All fisheries catch, effort, and sample data are uploaded to the RDB by métier, limited to a reference list of RCM agreed métiers defined by ICES area. Member States submit their data to ICES via Intercatch aggregated by métier/fisheries. JRC FDI data calls and other RFMOs also request the data by métier, often without reference to the RCM agreed list of accepted métiers.

Member States have independently developed their own code and processes for calculating species target assemblages and rules for merging métiers. These methods are not necessarily consistent between countries and not even between agencies within countries and could be based on, for example, a foreshortened list of species assemblages; rules for particular gears; catch by weight and or value and relative ratios. The impact of the different methods is presently not known. As data is being compared more readily at a regional and international level there is a need to improve on confidence in the current assumptions, simple rules, and standards applied.

Since 2009, RCMNA has regularly recommended that MS provide, maintain, and update fleet descriptions for all sampled métiers to better define and compare similar fleets and the sampling of them between nations. This has been only moderately successful with no clear repository for them. ICES Expert Working Groups are now also requesting fishery and métier descriptions as part of their data calls. A repository and better strategy is required for collating and maintaining MS descriptions.

1.3.1 Métier definition

In 2005 and 2006, two pan-European workshops *(EC, 2005, 2006)* were initiated to define the DCF métiers with the aim to propose a common definition for all the concepts used for fleet/fishery/métier based approach, which reconciled the definitions previously proposed by the ICES SGDFF *(2003, 2004a)*, GFCM *(2003, 2004)* and fisheries economists *(EC 2004a)*. They proposed a generic approach to split the fishing trips into groups of similar exploitation pattern, clustered in a hierarchical tree. An equivalent multi level approach was applied to the fleets for economic sampling purpose. It would then be possible to gather the economic and biological information harmoniously in a matrix where the fleet segments (see definition below) correspond to the lines and the fishing activities correspond to the columns.

In 2008, the European Data Collection Framework *(DCF, Reg. (EC) N° 949/2008 and Commission Decision 2010/93/UE)* adopted this approach based on the two following concepts/definitions:

- **A métier** defined as a *"group of fishing operations targeting a similar assemblage of species, using similar gear, during the same period of the year and/or within the same area and which are characterized by a similar exploitation pattern"*.
- **A fleet** *(or **fleet segment**)* defined as a *"group of vessels with the same length class and predominant fishing gear during the year"*.

The link between these two definitions is that one vessel can only be part of one fleet segment, however within a fleet segment a vessel can exhibit many behaviours during the year, these behaviours and shifts in fishing activities are defined as métiers. As such, the fleet describes the vessels (vessel' master strategy) while the métier(s) describes the fishing activity(ies) in which the fleet engages *(Ulrich et al, 2012)*.

The recent EU-MAP Regulation *(EU-MAP EC 2017)* reaffirms the métier as an important domain of interest, and retains the same concepts and definition for Métier and Fleet segment. In both the DCF and EU-MAP regulation, métiers are defined according to a hierarchical structure using six nested levels, by region:

- **Level 1**: Activity (fishing/non-fishing)
- **Level 2**: Gear category (e.g. trawls, dredges)
- **Level 3**: Gear group (e.g. bottom trawls, pelagic trawls)
- **Level 4**: Gear type (e.g. bottom otter trawl (OTB), bottom pair trawl (PTB))
- **Level 5**: Level 4 + target assemblage of main species type (e.g. demersal fish (DEF), crustaceans (CRU)) giving e.g. OTB_DEF
- **Level 6**: Level 5 + mesh size and other selective devices giving e.g. OTB_DEF_90-119_0_0. The last two zero's in the code refer to the selective device, the first zero can be 0 (Not mounted), 1 (Exit window/Selection panel) or 2 (Grid). The last zero is the mesh size of the selective device.

- Métiers can thus be described more or less precise where a métier description at level 1 is the less precise one.

The RCG list of approved métiers is at DCF level 6, and usually data are exchanged for datacalls on this level. The métiers on the RCG list may vary among areas.

Level 7

However, a further disaggregation, distinct from level 6, can be defined as level 7 aiming at distinguishing targets at the true species level *(e.g. Nephrops, Flat fish, etc.)*. This might be agreed at national or regional *(RCG)* scale to describe the fishing activity more accurately and as a tool to represent the heterogeneity in fishing practices of the vessels. These National or regional métiers could be defined based on specific target species *(i.e. sole/nephrops, flat fish, etc.)* rather than group of species defined in the regulation *(i.e. DEF: Demersal fishes).*

An example from the Baltic Sea is the DCF level 6 describing fishery using otter trawls and targeting demersal species: OTB_DEF_>=105_1_120. However, within this type of fishery, two more detailed types can be distinguished. One is targeting cod and another is targeting flatfish. Very often, on the national level for the purposes of, for example, discard estimation they are analysed separately. The reason for doing so is a different discard pattern of flatfish in these two fisheries. The analysis at the higher resolution level allows provision of better quality data to main end users (i.e. stock assessment groups) and are also used to meet national needs. There is currently no standard nomenclature for level 7, but it should be possible to aggregate the level 7 métiers into level 6. The level 7 métier should only link to one level 6 métier.

1.3.2 Why we need métiers

Building blocks to describe fishing activities

Recently, the recast of the EU-MAP Regulation reaffirms the métier as an important domain of interest. Today **fleet and métiers** are commonly employed in European fisheries to form the **building blocks which describe the heterogeneity of fishing**

activity in both biological and economic terms. These building blocks allow the partitioning of landings and effort into 'sensible' sized units representing the fishing activities within them *(ICES, 2003)*. The functionality of métiers is evident in the number of groups *(i.e. DCF, ICES, RCG, GFCM, RFMO, ...)* who now use them for a variety of programs, such as the pre or post stratification/aggregation of national sampling programs, bio-economic modelling *(e.g. Ulrich, Reeves, Vermard, Holmes, & Vanhee, 2011)* and management strategy evaluations *(e.g. Vermard et al., 2008)*.

Ultimately, well-defined métiers provide the building blocks of more effective management *(Davie & Lordan, 2011)* and constitute a potent tool to improve biological[1] and bio-economic expertise, to move towards an ecosystem-based approach and to better estimate PETS bycatch data. The use of métiers makes it possible to describe the fishing behaviour/fishing practices of fishermen and constitute a sound basis for the typological classifications of vessels by fleet segment, which forms the basis of economic data collection.

Mixed fisheries

There is a general understanding that **mixed-fisheries aspects** are a key issue in the traditional single-stock management approach, because of the evidence that catches of the various species are interlinked due to technical interactions between different fleets and gears. In addition, availability, abundance and economic attractiveness differ across species and areas, adding to the complexity of the problem *(Ulrich et al, 2012)*. In 2001 and 2002, the European Commission requested ICES to start compiling catch-at-age data disaggregated by fishery that would be more suitable to perform fishery-based forecasts. ICES reacted by establishing in 2003 and 2004 the Study Group for the Development of Fishery-Based Forecasts *(SGDFF)* where the notion of Métier appeared for the first time, as strata regrouping fishing trips according to similar exploitation patterns in order to improve the sampling precision by integrating the dynamics of fishing in an explicit way. Reference was made to métiers as it was concluded that referring to fisheries was too broad of a definition and could lead to as many interpretations as actors in the system.

Link with economic data

As early as 2005, it was noted that whilst the DCR had led to improvements in data availability, the different approaches to collecting biological data (on a stock basis) and economic data (on a fleet basis) did not support very well the provision of relevant inputs to fishery-based management advice. A major challenge of bio-economic modelling and also of management strategies evaluations, is to be able to link input data collected under different sampling schemes and derived from different populations *(EC, 2005, 2006)*.

For economic data, the sampling unit is the vessel and the population of vessels is derived from the fleet register. The key issue in combining economic and biological data is to be able to establish a link between the fleet segmentation based on physical criteria of the vessel (vessel type and length) and the fishery activity based on gear type and mesh size/target species/fish stock. **The common item of both the biological and the economic sampling scheme is the fishing activity.** The fishing activities on a yearly basis affects the economic performance and the fishing activity at the trip level defines the exploitation pattern to sample.

Use of métiers for an ecosystem-based approach

1 Allowing notably for more accurate estimates of partial fishing mortality induced by the various fleets.

The European Common Fisheries Policy (CFP) calls for the implementation of an ecosystem-based approach to fisheries management with increasing focus on limiting the impact of fisheries on the environment. Data provision and analysis at the métier level is appropriate. The métiers are used in data calls to refer to fishing activities used by different countries that are similar within regions. When using the métier tag, it is important that one métier e.g. on level 6 (e.g. OTB_DEF_90-119_0_0) can be used in a region to describe the same types of fishing activities across nations. For example, in the annual "ICES data call for VMS and Logbook data", the data is requested at an aggregation level of DCF métier level 6. For calculation of fishing pressure *(swept area ratio)*, the ICES working group WGSFD *(Working Group on Spatial Fisheries Data)* has grouped the DCF Métiers into different "Benthis métiers" in order to apply relationships developed in the Benthis project between vessel length or vessel power and gear width **(**Eigaard, 2016).

Use of métiers in the analysis of bycatch of Protected, Endangered and Threatened Species (PETS)

Another important consideration is the extent to which the total bycatch of Protected, Endangered and Threatened Species (PETS) is attributable to different types of fishing activities and how their relative importance varies depending on the species concerned and the métiers practiced. A good estimation of bycatches of PETS requires a detailed knowledge of the different fishing activities and appropriate regional sampling designs. Again, the métier could be the most appropriate level of analysis.

However, in some cases the métier DCF level 6 is not detailed enough for PETS bycatch data collection. For example, in the case of pelagic pair trawlers, where the fleet has a noteworthy bycatch rate of dolphins in some fishing grounds *(ICES 2013b)*. At level 6 this métier would be defined as pelagic pair trawlers (PTM) targeting small pelagic fish (SPF) or demersal fish (DEF) and then the corresponding mesh size. However, data collected by scientific observers demonstrate that there are important differences when this métier is targeting different species. When the target species is sea bass (*Dicentrachus labrax*) the bycatch rate is higher compared to when mackerel (*Scomber scombrus*) or other species are targeted. This illustrates the importance of using métiers at the proper level of aggregation to estimate PETS bycatches. Where DCF level 6 is not detailed enough for some purposes, a national level 7 can be defined that would split up the level 6 into groups, but ensure that data can still be exchanged at level 6.

1.3.3 The role of the Regional Coordination Groups (RCGs)

Former RCMs (Regional Coordination Meetings) and current RCGs (Regional Coordination Groups) have an important role in the standardization and harmonization of métier definitions. A major problem when the métier concept was introduced was that there was no common nomenclature to name and describe fisheries, implying that regional overviews were difficult to make. In 2006, after "the fleet activity matrix" was developed during the *ad-hoc* meetings in Nantes, France *(later appendix IV in 2010/93/EU)*, it was a concern for the RCMs that the different cells in the matrix were defined differently in different MS, which would jeopardize a regional sampling scheme built based on cells in the matrix *(regional métier based sampling)*.

The last 12 years of regional coordination meetings have been a slow but steady process improving coordination between MS. It is evident that two main elements have contributed considerably to the development and way the RCMs/RCGs are

working: the uptake of "the fleet activity matrix" *(later appendix IV in 2010/93/EU)* in the legislation and the implementation of the regional database. The "fleet activity matrix" is a comprehensive way to overview all the fishing activities in the region. It gave MS a common way to structure and identify fisheries/métiers and a generic way to name them. This allowed for regional overviews of fisheries and their importance in terms of catches, effort and value. A generic nomenclature also allowed for regional overviews of sampling coverage and relative contributions of sampling by different MS.

A common understanding and nomenclature gave the RCMs the possibility to work towards sampling plans on the regional scale but no effective means to do so. Several days of meeting time were spent just on simple overviews on regional fisheries as data was accessible through simple excel sheets. Even if MS had agreed on a generic nomenclature, there were always slight differences in how métiers/fisheries, fishing grounds, harbours and even species were expressed. This led to the uptake and implementation of the regional database for some regions (RCM NA, RCM NS&EA and RCM Baltic). The implementation of the regional database made the work in those RCMs far more effective as the meeting could analyse regional data instead of just compiling them. It also opened up a necessary discussion *(reflected in different recommendations from the RCM)* on harmonizing the coding of métiers/fisheries, harbours, areas and species across member states. The RCMs have worked intensively, together with MS, the RDB steering committee and ICES to establish reference lists for all these elements. This list must be as detailed as necessary in order to be able to answer all end users' needs *(in order to meet all the on-going regulations needs)* of a specific region, considering the fact that it is always easier to aggregate than to disaggregate the data.

An issue has been that in some cases, national métiers at level 7 have been defined, which could not be defined at level 6 (following the RCG list of agreed métiers). It needs to be ensured that it is possible to move across the levels in the métier hierarchy without compromising quality of the data *(i.e. being able to move from National Métier level 7 to EU Métier level 5 without any overlap)*.

In fact, this implies that some standardization and harmonization among different MS and institutes is needed when aggregating national level 7 métiers to the regionalized list of métiers agreed at DCF level 6 *(http://ices.dk/marine-data/Documents/RDB/RDB%20Metiers%20by%20fishing%20grounds.csv)*.
Harmonisation and standardisation are also needed for the procedure and rules used to define the métiers *(common approaches and reference tables following DCF standards)* in order to improve the interoperability and compatibility between data. This workshop is a first step to move in that direction and then **RCGs could be the bodies responsible for documenting this information at regional basis**.

For example, the mesh size ranges used for métier codification at level 6 were defined by the RCMs, based on the Regulation (EC) No 850/98. This was a very relevant step in order to achieve harmonization in the naming conventions, and allow data compilation (i.e. RDB) and coordination at a regional level. Nevertheless, this needs to be further discussed in RCGs if these mesh-size range does not meet some need of specific regulation, considering the fact that it is always easier to aggregate than to disaggregate the data.

It is also important to highlight that the concept of métiers is more scientific than regulatory. Métiers should be able to reflect the real behaviour of the fishery *(to be able to describe the extensive list of all the on-going métiers used in the region)* and to track trends in historical data. Names should change if the fishing behaviour

changes *(if a new métier appears)* and this should not necessarily be related to regulation. **It should be continued to be the responsibility of the RCGs to ensure consistency in the métier codification and to accept potential new métiers.**

RCGs could also be the best forum to discuss the proper use of métier and discuss/agree on advice/recommendations coming from other experts groups.

For example, though initially considered for sampling design *(DCF, 2009)*, ICES expert groups *(i.e. WKPICS, WGCATCH)* advise against considering métiers as sampling units. These expert groups recommend the use of probability-based sampling schemes[2] with sampling frames, primary sampling units and strata optimised to deliver the required estimates for species, fleets, métiers, fishing grounds or other variables of interest. Such schemes allow samples to be easily extrapolated to the target population using weighting factors based on inclusion-probabilities. For sampling on shore, sampling frames generally consist of sites and days (sites being ports or other access points). For sampling at sea, the frame is based on a list of vessels. This led to a less prescriptive Data Collection Regulation *(Commission Implementing Decision (EU) 2016/1251)* agreed during RCM/RCGs where this issue was extensively debated.

2 ToR 1: Review current algorithms and processes for allocating a trip to a métier based on transversal data

Until now, there has been no unified method and no common reference tables (to aggregate species into target species group or gear into métier level 4), agreed at EU level, to assign data into métiers, leaving some room for interpretation at the national level. This has slowed the development of a standard, generic EU approach, leading to continuing national differences in métier definitions within the same EU region *(Ulrich et al, 2012)*.

One of the purposes of this workshop was to improve this situation and to better achieve interoperability and compatibility between data sent by the different MSs. A first step to achieve this is to document the approach taken by each nation to assign métier to transversal data in order to highlight potential differences and find a way to reach some harmonisation. A short description of the method used in each country for each participating member states is given below.

2 The key advantages of a probability-based sampling scheme, with simple random sampling within strata, is that different types of fishing trips (gears used; areas fished etc.) within a sampling stratum will tend to occur in roughly the same proportion in the samples as in the fleet as a whole. This is an advantage if the fishing areas or gears used change unpredictably between years. The desired balance of sampling across métiers is achieved by adjusting sampling rates within vessel or port strata according to the expected distribution of métier activities of the vessels. These ICES expert groups advise against using the alternative and widely adopted sampling method of setting "quotas" for numbers of fishing trips or fish to sample within multiple, highly resolved and dynamic fleet activities *(e.g. EU Level-6 métiers)*. This method involves searching for specific types of trip to sample in order to meet a quota for a specified period of time, and consequently alters the selection probabilities for all other métiers in the sampling frame. This can lead to bias and reduced precision.

2.1 Belgium

All the information needed to allocate a trip to a métier, is provided in the electronic logbook. For every trip, the skipper enters the gear code, the mesh size and the target species code. The gear code is selected from a predefined list (corresponding with the Master Data register for fishing activity).The mesh size is provided as the exact number in mm. The species group the skipper intended to target is selected from a predefined list (e.g. pelagic, demersal, scallops etc.). The combination of the gear code, the target species group and the mesh size range that corresponds with the provided mesh size, defines the métier at level 6.

2.2 Denmark

The métiers are assigned to the transversal data (DFAD), which is a combination of sales notes (all trips), logbooks where mandatory and vessel register, using the unit trip-id and region. Species are classified into target species groups (CRU, DEF, MOL etc.), and the target species assemblage is found as the species group with the highest landed value per trip-id and region. Mixed target assemblage groups (MCD) are assigned based on expert knowledge.

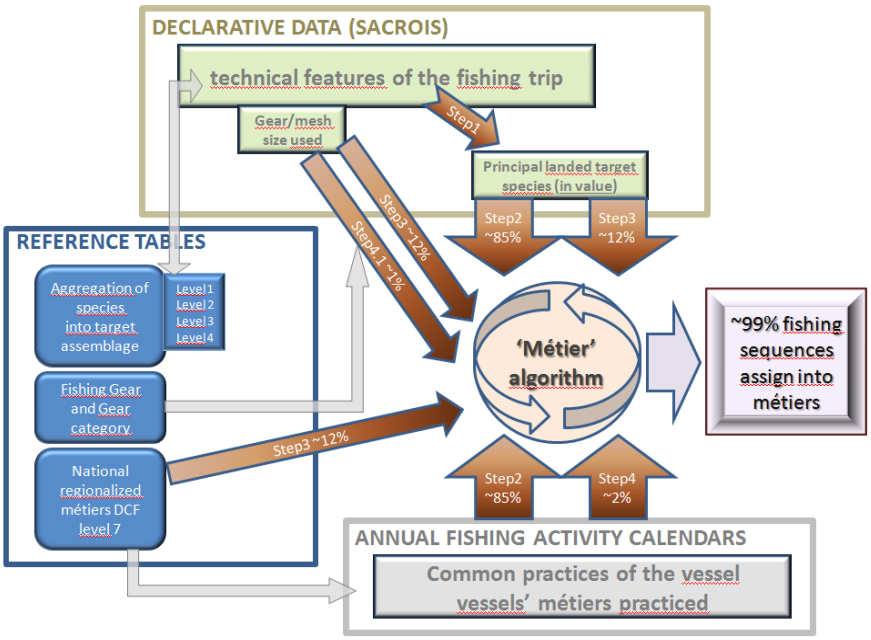
The métier definitions are stored in a lookup table with possible métiers, associated gears, region, subdivision, species group (CRU, DEF, MOL, CAT, SPF, LPF, ANA, FWS, DWS), mesh size range, start and end date. The lookup table also includes aggregated métier codes which is a “Merged level 6” which was previously used for the sampling program, and still used in estimation and input to ICES fleets as well as FDI domain, and the métier codes used for the ICES MixFish data call, which is similar to the Merged_level_6.

The transversal data are merged to the métier lookup table by gear, target species assemblage, region, subdivision, mesh size and date.

2.3 France (France Ifremer working document in Annex 4)

The métier is defined by fishing "sequence" *(aggregation of fishing operations)*. Each fishing "sequence" is determined by a fishing trip and a new sequence is calculated for any change of day or 'gear/mesh size/dimension'. A fishing sequence could thus aggregate different areas or different operations for which fishing was performed during the same combination of *"fishing trip*day*gear/mesh size/dimension"*. The 'Métier' algorithm assigns data into métier according to the following steps.

Flowchart of the French method used to assign data into métiers



For each fishing "sequence" (*"fishing trip*day*gear/mesh size/dimension"*), the principal target species or assemblage of species *(in value)* is calculated at the different level *(up and down)* of aggregation defined in the reference table of aggregation of species into target assemblage *(Step 1)*.

This are compared *(iterative process)* with the common practices of the fishermen *(outlined by the comprehensive collection of annual fishing activity calendars of the vessels)*. If there is a 'match', the métier corresponding is assigned to the fishing "sequence" *(regardless the gear declared) (Step 2)*. Priority is given to the principal landed target species or assemblage of species as it has been proved that it is the most discriminative factor to define the métier, taking also advantage to have access to the common practices of the fishermen. Furthermore, lots of inaccuracies or misreporting has been observed for the declared gear.

Otherwise, the combinations of the gear declared and the different level of target assemblage of species *(iterative process)* is compared with the national frame of reference of métiers defined by region *(by FAO area)* and if there is a 'match', the métier corresponding is then assigned to the fishing "sequence" *(Step 3)*. Additional steps include the test of 'fishing gear' codes linked with the declared gear in order to specify potential declared generic code *(e.g. SX- Seine nets (not specified))* or to avoid some misreporting, testing all the fishing gears belonging to the same fishing gear category.

For the remaining fishing "sequences", complementary steps are applied consisting of: *1)* compared the declared gear *(or gear' codes linked)* with those of the comprehensive list of métiers practiced by each vessel throughout the year *(regardless the landings profile of the fishing sequence, misreporting suspected)* or *2)* assigned the fishing activity calendar' métier of the *"vessel*month"* if there is only one *(Step 4)*. Finally, the remaining fishing "sequences" could then benefit from an expert analysis.

Best quality is given to métiers assigned in the first step *(mapping with the common practices of the fishermen)* when lower quality is given to métiers assigned in the following steps.

The 'Métier' algorithm is thus extensively based on the fishing activity calendars[3] providing an efficient tool to: *1)* taking into account possible misreporting *(fishing gear, species landed, ...)*, in particular to assess the reliability and, if necessary, re-evaluate or specify the declared fishing gear, *2)* better reflect the fisher' fishing strategy assigning the good aggregating level of target species or assemblage of species[4] and *3)* limit the list of possible métiers practiced by each vessel to a validated/appraised frame of references avoiding multiplication of métiers based mainly on a raw ordination of principal landed target species or assemblage of species and gear used.

Detail of the procedure applied can be found in annex 4, in the working document elaborated in order to contribute to the DCF métier workshop.

2.4 Germany

The allocation of fishing trips to a métier is done for the whole fishing fleet based on the available transversal data. It differs between large and small vessels:

- Large vessel (>8/10m total length) have a mandatory logbook: Gear, mesh size, area and species assemblage are taken from the logbooks. Nets are corrected if necessary (e.g. drift nets are not allowed in the Baltic Sea. If there is an entry for drift nets, it is changed, like GND -> GNS for example). The target species is defined by weight (no threshold, the species with the highest landing weight is used, discards or BMS are not taken into account), except for the fisheries on Nephrops (NEP) where the value of the landings is used instead to account for the economic importance relative to the catch weight. The target species assemblage is chosen based on the identified target species and, if necessary, by the species assemblage of the catch. The level 6 métier is defined by combining the information on the net, area and target assemblage.
- Small vessels (<8/10m total length) don't have a logbook and usually only report landings on a monthly basis. Métiers are defined by using the landings declaration (for species and area) and the registered gear from the European fleet register. This results in a single métier per month/landing declaration, not taking into account polyvalent trips that are using more than one gear or trips with gears that are not in the register (as it only contains up to two different gear types).

Métier assignment lists are not static and adjusted to current regulations, amendments and technical measures. If we have an observer on board or conduct self-sampling, we ask the fisher directly for the information and assign a level 6 métier directly.

2.5 Ireland

Métiers are assigned for trips with logbooks and sales notes using an output method of estimation based on weight. On receipt of the logbook data, an SQL script is applied. Initially, this script corrects the basic logbook data for obvious errors and typos such as ICES Division, DCF fishing ground, a corrected Gear type, a mesh size range, and vessel length. Then the data is grouped into species group on a trip level in preparation for determining the target assemblage. The declarations are then summed by species assemblage at the level of each

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3 One of the originalities of the Fisheries Information System (FIS) of Ifremer lies in the fleet monitoring procedure: a comprehensive collection of annual fishing activity calendars of the vessels aiming at characterizing the inactivity or activity of the vessels each month of the year and, in the latter case, the métiers practiced (use of a gear to target one or several species) and the main fishing areas *(Berthou et al. 2008).*

4 For example, a vessel could have a very opportunistic fishing strategy targeting all the demersal fish species (DEF) when another could target specific specie as Anglerfish (MNZ).

Trip/ICES_Division/Gear/Mesh combination. These species assemblage proportions are then ranked from highest to lowest. The fraction that these species grouping contribute to the Trip/ICES_Division/Gear/Mesh combination is then calculated. To identify the target species assemblage only the top 2 species groups by declared weight are used. If the proportion of the species group is greater than or equal to 50% then this species group defines the target species assemblage. When the top ranked assemblage's fraction is less than or equal to 50% there are a number of specific rules that are applied to cover the remainder of the trips. A métier is now generated by combining gear, target assemblage, and mesh range. The generated métier is now compared to a predefined list of nationally accepted métiers. If it does not correspond to the list, it is assessed by expert opinion for validity. Finally, specific national rules are used to decide which vessel's trips had selectivity device; these rules are based on auxiliary information and expert opinion. For trips with no logbooks and no sales notes, no métier is provided.

2.6 Italy

We have two data sources: sample survey and logbook data.

For sample survey, the métier is based on a group of trips. In fact, data collected from the sample survey refer to periods that include one or more trips. The métier is assigned based on the weight of the species caught with a specific gear and landed in the survey period. The sample data provide all the information we need (gear characteristics, species, weight and value for each species) to assign the métier to the single gear used in the sampled period. The sample survey is the only source of data for small vessels (<10m total length).

For logbook data instead, the métier is assigned based on the single trip.

In both cases, the algorithm that assigns the métier is based on the gear and the composition of the species caught with that gear, defined by weight. It works as follows:

For some gears (DRB, GTR, LLD, LLS, LTL, OTM, PTM, TBB, LA and MIS) the assignment of the métier is straightforward and does not require any elaboration on the composition of species.

In all other cases, the assignment of the métier depends on the presence of a discriminating species, or groups of species, versus the total of landings related to the single gear.

- For **OTB** the métier is defined on the basis of the relevance of the shrimps (*Aristaeomorpha foliacea* and *Aristeus antennatus*) (C_{gr}) on the total (C_T):

% DWS	**Métier**
$C_{gr} / C_T = 0$	OTB_DEF>=40_0_0
$0 < C_{gr} / C_T \leq 40$	OTB_MDD_>=40_0_0
$C_{gr} / C_T > 40$	OTB_DWS_>=40_0_0

  Thus, if there are no shrimps, the target is "Demersal species". If the shrimps are present, but less than 40%, the target is "Mixed". Finally, if the shrimps are more than 40%, the target is "Deep water".

- For **PS** the allocation of the target is based on the relevance of the large pelagic group (C_{LPF}) on the total (C_T) :

% LPF	**Métier**

$C_{LPF} / C_T \geq 50$	PS_LPF_0_0_0
$C_{LPF} / C_T < 50$	PS_SPF_>=14_0_0

- For **FYK**:

% CAT	**Métier**
$C_{CAT} / C_T \geq 30$	FYK_CAT_0_0_0
$C_{CAT} / C_T < 30$	FYK_DEF_0_0_0

- For **GNS:**

% SLP	**Métier**
$C_{SLP} / C_T \geq 50$	GNS_SLP_>=16_0_0
$C_{SLP} / C_T < 50$	GNS_DEF_>=16_0_0

- For **LHP-LHM**:

% CEP	**Métier**
$C_{CEP} / C_T \geq 50$	LHP_LHM_CEP_0_0_0
$C_{CEP} / C_T < 50$	LHP_LHM_FIF_0_0_0

- For **GND**:

% SPF	**Métier**
$C_{SPF} / C_T \geq 50$	GND_SPF_0_0_0
$C_{SPF} / C_T < 50$	GND_DEF_0_0_0

- For **FPO**:

% DEF	**Métier**
$C_{DEF} / C_T \geq 50$	FPO_DEF_0_0_0

$C_{DEF} / C_T < 50$	MIS_MIS_0_0_0

- For **SB-SV**:

% DEF	**Métier**
$C_{DEF} / C_T \geq 50$	SB_SV_DEF_0_0_0
$C_{DEF} / C_T < 50$	MIS_MIS_0_0_0

2.7 Lithuania

For fleet segments over 8 m length, overall data obtained from electronic or paper logbook data are the main source of information on fishing activities to define métiers. Primary data is checked by performed cross-checking, analyses and verifications through automated computerised algorithms and mechanisms on vessel monitoring systems, catch, effort and sales notes data and data related to the Community fishing fleet register as well as the verification of licences and fishing authorisations. A combination of the vessel length, gear, target species and fishing area is used to qualify the activities for each fishing operation. The percentage composition of landings for each species is calculated and ranked from highest to lowest. The target assemblage is defined based on the percentage composition of the top species combined by certain criteria and by landed weight. If the fraction of these species groups is more than fifty percent of the total then this group is used to define the target assemblage. If no species group fits this guideline then expert examines gears, fishing area, vessel's previous landings of similar trips and use knowledge to define the target assemblage. Mesh size range is aligned to regulation which has been applied to certain fishery or taking in consideration a mesh size used by fleet. During a year, a vessel usually practices more than one métier, in which it allocates a certain level of its fishing effort. During the trip, few fishing areas per métier might be registered. As selective devices are not declared, based on observation there is assumed that only to certain trawl with target species as a cod are attached the selective grids.

The boats less than 12 m length overall have a coastal activity and the degree of polyvalence are high. That means that ability to use several kinds of gears or to target different species during the trip are usual behaviour for that fishery. Small scale fleet practice wider range of métiers but mostly they belong only to that fleet segment. Fleet segments with vessel's length from 8 m to 12 m length overall are obliged to report fishing information in the paper logbooks. For the less than 8 m overall length fleet without logbooks, data for métier is derived from monthly declarative form with a summary of information derived from National logbooks. Targeting species as well as certain gears use a seasonal approach of that fishery. The percentage composition of landings of each trip for each species is calculated for vessels with logbook and for monthly effort for fleet segment without logbooks. Mesh size range are aligned to National legislation that has been established for that fishery.

Mostly métier definitions are static over time. However, there are some métiers where definitions have been slightly corrected in line with amendments to the technical measure regulation.

Issues highlighted include:

- No general concepts on the target species (or target assemblage) as a definition criterion.

- No clear instruction on mesh size range allocation for métier
- No clarification on target assemblage specification in case of efforts without landings
- No obligation to declare selective devices

2.8 Poland

Transversal data is accessible from the Ministry's system in a form of a report containing combined information from electronic logbooks (vessels >=12m), paper logbooks (vessels >=10m and <12m) and monthly catch reports (vessels <10m). Catches are not registered on a fishing operation level but are aggregated to a fishing day, gear, area and species. Selection device information is not available. Monthly catch reports data is very limited. It does not contain information on departure/arrival dates and mesh size. For the small-scale fleet, one fishing day is considered as one trip. Moreover, from 2017 boats with length less than 8m are not obliged to report their catches.

Transversal data analysis shows that there is a relatively small number of trips covering more than one area or fishing with more than one gear. Mixed fisheries has a minor share in the national fisheries. Therefore, a simplified approach was applied to identify the target assemblage. The method consists in determining the dominant combination of area, gear and species using catch weight. The information on the single species that was dominant in the catch is used to determine the mesh size in cases where it is missing or incorrect. The real intention of the fisher is not known, as it is not compulsory to register it in logbooks. However, it is registered by scientific observers during sampled trips.

The métier determination method is output based as it uses the information on the retained part of the catch from logbooks and other documents. National reference list of métiers is based on the RDB 'Fishing Activity Category' lookup table. For sampled trips, the métier is assigned using the information registered by scientific observers. Relevant regulations are used to identify the allowed gears and mesh size ranges.

Due to a relatively small number of trips covering more than one area or fishing with more than one gear, a simplified approach was applied to identify the target assemblage. The method consists in determining the dominant combination of area, gear and species using catch weight.

2.9 Portugal – mainland

2.9.1 Methodology for trip classification at métier level

The Portuguese fleet is highly polyvalent using multi-gear and targeting multiple species and this makes it very difficult to adopt a simple classification procedure using only transversal data. Moreover, several sources of information can provide different information with more or less input on the fishing activity, depending on vessels having or not logbook.

Regarding this, Portugal has developed two different methodologies in order to use the best information from all available sources to classify all the Portuguese fleet activity.

2.9.1.1 Vessels without electronic logbooks (SSCF)

The algorithm, based on a hierarchical tree decision schema, defines the gear used during the trip by the Licenses of reference year. The target assemblage is defined by the composition of the landing in terms of groups of species (% of each group). For classification purposes those groups of species were previously defined (DWS, SPF, DEF, CRU, etc.). The importance, in percentage, of the groups of species is calculated using either weight or value. Besides, since Portuguese fisheries are multigear-multispecies, we also have to consider several mixed

groups (MCD- Mixed crustaceans and demersal fish; MCF-Mixed cephalopods and demersal fish; MDD-Mixed demersal and deep-water species; MPD-Mixed pelagic and demersal fish) in the species assemblages.

2.9.1.2 Vessels with logbooks

The methodology used to infer métier at trip level is based on gear and catch composition information registered by the skipper on Logbook per fishing gear operation (for each haul). Using a SQL script, also based on a decision tree schema, each fishing gear operation (fgo) is classified into a métier level 5 according to the gear declared in the logbook and species assemblage classified according to the percentage in weight of each group of species in the catch composition.

Currently, only species (group of species) weight is being used as criteria in the métier classification because logbooks don´t have species value. The near future goal is to introduce species value estimated from the sales notes (average value of species by vessel and by region) and include them in the decision criteria. Groups of species (DWS, SPF, DEF, CRU, etc.) were identified by expert's knowledge to be used in métier classification analysis. Then, for trips with more than one fgo, the method applied to assign the representative métier for that whole trip was to consider the métier with greatest number of fgo's. When this approach doesn't give any valid classification for the trip, additional verifications of its activity are performed and other criteria are used, including, at the very last individual analysis:

a) In case of a tie in number of fgo's in the trip, it prevail the métier with higher catch weight.

b) If the tie persists the métier will be selected randomly by picking the first of the results list.

Other criteria like fishing days and value will then be tested with the same algorithm to look for improvements in the outputs and possible implementation.

The process of classifying trips performed by the Portuguese fleet has taken time to be developed but since it has been given a boost by manpower input in the last months along with the outputs of this métier workshop, the progress is promissory.

2.10 Spain (AZTI) (Spain IEO working document in Annex 3)

Most of the métiers for the industrial fleet are defined at level 6 DCF straight forward. The gear is collected from logbooks, usually DCF level 4 and the mesh size when needed is based on the regulation.

This is straightforward because these métiers are not mixed fisheries and gear and target species don´t need any special analysis. Some examples are:

PS_SPF_0_0_0. Purse seiner targeting only small pelagic species

LLS_DEF_0_0_0. Longlines targeting only demersal species.

Bottom trawlers fishing in the Bay of Biscay and in Scottish waters are fisheries that we consider as mixed fisheries and we have to split OTB DCF Level 4 to DCF Level 6. Gear level 4 comes from the logbooks and mesh size is defined based in the regulation. Then target species assemblage that would be used as indicators to define métiers at Level 6 are defined. In the case of Basque trawlers, we have 4 groups:

DEF (Demersal fishes): Based in the value of these species, our expert knowledge and skippers feedback we have consider some key species, which % in the catches will define this métier at level 6. The species are: *Lophius spp.*, *Merluccius merluccius*, *Lepidorhombus spp*, *Trisopterus spp* and *Scyliorhinus canicular*.

SPF (Small pelagic fish): Target species in this case are: *Trachurus trachurus* and *Scomber scombrus.*

MCF (Mixed cephalopods and Demersal): Target species are: *Loligo spp., Sepia spp., Dicentrarchus labrax and Mullus spp.*

MPD (Mixed pelagic and demersal): Target species are: The species defined for DEF and SPF group.

Then, based on the landings percentage of each of the groups, trips at métiers level 6 are defined. **The process is as follows and it is sequential!**

1) If >80% of the landings correspond to SPF group, then trip métier is defined as: **OTB_SPF_MESH SIZE** (based on regulation)
2) If >50-80<= of the landings correspond to SPF and DEF, then trip métiers is defined as: **OTB_MPD_MESH SIZE** (based on regulation)
3) If =>25% of the landings correspond to MCF species, then the trip métier is defined as: **OTB_MCF_MESH SIZE** (Based on regulation).
4) If >50% of the landings correspond to DEF groups and MCF group species landings are <25%, then the trip métier is defined as: **OTB_DEF_MESH SIZE** (Based on regulation).

As for the industrial fleet, the definition of most of the métiers are straightforward for the SSF. Main problem is with netters. In Spain it is forbidden to use more than one gear by trip but the information provided in the logbooks is at level 4. This means that in many cases skippers put Nets as gear used. Then we need to split these trips between gillnets and trammel nets in this case.

The process is similar to the bottom otter trawler industrial fleet. First, target species for Gillnets and Trammel nets are identified. In this case, only demersal species are target for netters. This is based on expert knowledge and skippers' feedback and based on trip-based analysis on these trips too.

Then if the percentage of landings of these target species for gillnets are higher than 50% the trip is considered at level 6 as Gillnetter: GNS_DEF_MESH SIZE (Based on regulation).

On the other hand, if the landings of the target species identified for trammel nets are higher than 50% the trip is considered as trammel net: **GTR_DEF_MESH SIZE** (Based on regulation)

Target species for Gillnets are: *Merluccius merluccius, Mullus spp., Trisopterus spp.* and *Triglidae* species.

Target species for Trammel nets are: *Lophius spp., Solea vulgaris, Rays and skates* and *Scorpaena spp.*

AZTI researchers also make interviews to skippers about their activity during the year and ask about the gears used and associated target species to them. With the information collected a monthly based calendar is obtained where information of gear and related target species by vessels are provided. This information is used to crosscheck with the information provided in the logbooks. For vessels that don´t have to fill in logbooks, the information reported in these interviews and monthly vessel calendar are used. Information obtained from our specific port sampling programme for these fisheries is another source of information used to validate the métiers defined.

2.11 Sweden

Vessels with logbooks(vessels >10 meters, and all vessels (no matter length) when using trawls or seines):

Sweden has an extended logbook where information is reported on haul/fishing operation level. Métiers are assigned by fishing operation.

Level 4:

Gears are derived from national gear codes entered in the logbook. OTB/OTT is determined from “number of gears” which is entered in the logbook by the fishermen.

Level 5:

For gears that are specific for a species/species group the target species assemblage is derived directly from the gear. For gears with multiple target species options the landings composition in weight is used to determine the target species assemblage. Each species is assigned to a species group and the dominant species group defines the target assemblage. The exception is the mixed Nephrops/demersal fish fishery in area IIIa where the proportion of Nephrops in the landings determine the target assemblage. (<10% Nephrops -> DEF, 10-<90% Nephrops -> MCD, >=90% -> CRU).

Level 6:

Sweden has some information on selective devices through national gear codes but the quality of the information for selective panels varies between gears. When it exists, it is included in the métier level 6. However, the list of accepted métiers from the RCGs are currently not allowing all mesh sizes in the Swedish selective panels to be included.

The métiers are checked against the list of accepted métiers by area. Métiers that fall outside the matrix are assigned the most similar accepted métier (expert knowledge).

Vessels without logbook:

Vessels not obliged to carry logbooks have to report by monthly fishing journals. The information is aggregated over the whole reporting period but each gear/mesh/area combination has to be reported separately. Individual trips cannot be identified. The métiers are assigned with the same method as for vessels carrying logbooks but over the whole reporting period for each record (gear/mesh/area combination) in the journal.

2.12 The Netherlands

Métier definitions are assigned to (electronic) logbook data, for each trips gear code and mesh size is provided. Subsequently, gear code in combination with mesh size, is the proxy for the target assemblage as the choice of gear type a priori defines the target. This follows the idea that the fishers define their target assemblage by choosing the appropriate gear. However, the proxy gear-mesh combination is not sufficient in describing differences between bottom trawler (OTB) métiers for demersal fish and a mix of fish-Nephrops. In this particular case, post identification is applied and landed catch weight is used: If the share of Nephrops is >30% of the total, it is defined as a mixed crustaceans/ demersal fish. The combination of the gear code, the target species group and the mesh size range that corresponds with the provided mesh size, defines the métier at level 6.

2.13 UK

The UK does not receive any logbook information regarding the intended fishing activity or target assemblage, as such a methodology was deduced to categorise the data based on catch profile. The data are initially cleaned. Gear codes are mapped to the DCF gear codes and species codes are mapped to species groupings akin to target assemblage codes. Landings values are converted to Euros. A dataset containing the voyage ID, DCF gear, species grouping, landed weight and landed value is passed to a function to set the target assemblage.

This process looks at the gear used and will set target assemblage based on a set of rules using either landed weights or values, with varying thresholds. Once the target assemblage is set a dataset containing the DCF gear, target assemblage, mesh size and area is passed to a function to set the métiers. The area fished is mapped to a region; this is used to test the validity of the assigned métier for that region. A lookup table is used to assign the métier code based on the gear, testing the mesh size against min and max ranges, target assemblage and the area where that métier is valid.

3 ToR 2 and 3: To understand and document the problems, issues and anomalies arising from métier calculation in different Member States. To provide standard guidelines for determining or allocating a trip to a métier or multiple métiers and how to aggregate the data.

This section describes problems and issues that workshop participants have encountered when assigning métiers to transversal data. Where possible a suggestion for best practices is made.

3.1 Métier definition level (trip/fishing operation/fishing sequence)

A question was raised about the level where the métier has to be determined. Three possibilities were identified: 1. by trip, 2. by fishing operation (i.e. haul for trawlers) or 3. by fishing sequence (aggregation of fishing operations). **The group agreed that during a fishing trip, fishermen can practice more than one métier and that should be taken into account**. Depending on the quality of data available, the métier workshop concluded that assignment of more than one métier to one fishing trip must be possible, especially when a vessel changes gear or mesh size during a fishing trip *(also when changing a fishing ground but this may be due only because of a métier codification issue, see below)*. The métier workshop agreed that the polyvalent fleet is a reality and it has to be sufficiently described. **The workshop agreed that a métier could be assigned on the fishing operation level if it is available but in order to avoid a multiplication of métiers it is advised that in case of possible increase of the number of métiers assigned a consolidation step could be performed at fishing sequence level, notably *"fishing trip*day*gear/mesh size/dimension"*[5].**

It is highlighted that fishermen could in some cases sum their fishing activity, performed with two different gears, into a single sequence *(and thus only one gear)* in their declarative forms. If data from one fishing sequence obviously results from the practice of two different fishing métiers by the vessel *(for example the target species are both fish and molluscs for trawlers/dredgers)* then the possibility to split data into two fishing sequences should be given. In this case expert knowledge and/or information on the vessel's common practices is essential combined with the examination of the second most landed target species or assemblage of species. Difficulties could arise to determine the part of the landings to assign to each of the sequences, especially for species potentially caught by both of the two gears/métiers.

However, assigning more than one métier to a fishing trip raises the following issues:

5 Each fishing "sequence" is determined by a fishing trip and a new sequence is calculated for any change of day or 'gear/mesh size/dimension'. A fishing "sequence" could thus aggregate different areas or different fishing operations for which fishing was performed during the same combination of "fishing trip*day*gear/mesh size/dimension".

1) For the raising procedure of biological variables, it is often necessary to assign only one métier to each fishing trip, as in many countries, vessel/trip constitutes a primary sampling unit in their sampling programs. In this case, a common documented method must be applied between MS to assign a 'unique' main métier to each fishing trip *(based, for example, on the % of catches/landings, % of fishing effort, etc.)*.

2) For the Fishing Days and Days at Sea variables, the principles established during two transversal variables workshops (Ribeiro et al. 2016) could be applied to split the fishing effort between the different métiers used during one fishing trip. However, it is still unclear how to handle the "number of fishing trips" variable, which is a mandatory information, requested in the RDB database. The trip could either be split into portions or counted separately for each métier. The group advised that for this variable, principles established during the second DCF workshop on transversal variables could be applied. The RDB requires an integer value for the number of trips so it has to be decided if the number has be to rounded to the nearest integer or the RDB format has to be altered to accept decimals.

3.2 Métier determination for trips covering more than one area

One of the métier assignment issues concerns trips covering more than one area where different but overlapping mesh size ranges are defined according to relevant regulations and frame of references associated. For example, in the Baltic Sea, two different métier codes are in use to describe sprat fishery depending on the area of fishing, i.e. OTM_SPF_16-31_0_0 applicable in subdivisions 22-27 and OTM_SPF_16-104_0_0 applicable in subdivisions 28-32.

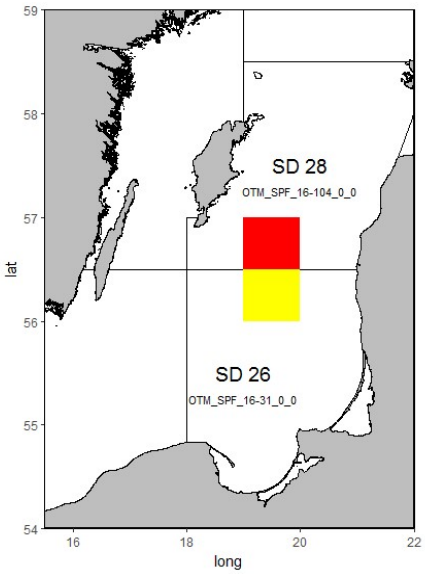

Figure 3.2.1: Example from the Baltic Sea of the same trip can end up in two different métier codes

In this case, a solution could be to determine the métier at the trip level and then identify the area where the most fishing took place. But it seems to be incorrect especially when reporting the landings statistics, indeed there are going to be records with ICES subdivisions that are inconsistent with the métier code assigned.

A better possible solution is to assign two métier codes *(one for each area)* to the fishing trip. This solution seems to be more acceptable but then the same questions as outlined above *(see métier definition level, section 3.1)* remain, especially for allocating *"number of fishing trips"* to each métier.

Moreover, the real question raised here is about the necessity to determine two different métiers for this type of fishing trip when it is due only because of a métier codification issue. **The group recommends that codification of métiers needs to be harmonised between areas in order to avoid such problems and to limit the number of métier codes** *(for example to have the two following codifications "OTM_SPF_16-31_0_0" and "OTM_SPF_31-104_0_0" for the subdivisions 28-32 of the Baltic sea will solve the issue)*. This could be agreed on a regional level by the relevant RCG which should be responsible for maintaining a list of allowed métiers for its region *(see section 1.3.3 about RCG' role)*. In fact, having a list of métiers determined by region is a good procedure to avoid multiplication of métiers but harmonization of the codification between regions *(especially for mesh-size ranges)* is also needed.

3.3 Fishing intention and target species assemblage

With a specific gear, a vessel may target different species, depending on the fisher's choice regarding fishing grounds, fishing season and gear attributes. An exploitation pattern is strongly related to the gear used and the gears have many variants related to the rigging or the mesh size. To express similarities of exploitation pattern in a given métier definition, a targeted (assemblage of) species is defined. For the sake of simplicity, targeted species are gathered into large groups like crustaceans (CRU), molluscs (MOL), demersal (DEF) etc.

In practice, target species assemblage is often estimated a posteriori, based on landing/logbook data of a fishing activity, e.g. trip, and, therefore, not necessarily reflect a fisher's choice or behaviour with a corresponding exploitation pattern. In addition, inconsistencies in métier definition occur, due to different threshold levels used between MS. For example, MS *x* will define a 50% of Nephrops in the landed catch as CRU (target assemblage of crustaceans), whereas MS *y* defines the target assemblage CRU at an 80% level.

Recording of target assemblage a priori to a trip would reflect the fishers choice and would diminish inconsistencies in métier definition between MS, caused by different threshold levels or different interpretations in a posteriori target assemblage calculations. Currently, there is no legislation in place requiring fishers to declare "fishing intention" *(e.g. in logbooks or declarative forms for under 10m' vessels)*. The target species is currently given in logbook from Belgium and the Netherlands and in Sweden, some gears are linked with métier and target species, but this is not common in EU MSs. **Therefore, it is recommended** *(as in the Nantes series of workshops)* **that information on "target species / assemblage of species" or "fishing intention" should be collected in official logbooks/declarative forms. This could be logged by fishermen before leaving the port in order to compute target assemblage of species and métier associated.** MS should then, continuously, assess the quality of the data obtained in this way.

Analysing the differences between recorded fishing intention and actual assemblage of landed/ caught species gives insight in the degree of inconsistencies caused by a posteriori target assemblage calculations based on different threshold levels would be a relevant exercise to perform.

The sections below go into more detail on definition of target species assemblage and methods for classifications (value vs. weight, input vs. output based methods) and the logic of classifications.

3.3.1 Definition of target species assemblage

Target assemblage is the variable, combined with the DCF level 4 *(gear type)*, which determine the DCF métier level 5 *(Anon., 2005)*, see section 1.3.1 above, and DCF regulations (*DCF, Reg. (EC) N° 949/2008, Commission Decision 2010/93/UE and*

Commission Decision 2016/1251/EU).) DCF level 5 is part of DCF level 6 and therefore commonly requested *(including mesh-size ranges and selective devices)*, for example in the main data calls *(ICES, RDB, FDI)*. The definition of target assemblage was discussed in detail during a series of meetings and workshops on the fleet and fishery description in Nantes *(EC, 2005, 2006a, 2006b)*. During these meetings the importance and difficulty in defining fisher behaviour was identified. Traditionally stock assessment focused on the resource, ignoring the fisher component, which is like omitting the predator from any predator-prey system *(Hilborn and Walters, 1992)*. However, ignoring fisher behaviour in models can result in a wrong perception of the stock dynamics of the fishery, leading to errors in assessment and inappropriate management *(Pelletier and Ferraris, 2000)*. Therefore, it has become imperative to be able to classify fisheries into sensible sized units that reflect fisher behaviour units *(ICES, 2003)*. Target assemblage, consistent with DCF level 5, is the variable used to define fisher behaviour by defining the fishers' intention *(describing the heterogeneity of fishing activity in both biological and economic terms, bio-economic variable)*.

During the series of Nantes workshops *(EC, 2005, 2006a, 2006b)* target assemblage was defined as being consistent with the FAO definition *(Garcia, 2009)*:

"Target species - Those species that are primarily sought by the fishermen in a particular fishery. The subject of directed fishing effort in a fishery. There may be primary as well as secondary target species"

This definition focuses on the fisher's intention to catch certain species/assemblages of species before they leave the port. These Nantes workshops identified that target assemblage was as a good approach to describe fisher behaviour at an international level by defining it simply into large groups like crustaceans, molluscs, benthic, demersal and pelagic fish *(EC, 2005, 2006a, 2006b)*. These simple aggregations allow us to aggregate at a European level, more precise strata could lead to implementation difficulty *(EC, 2005)*.

Conversely, the regulation previously defined target assemblage in an operational format:

"The retained part of the catch should be classified by target assemblage (crustaceans, demersal fish, etc.) at a trip level or at a fishing operation level when possible, and sorted by weight or by total value in the case of valuable species (e.g. Nephrops, shrimps). The target assemblage that comes up at the first position should be considered as the target assemblage to be reported in the matrix."

However, as noted by the Nantes workshops, this post hoc allocation can create serious problems in the estimation of fisher intent *(EC, 2006a)*. There is much discussion in the literature as to how target assemblage/ fisher intent should be calculated. Marchal *(2008)* conducted an extensive analysis on the impact of variation in the calculation of target assemblage. Marchal *(2008)* stated that target assemblage should reflect the fishing intention, e.g. the species targeted, the area visited, and the gear used, at the start of a fishing trip. He compared the impact of determining target assemblage and *(consequently métier)* from input and output based methods. Marchal demonstrated that overall, grouping métiers as combinations of gear and a priori target species, at the most disaggregated level, generally appears to be the most appropriate typology, suggesting that initiatives to collect information on fishing intention before a fishing trip *(e.g. target species)*, which cannot currently be accessed directly from logbooks, should be encouraged *(Marchal, 2008)*. This is also stated in the Nantes series of workshops, where it is recommended that target

assemblage be added to the logbooks *(EC, 2005, 2006a, 2006b)*. 10 years since Marchals' key paper and there is still a need for clarity within the regulation on the definition of this variable. This is evidenced by the variance of methods used by MS to estimate target assemblage *(Table 3.3.2.1)*. And due to previous definition of target assemblage within the DCF *(Anon., 2005)* we have lost sight of the original intention and ultimate utility of the variable target assemblage. The confusion between target species and (multi) species composition in the catch is everlasting *(EC, 2006b)*. The reason is that the second is easily accessible through declarative forms (logbooks, sales notes, landing declarations) and the first is much more difficult to estimate, moreover at the population level *(EC, 2006b)*.

3.3.2 Methods for classifying target species assemblage

There are a number of methods available for MS to determine fisher intent if it is not available directly through logbooks or other sources. Each of these methods has its advantages and disadvantages which are summarised in the paragraphs below and the flowchart *(see section 5)*.

3.3.2.1 Metric: Value versus weight

There has been much debate in the literature on appropriate metrics for defining métiers either landed weight and/or first sale value. Weight often is chosen if accurate values of first sale are not readily available *(Davie and Lordan, 2011)*. Also if management was primarily focused on maintaining biological and ecological imperatives, catch weight is a more relevant metric than value *(Davie and Lordan, 2011)*.

However, it is **the recommendation of this group** that if target assemblage is defined as describing the fisher intent then **value is the metric that should be used**, as fisheries are conducted for economic gain. Likewise, when species with a low weight relative the value is the real target, then value is a better metric. Finally, the use of value as the metric for target assemblage would help to avoid the complication created by the implementation of the landings obligation, where potentially large weights of low economic value could affect any post classification system based solely on weight, resulting in incorrect definition of fishing intention. Despite this, there might be some cases where a combination of value and weight should be used. For example, purse seiners targeting small pelagic fish can catch a school of the target species but if some other valuable species are caught in less weight the output of the trip can be conditioned by the more valuable species although it was not the original target. A combination of the two criteria should be used in these cases.

There are however some important points when considering the use of value. Unlike weight, value is a metric which is derived from a number of sources. The calculation of which must be considered to fluctuate in space and time, where country, region and month have impact on the value *(Branch et al., 2006)*. For some countries sales notes are not always available throughout the year, for all countries or for all the vessels *(direct sales /sales out the auction market)* therefore it would be important to document the proportion of trips lacking value and the procedure used to estimate it *(e.g. average price calculation methodology to fill in the missing data)*. MS must then make efforts to document the algorithms used and bias produced in determining these values.

3.3.2.2 System of estimation: Input versus output

As described in detail by Marchal *(2008)* there are three main approaches for defining métier: input-based, output-based and combined methods.

Input-based methods make use of existing records of the technical features of fishing trips, which are typically available in fishers' logbooks, e.g. gear and mesh size used, season *(e.g. Marchal and Andersen, 2006; Ulrich et al., 2001)* or build on direct interviews with stakeholders *(Christensen and Raakjær, 2006; Neis et al., 1999)*.

Output-based methods assume that catch profiles perfectly reflect fishing intention. The simplest approach consists of selecting the fishing trips where a certain catch proportion *(in weight or value)* of selected key species is exceeded. Each set of fishing trips discriminated by this approach may then be drawn into a métier category *(Biseau, 1998)*. Another approaches involve multivariate analyses of catch profiles, then grouping fishing trips of similar catch profiles into métiers *(Deporte et al., 2012; Holley and Marchal, 2004; Lewy and Vinther, 1994)*.

Finally combined methods categorize métiers by clustering catch profiles *(outputs)*, then relating these clusters to fishing trip characteristics *(inputs)* using multivariate analysis *(Pelletier and Ferraris, 2000; Ulrich and Andersen, 2004)*.

Both methods, input- and output-based, have benefits and limitations. Collecting fisher intention from interviews *(France, Spain)* and pre-trip logbook entries *(Belgium)* are valuable sources of data; however, they can be time consuming and have to be qualified. Whereas methods based on catch profiles are highly flawed as they are often based on landings only and completely ignore the discard proportion. Additionally, species do not always have the same temporal and spatial dynamics therefore the outcome of a fishing activity may not reflect initial intention *(Marchal, 2008)*. Therefore, whichever method is used it must be augmented with expert knowledge (in particular a comprehensive knowledge of the fishing activity and fishing dynamics on-going in the region). To develop and improve expert knowledge specific questionnaires could be handed around or there could be taken advantage of on-going observer' program. However, Marchal *(2008)* analysis demonstrated that grouping métiers as combinations of gear and a priori target species, at the most disaggregated level, generally appears to be the most appropriate typology, suggesting that initiatives to collect information on fishing intention before a fishing trip *(e.g. target species)*, which cannot currently be accessed directly from logbooks, should be encouraged.

The development of annual fishing calendars is recommended by this group as it gives an annual vessel-based overview of the fishing activity. This calendar would provide a method for identifying fisher intent before they leave port and a method of consolidating data at a vessel level by showing métiers that may be mislabelled and not matching with the calendar and by avoiding multiplication of métiers (possibly determined by a simple quantitative method based on raw ordination of species combined with gear used) showing the fishers common practices. This will also facilitate the assignment of the good aggregating level of target species or assemblage of species by vessel (For example, a vessel could have a very opportunistic fishing strategy targeting all the demersal fish species (DEF) when another could have a more specific fishing strategy targeting a specific species as Anglerfish (MNZ)).

3.3.2.3 Logic of classification: flowchart and tables

Given the dynamic nature of fisher behaviour and the multivariate form of the data used, it is understandable that MS have developed a variety of different algorithms to determine target assemblage *(Table 3.3.2.1)*. These algorithms *(decision tree)* are often and should be based on expert knowledge of a MS fishery and are not required to be standardised across Europe. However, to ensure that it is possible to aggregate and use these data at a European level there must be some harmonising of the logic and thresholds applied to determine target assemblage at DCF level 5. This group has produced a flowchart *(see section 5)* to frame and guide this classification process and working documents (see annexes) on the algorithms used by some countries to determine this. Finally, a table of the MS specific logic and typical outcome of species and group classification has been produced *(see section 4)*. It should be noted that this table does not reflect the biology of the species but the types of fisheries and gears that they are targeted with and within specific MS *(i.e discriminant species which could differ from one gear to another)*. Sometimes, complementary species could be more important than principal landed species to reflect the fisher intent. Many member states use a further classification system of métier level 7 to classify based on nationally specific species grouping or species biological requirements.

Recommendations:

i) **Clear definition:** There need to be a clear description of target species assemblage, which defines target assemblage as a fishing intention.
ii) **Value as a metric:** This group recommends that value be used as the metric to define métiers and fisher intention. There are however a number of instances where weight must also be considered.
iii) **Documentation of logic:** There is a requirement to document the logic applied by MS to determine the target assemblage. This documentation will provide a road map towards harmonising data across MS, ensuring possible aggregation and analysis at a European level *(within report reference, flow chart and logic)*.
iv) **Input on declarative form for fisher intent:** As in the Nantes series of workshops, it is recommended that target assemblage is logged by fishermen, in the declarative form before leaving the port. And that MS continue to assess the quality of this data.
v) **Testing and development:** Fisheries and fisher behaviour are in a constant state of evolution, therefore métier typologies and algorithms for allocation of these should reflect this development. A framework for multivariate analysis of has been developed Pelletier & Ferris *(2000)* and further outlined by Ulrich & Andersen *(2004)* and SGDFF *(ICES, 2003)*, and implemented in many other studies *(e.g. Deporte et al., 2012, Davie and Lordan, 2011; Holley and Marchal, 2004; Mateo et al., 2017)* . This framework combines the use of quantitative multivariate analysis of retained catch data with qualitative expert knowledge, avoiding prior assumptions on homogenous groupings. Providing a method of visualise groupings and trends in fisher behaviour, therefore providing a tool to develop or validate algorithms of allocation.

Table 3.3.2.1 Summary of the data source, metric and methods that MS use to define target species assemblage.

Member State	Metric	Method
Ireland	Weight	Output method – based on landings profiles, target

		assemblage based on the dominant (>50%) species group on the catch profile of a métier.
Netherlands	Gear type – mesh size combination	Gear type in combination with mesh size, is the proxy for the target assemblage as the gear type a priori defines the target. This is the way it works for the fishermen as well. They define their target assemblage, chose the appropriate gear. However, the proxy gear-mesh combination is not sufficient in describing differences between bottom trawler (OTB) métiers for demersal fish and a mix of fish-Nephrops. In this particular case, catch weight is used: If the share of Nephrops is >30% of the total, it is defined as a mixed crustaceans/demersal fish.
Sweden	National gear codes (input method), landed weight (output method)	Combination of input and output method: Some gears are specific for a species/target assemblage and for those the target is assigned directly from the gear (input). For other gears the dominant species group in landed weight defines the target assemblage. Exception: Mixed Nephrops/demersal trawls fisheries in IIIa where predefined thresholds (in landed weight) for the proportion of Nephrops define the target (<10% Nephrops =DEF, 10-<90% Nephrops=MCD, >=90% Nephrops =CRU).
UK	Combination of gears, weights and values and varying thresholds.	After an initial classification based on gears, recorded logbook species are mapped to a species grouping, these refer to the target assemblage codes as described in the regulation (DCF/DGMAP).
Belgium	-	All the information needed to allocate a trip to a métier, is provided in the electronic logbook. The species group the skipper is intended to target is selected from a predefined list (e.g. pelagic, demersal, scallops etc.).
Portugal	Weight and/or Value	<u>Output methods:</u> Sales notes: Value or Weight of dominant species (> 70%) in landings profiles (vessels with no logbooks); Logbooks: Weight of dominant species (>70%) declared in logbooks. In the near future, we expect to use mean value to include in this analysis. The threshold (70%) may change according to expert's knowledge on gears and species characteristics.
Spain (AZTI)	Weight based, using some species considered as target due to their value and expert knowledge. These species	Target assemblage is defined by the mentioned target species that reflects the fishing intention. Taking into account the catch profile of the trip, some thresholds in weight % are applied to those target species. Based on these, a sequential process is carried out (see AZTI template ToR 2) to define the métiers. These process is specific for mixed fisheries. In AZTI´s

	reflect the fishing intention.	case trawlers and Netters. Rest of the métiers are straightforward.
Denmark	Value	Species are classified into species groups, and the value of landings summed by trip and region. The target assemblage group is based on the dominant species group.
Poland	Weight	Due to a relatively small number of trips with more than one gear or performing mixed fisheries, a simplified approach was applied to identify the target assemblage. The method consists in determining the dominant combination of area, gear and species using catch weight. The real intention of the fisher is not known, as it is not compulsory to register it in logbooks. However, it is registered by scientific observers during sampled trips.
Lithuania	Weight	Output method – based on landings profiles, target assemblage based on the dominant (>50%) species group on the catch profile of a métier.
France	Value combined with common practices of the vessel and/or gear/mesh size used/declared	Combined approach based on principal landed species or assemblage of species *(in value, iterative process taking into account different level of aggregation)* compared with the common practices of the vessels outlined in their fishing activity calendars and sometimes the gear/mesh size used/declared.
Germany	Weight / Value	Based on landings weight reported in the landing declaration. Target species is determined by the highest weight (no threshold) and assigned to its target assemblage afterwards. Discards and BMS catches are not taken into account. Exception: In case of Nephrops (NEP) catches, the target species is determined by value instead of weight.

3.4 Trips with no catches

The Métier workshop agreed that the existence of trips without any catches is a reality especially for some specific gears *(e.g. purse seine)* or métiers *(e.g. hand lines for large pelagic fishes)*. Trips without any catches could also be due to accidents with gears *(i.e. untied cod-end)* or catch damaged by predators *(i.e. seals)*. If the method to assign métiers is mainly based on landings profile calculation *(output-based approach)* then difficulties could arise to assign these fishing trips into métiers. For these type of fishing trips, expert' knowledge and/or information on the vessel' common practices *(vessel fishing strategy)* become even more essential to be able to assign a good quality métier *(either than MIS_MIS)*. In fact, in this case, there are no possibility to assess the fishing intention of the fisherman *(estimate the métier, the fishing activity of the vessel)* based on the landings profile. **To assign métier into data in this case, MS expert could take into account area and period concerned for example. Previous trips *(with similar effort and gear)* and/or the vessel's usual behaviour/common practices could also be considered.**

This issue is also linked to the 50 kg threshold, which applies for logbooks: *"All quantities of each species caught and kept on board above 50 kg of live-weight equivalent shall be*

recorded. The 50 kg threshold shall apply as soon as catches of a species exceed 50 kg." (EC, 2015, (EU) 2015/1962). Again, a method to assign métier mainly based on landings profile calculation could be affected by such threshold especially for the small-scale fleet and in this case expert' knowledge and/or information on the vessel's common practices become even more essential to be able to assign a good quality métier.

The same problems may appear for MSs applying an algorithm to improve declarative data *(i.e. mainly logbooks)* by linking them with other data available, especially sales note. For example, when a sales note combine landings from two fishing trips together, then the algorithm used must be well defined to allocate the right landings to each trip in order to calculate the real species group composition of each of the trips studied and then to assess the 'right' métier conducted during the fishing trip.

3.5 Selective device information

The last part of the métier level 6 code aims to describe selectivity devices. The selective devices affect the catch compositions, and a purpose of them are to change the discards of a fishery. In some cases, there can be several different legal selective devices within the same métier and area (e.g. Kattegat). In these cases, it is important to be able to distinguish the métiers because of the differences in discards. Presently codes are available for panel and grid and the mesh size of the panel/the space between the bars of the grid. However, this information is sometimes difficult to interpret at the moment. Not all countries have access to information on selective devices in the logbooks and even if the information exists, it is often considered unreliable and is therefore not used. With the current métier code system it is not possible to distinguish between a gear with no selective device and a gear with no information about selective devices since there is no available code to indicate that the information is missing; the code “0_0” could indicate either of those situations. In order to interpret the selective device information at métier level 6 correctly it would be necessary to introduce a code to indicate that the selective device is unknown.

Finally, countries that have good information on selective devices have a need for new codes to describe newly developed selective devices or combinations of more than one selective device.

3.6 Small-scale fleet

The sections below describe métier issues related to the small-scale fleet. First describing the small-scale fleet definition and main issues with assigning métiers. Then looking at two types of census approaches: one mainly based on sales notes and another mainly based on adapted declarative forms. A sampling approach is also described and the section is finalized with other issues related to the small-scale fleet.

3.6.1 Small-Scale Fleet, definition, specificities and main difficulties to assign SSF data into métiers

There is no single harmonised definition of Small-Scale Fisheries (SSF), as any definition used is determined by the end-user needs such as for stock assessment, marine spatial planning, socio-economic studies, marine strategy framework directive (MSFD), marine protected areas (MPA), management regulation texts, etc. *(2015 & 2016, ICES Working Group on Commercial Catches (WGCATCH)).*

Recently, PGECON SSF DCF subgroup workshop (*2017, PGECON SSF DCF workshop)* discussed the issue relating to the **definition of small-scale fleet for data collection purposes**. Given the data collection issues *(lack of legal basis for direct reporting of activity using EU logbooks for less than 10m vessels -8m in Baltic and*

no VMS obligation for less than 12m) and in light of what exactly the terms 'Small-scale fleet' or 'Coastal fleet' refers to varies across the range of end-users, this workshop agreed it was more precise to refer to vessels with and without logbooks, or vessels with or without VMS data as the major difference in situations for the SSF is related to the sources of information available. The group agreed, in particular, that, less than 12 meters' vessels using active or passive gears are facing the same issues related to data collection and calculation of fishing activity variables. Consequently, the group agreed that, for data collection purposes, SSF could not refer to only vessels using passive gears and has to include also small vessels using active gears. This part of the fleet could be assessed as a data poor fleet segment which clarifies the fact that there are specific data collection issues related to these vessels that do not apply to the large-scale fleet (for example, as well as not being legally required, the EU logbook format is not suitable for these vessels). It is clearer then **to refer to fleet segments by vessel length (LOA) ranges (<10m, 10-12m and >=12m, under-8m in Baltic Sea)**; this view is also in line with the view adopted in previous workshops *(2013 Nantes DCF SSF workshop, 2015 & 2016 ICES Working Group on Commercial Catches (WGCATCH)).*

This generates some specific difficulties to assign data into métiers depending on the data sources and quality available by MS. Moreover, diversity and specificities of SSF have been extensively highlighted in previous works *(EC Study N° FISH/2005/10, 2013, Nantes DCF SSF workshop, 2017, PGECON SSF workshop)* and, among others, it has been concluded that SSF are diverse, multi-gear, multi-species, geographically widespread fleet, involving full time, seasonal or part-time activities into coastal areas, specific features which further complicates the determination of the métiers for it. In particular, SSF present a great polyvalence in terms of number of gears and target species (polyvalent fleet) during the year and sometimes even during a single fishing trip. Furthermore, SSF present sometimes a high rate of direct sales, which means that determinant species (the ones with high value) may not be declared in sales notes and, depending on the quality of the data available, may not be reachable to determine the métiers which must be assessed based on the other species.

However, previous workshops outlined the fact that the <10m and 10–12m vessels ranked highest in importance in nearly all countries in terms of number of vessels and consequently in terms of number of trips which highlight the importance to solve these issues in order to be able to assign SSF fishing data into métiers, avoiding the use of the "MIS_MIS_0_0_0" codifications of métiers. Supporting this goal, the group stresses the need to improve data collection and quality on this part of the fleet in order to avoid such classification. In particular, use of complementary data (e.g. licences register used in Portugal), development of an expert' knowledge or additional data build on direct interviews with stakeholders (e.g. fishing activity calendars in France) are encouraged.

During the workshop, several MS' approaches to assign SSF fishing data into métiers have been described. They are depending mostly on the approach used to collect fishing data and monitor SSF. Recently, the PGECON workshop (*2017, PGECON SSF DCF workshop)* concluded that there are two different types of data collection methodologies currently applied in EU to calculate fishing activity estimates of vessels less than 10/12 meters: 1) Census approach and 2) Sampling approach. Among the census approach used, distinction could be made between the ones based mainly on sales notes and the other based mainly on adapted declarative forms (sometimes combined with sales note data). The main issues related to each of them are described hereunder.

3.6.2 Census approach based mainly on sales notes:

For MS using census approach based mainly on sales notes to estimate SSF fishing activities, many issues raised to assign data into métier. Sales notes give information on vessel ID, date, port of landing, landings quantity and value by species; but information on gear, mesh size, gear dimension and spatial distribution are missing. **Therefore, métiers must be mainly determined based on the landings profile of the sale (often assumed as a fishing trip) and on the analysis of dominant/discriminant species**. Furthermore, sometimes high value species are not sold through auction markets (direct sales, see above) and then not available to determine the métier that has to be assessed based on the other species. **In this case, expert' knowledge (developed based on previous studies or sampling data) and/or information on the vessel's common practices (vessel fishing strategy) become even more essential to be able to assign a good quality métier (other than MIS_MIS).** Again, in this case, documentation of the logic applied by MS to determine the métier is essential in order to harmonize data across MS, ensuring possible aggregation and analysis at a European level. The use of complementary data to improve the quality of "métier" assigned is also encouraged at this step (e.g. list of vessels' licenses, restricting possible gears used by vessel, it become even easier for vessel with only one license). **Furthermore, direct interviews with stakeholders on a sample of vessels or the complete fleet constitute also a good way to improve the quality of métier assigned (e.g. fishing activity calendars survey, fishermen' questionnaires) and to constitute a learning base in order to improve the algorithm applied.**

Another issue is linked with the high degree of polyvalence of the SSF. In particular, it is a common practice for SSF to be multi-gears vessels and also to use more than one gear during the same trip. Without any information on the gear used, it could be very difficult to assess the métier by sale in particular for multi-gears vessels. Some discriminant species could help but sometimes it becomes impossible to determine which of the gear has been used. In this case, the two potentially used gears/métiers have to be assigned to the sale considered. Difficulties arise then to determine the part of the landings to assign to each of the gear especially for species potentially caught by the two gears *(overlapping)*.

For this specific case, the group agreed that, as far as possible, the expert/algorithm should try to create two or more sequences for the same fishing trip, assigning a single métier to each of them and using practical assumptions (could be as simple as assigning half of the landings of a species to each of the sequence created) to determine the part of the landings to be assigned to each of the sequences. Nevertheless, for SSF netters, which commonly used trammel net and gillnet, the group advises for the use of a new codes of métiers assuming that this is a usual practice and there is no 'good' way to distinguish the two sequences well, the code "GTN - Combined gillnets-trammel nets" could be the one to be used (already defined by FAO[6]).

6 *List of revisions and correspondence between ISSCGG (1980) and ISSCFG Rev.1 (2013) (former ANNEX M.III), http://www.fao.org/3/a-bt986e.pdf*

3.6.3 Census approach based mainly on adapted declarative forms

For MS using a census approach based mainly on adapted declarative forms to estimate SSF fishing activities (sometimes combined with sales notes data), issues to assign data into métier are similar to the ones described above for vessels carrying logbooks. Specific issues are raised concerning the format of the declarative forms and the quality/completeness of the data obtained in this way.

In particular, data are often not compiled by fishing trip but by day or month (Monthly/Daily reports) and could then aggregate several fishing trips into one single declaration. The group agreed that in this case flexibility may be allowed to assess métier at day or month' scale and that databases *(e.g. RDB, JRC)* should be developed in order to be able to incorporate such type of data.

Same flexibility may be allowed also in the metric (weight or value) to be used to assess the métier as this fleet present a large part of direct sales and then value could be difficult to estimate.

The group agreed also that the assessment of the quality and the coverage/completeness of the SSF data reached by this type of data collection require specific attention by MS in order to improve its quality. In particular, a specific check will be advised on vessels without any information or with part-time information to verify the completeness of their data and assess the reality of their inactivity.

Finally, and as for vessels carrying logbooks, the group encouraged development of declarative forms giving the possibility that target assemblage is also logged by fishermen, in the declarative form before leaving the port.

3.6.4 Sampling approach

For MS using a sampling approach to estimate SSF fishing activities, the group advised to survey the métier directly in the questionnaires. It should be noted that this procedure will then have the benefit to provide the métiers as given by the fisherman himself throughout the year.

3.6.5 Other considerations

Finally the group advised that databases (e.g. RDB, JRC) should be developed in order to take into account the specific features of SSF (e.g. data aggregated at day or month' scale) and should also accept data reported with missing métier information (e.g. MIS_MIS_0_0_0) in order to evaluate the proportion of data affected and find solutions/procedures to solve the issue.

3.7 Different criteria for defining the same métier

As stated in section 3.3.2.3, MS have developed a variety of different algorithms to determine target assemblage and define their métiers. These algorithms should be based on expert knowledge of a MS fishery and are not necessarily required to be standardised across Europe. However the process to derive metiers should be harmonised as far as possible.

Consequently, the same métier in the same area defined by two different MS may be based on different fishing behaviour based on different rules applied (table 3.7.1 below, use of different

target species, different threshold). The same code can therefore be used for fisheries targeting different species which all fall in the same group (e.g. different demersal species), or for fisheries fishing at different locations in the same fishing ground (e.g. different locations in the Bay of Biscay), when different threshold could be used to define the target assemblage. In order to ensure comparability of the métiers, a possibility of aggregation and use of its data at a European level there must be some harmonizing of the logic applied to determine target assemblage (see figure 5.1 in section 5, flowchart developed by this group) and more detailed analysis should be done, case by case, based on common rules applied as well as detailed description of the métiers, which can be used in the template developed for RCGs, see section 6. Then it would be possible to assess to what extent the métiers could be merged.

Table 3.7.1: Assignment of the same métiers using different methods

	Bay of Biscay
	OTB_DEF_>=70, OTB_SPF_>=70, OTB_CEP_>=70, OTB_CRU_>=70, OTB_MOL_>=70, OTB_MPD_>=70, OTB_MCF_>=70
SPAIN (AZTI)	Bottom Otter Trawlers métiers are defined at level 6 in a sequential process using key target species and predefined thresholds. Key target species: **DEF (Demersal fishes):** *Lophius spp., Merluccius merluccius, Lepidorhombus spp, Trisopterus spp and Scyliorhinus canicular.* **SPF (Small pelagic fish):** *Target species in this case are: Trachurus trachurus and Scomber scombrus.* **MCF (Mixed cephalopods and Demersal):** *Target species are: Loligo spp., Sepia spp., Dicentrarchus labrax and Mullus spp.* Sequential process: 1) If >80% of the landings in SPF group → OTB_SPF_>=70 2) If >50-80<= of the landings in SPF and DEF groups → OTB_MPD_>=70 3) If =>25% of the landings in MCF group -> OTB_MCF_>=70 4) If >50% of the landings in DEF groups and MCF group species landings are <25% -> OTB_DEF_>=70
FRANCE	Bottom Otter Trawlers métiers are defined at level 6 in a iterative process using key target species and common practices of the vessels outlined by the comprehensive collection of their annual fishing activity calendars. As the métiers are defined at the national DCF level 7 and by fishing sequence (*"fishing trip*day*gear/mesh size/dimension"),* France's algorithm do not assign mixed métiers into data (no MPD or MCF target assemblage calculated). Possibility is also given to assign two different métiers to one unique fishing trip if target species or assemblage of species differs from one fishing sequence to another and if the vessel usually practice two different Bottom Otter Trawl métiers. Key target species or assemblage of species **DEF (Demersal fishes):** *Dicentrarchus spp, Zeus faber, Lophius spp, Argyrosomus regius, Mullus spp, Soleidae, Merlangius merlangus, Sparidae, Pleuronectiformes, Osteichthyes.* **SPF (Small pelagic fish):** *Scombridae* **CEP (Cephalopods):** *Sepiidae, Loliginidae, Ommastrephidae*

	CRU (Crustacean): *Nephrops norvegicus* **MOL (Molluscs):** *Aequipecten opercularis* The iterative process test for each fishing "sequence", the principal (>=50%) target species or assemblage of species (in value) at the different level (up and down) of aggregation defined in the reference table of aggregation of species into target assemblage and then there are compared (iterative process) with the common practices of the fishermen. If there is a 'match', the métier corresponding is assigned to the fishing "sequence".

3.8 Use of métiers to answer data calls

Despite the effort made by all countries to effectively assign each trip to a métier level 6, these métiers are often aggregated in order to answer to the different data calls. When the information is requested at higher aggregation levels (level 5, level 4, level 3), it can be obtained just by summing up the data coming from more disaggregated levels. Métiers at the most detailed level can be seen as the building blocks to be able to answer the data calls and métier definition should not be driven by the codification asked in these data calls.

However, other ways of aggregating métiers defined at the most detailed level can be also problematic. Taking as an example the ICES data call, métier aggregation is often made to fit the data into the required format, because the list of allowed métiers for each stock is restricted, but also to simplify the data by aggregating data into dominant métiers and by using the miscellaneous group (MIS_MIS) for data accounting for less than 10 % of catches and effort. By doing so, it can happen that one country aggregates a métier into MIS_MIS, or into a dominant métier, and another country leaves it disaggregated. Thus, data are not comparable.

Although in the ICES data call it is specifically stated that the aggregations into dominant métiers should be clearly stated in the InfoStockCoordinator information text, and that the use of the miscellaneous group should be minimized; how the aggregation is made and documented is very much depending on the willingness of each Country/Institute. Usually, the aggregation is based on expert knowledge, made ad-hoc and is not well enough documented. Consequently, the information is delivered by métier level 6 (the name of the dominant métier is usually maintained), but these métiers are in reality a mixture, whose real composition data users are not aware. This situation hinders the ability to effectively model the fishery.

This issue can be illustrated by an example: In a way to simplify the number of métiers provided to the ICES assessment working groups, for some métiers, England aggregates several métiers into a single métier – e.g. the OTB_DEF_70-99_0_0_all results from aggregating other *similar* métiers (table 3.9.1), and are based on *ad-hoc* decisions. This is relevant because 1) Other countries might use different criteria to aggregate the métiers to respond to The ICES data calls; and 2) the OTB_DEF_70-99_0_0_all métier delivered to ICES is in reality a mixture of métiers and could be more accurately defined as “OTB”. The use of a métier level 6 codification is thus confusing.

Table 3.9.1. Example on the merging métiers level6 for ICES data calls – UK - England.

DCF métier Level_6	ICES métier
OTB_MOL_70-99_0_0_all	
OTB_SFP_70-99_0_0_all	
OTB_MCD_70-99_0_0_all	OTB_DEF_70-99_0_0_all

OTB_MPD_70-99_0_0_all	
OTB_MCF_70-99_0_0_all	
OTB_MDD_70-99_0_0_all	
OTB_DEF_70-99_0_0_all	
OTB_CRU_70-99_0_0_all	OTB_CRU_70-99_0_0_all

In 2018, a transnational workshop on the North Sea sole data compilation will be conducted to provide landings, discards, biological and effort data for the North Sea Sole stock (sol.27.4) to the ICES data call 2018. In this workshop, we aim to document the national procedures used to provide these data (national databases, sampling protocol and imputation procedure). In relation to métier definitions, one of the objectives is to document how each country defines and merges métiers and what are the ICES and national rules that can introduce discrepancies between national data submission. It is essential that countries document how the aggregations and merging of métiers are conducted.

In relation to this, it is important to note that the long-term plan is that the new RDB will be capable of both storing data and utilizing appropriate statistical estimation methods. As such, the new RDB will replace InterCatch; and stock assessment data requirements will be derived from the landings, effort and sampling data uploaded in the RDB. In that process, it is envisaged that the new RDB should not have any "black boxes" inside it and that all processing should be transparent and subject to review and verification by experts. In order to achieve this objective, the issues explained above in relation to métier aggregation will need to be addressed and solved.

Finally, it should be highlighted that this problem is not exclusive to the ICES data call. It could also occur in other data calls, such as JRC's data calls (STECF FDI-new, Fleet economic etc.), RFMO's data calls (IOTC, CICTA etc.).

4 ToR 4: To provide and reference metadata for the key inputs to métiers (Gear, mesh and species/species groups) and how they are aggregated.

In the procedure of assigning métiers to transversal data, species are often assigned into species groups defining target species assemblage. In some cases similar gears are grouped into one level 4 gear type. Countries have developed their own classifications, and standard reference tables could be useful for harmonization across countries. Regarding mesh sizes used for métier level 6, the groupings should be given by the RCG list of approved métiers. For answering ToR 4 gear and species lists were identified and the classification used for some nations were collected. This resulted in tables that should be stored at a publicly available website for reference.

4.1 Gear list

Level 4 of the métier classification relates to Gear Type. The origin of gear codes used is the International Standard Statistical Classification of Fishing Gear (ISSCFG). A subset of these is presented in the EU Master Data (MDR) register, which contains data structures and lists of fisheries codes to be used for information exchanges among Member States and to record and report fishing activities. The MDR gear code list was adapted in 2015 to reflect codes listed in Commission Implementing Regulation (EU) No 404/2011 (which is referenced in EUMAP),

however the changes consisted only of dropping certain codes. The ISSCFG has been reviewed and extended by the Coordinating Working party on Fisheries Statistics (CWP) however; changes have yet to be incorporated into the MDR.

Annex 1 gives an overview of how the MDR gear codes (more extensive version, prior to 2015) are converted to Level 4 gear codes across different Member States. A first observation is that the MDR codes and the codes allowed under Level 4 do not always have the same name. Furthermore, not all codes used by MS are in the current MDR list and indeed some codes which are important for métier in the EUMAP are also absent. There may be some extra national restrictions on using certain MDR codes. For example, France try to limit the use of generic codes, such as *TX- Other trawls (not specified)* or *OT- Otter trawls (not specified)*, which codes may lead to confusion. Furthermore and more broadly, providing a large number of valid occurrences/modalities when entering the data may lead to increased probability of misreporting. Regionalisation and limitation of the reference tables is encouraged in order to avoid such issues (this is even more accurate for species[7]).

There are differences across MS of how the MDR code is translated into a Level 4 gear code. However, this may be justifiable. For example, *TBS- Shrimp trawls – bottom* is an OTB in the UK, Sweden and Lithuania, but a TBB in Belgium. In some countries it is used for a Pandalus fishery using bottom otter trawls, while in e.g. Belgium it is used for a Crangon fishery using beam trawl. A further point is that an MDR code maybe translated differently into a Level 4 code depending on the region. Level 4 codes are specified by region in Appendix IV (2008/949/EC). Therefore, such differences may be acceptable.

Some additional legal restrictions with regards to the use of gears in certain regions have been enforced since the DCF Regulation. For example, since 2010 it has been forbidden to use *beam trawls* (TBB) in the Baltic Sea. Therefore, if it occurs in the logbooks in Germany, it is transformed into OTB. Similarly, reported *Danish seines* (SDN) in Poland are transformed into *Set gillnets* (GNS) as this is esteemed to be misreported.

Despite differences, there also seems to be considerable coherence across Member States as far as gear type is concerned. Overall, this can be seen as a worthwhile exercise in the sense that it looks into the comparability across the MS. At first sight, it would seem that are no large discrepancies.

4.2 Species list

To document the processes used and understand the comparability between MS target assemblage setting it was decided to look at how each MS groups the landed species. A comparison is provided in the table “Species SG2 Report.xlsx”, which is too big to insert as a table, and is therefore provided together with this report. This provides additional information on the taxonomic classification and grouping of each species that was taken from the ASFIS list which is the source of MDR species codes: http://www.fao.org/fishery/collection/asfis/en. The main intention of the comparison was to produce a revised version of the species classification reference table, which had been developed in the Nantes 2006 workshops. This table is referred to in the workshop reports but it was not possible to source a copy for the later workshop.

Below are listed the definitions of species groups from the Nantes 2006 report.

7 In fact, for commercial species, the number of species exploited by fleets of a member state is often less than 1000 whereas the ASFIS classification proposes more than 12000 occurrences.

- **Anadromous species (ANA):** living aquatic resources with lifecycle starting by hatching in freshwater, migrating to saltwater, returning and finally spawning in freshwater**.** [EU MAP definition].
- **Catadromous species (CAT)**: living aquatic resources with lifecycle starting by hatching in saltwater, migrating to freshwater, returning and finally spawning in saltwater. [EU MAP definition].
- **Cephalopods (CEP):** animals (molluscs) with tentacles converging at the head, around the mouth (examples: squids, cuttlefish, and octopus) [FAO definition].
- **Crustaceans (CRU)**: large group of arthropods (55,000 species). They include various familiar animals, such as lobsters, crabs, shrimp and barnacles [Wikipedia].
- **Deep water species (DWS):** the group decided to base the classification as deep water species on the list of species defined as such in EU Regulation (EU) 2016/2336 and allied species and genera with a Deep Sea lifestyle.
- **Demersal fish (DEF)**: living in close relation with the bottom and depending on it. The term "demersal fish" usually refers to the living mode of the adult. [FAO definition]. The distinction between benthic and demersal has been seen as confusing and subject to endless discussion, thus it was decided to combine the fish having benthic behaviour and fish having demersal behaviour in the only demersal fish group.
- **Finfish (FIF)**: generic term, including all teleosteans and elasmobranchs.
- **Fresh water species (FWS)**: species that spend all their life in fresh and brackish waters. This term is specific to the Baltic region.
- **Large pelagic fish (LPF)**: sub-component of the pelagic fish composed of all species assessed by ICCAT and IOTC. These include tunas, swordfish, billfish and some sharks species. The Nantes 2006 meeting group decided to include dolphinfish and amberjack as large Pelagic Fish.
- **Molluscs (MOL)**: family of species including the classes of cephalopods, gastropods and bivalves.
- **Pelagic fish (PEL)**: fish that spend most of their life swimming in the water column with little contact with or dependency on the bottom. Usually refers to the adult stage of a species [FAO definition].
- **Small pelagic fish (SPF)**: sub-component of the pelagic fish other than the large pelagic fish.

The majority of MS use a one to one relationship in assigning a species to a species group, as the first step in the target assemblage setting process. For some MS the method used does not require species group mapping, and for some MS a one to many relationship is used to define species group, as the species grouping within a MS can be fishery dependent. *France*, for example, has developed a reference table which aggregate species into different level of target species or assemblage of species *(soles, flat fish, demersal fish,…)* through a cluster tree, in order to better assign the 'good' level of target assemblage depending of the gear used and the common practices of the vessel.

The following MS do not explicitly use a species group mapping:

Netherlands – the target assemblage is set according to the gear and mesh size combination.

Belgium – the métiers are set using fisher intention information provided in the ERS logbook. Paper logbook métiers are set according to the gear and mesh size combination.

Spain (Basque) – key indicator species are used to assign the métier.

As expected, there are mismatches as a result of the difference in how a fishery operates between MS. For example, smelt (SME) is grouped in 3 different ways by MS according to how they are fished/classified, SPF (small pelagic fish), ANA (anadromous fish) and FWS

(freshwater species). Each of these codes can be argued as valid and are largely dependent on where the fishing activity occurred. Other questions can also be raised as to whether the species grouping should be based on biological knowledge or the fishery/fishing intention.

The “Species SG2 Report.xlsx” table proposes various levels of classification of a species to be employed as appropriate depending on the gear used and area. Group 1 comprises the broadest categories (Finfish, Molluscs, Crustaceans and Miscellaneous and also Seaweeds which are absent from EU MAP but still considered important for target assemblage), Group 2 provides a further breakdown of the Finfish (Demersal, Large Pelagic, Small Pelagic, Anadromous and Catadromous fish) and Molluscs, identifying Cephalopods. A further column identifies Deep water Species, which are classified here as being listed in Regulation (EU) 2016/2336 or belonging to closely allied species or generally caught with those species in a deep sea fishery. Ireland identified a number of other species as being Deep Sea. Further consideration should be given to whether these should be classified as such in the reference table.

A number of species would benefit from being classified by relevant experts and in particular those in the Large Pelagic and Long Distance RCGs. The list of reported species also includes some freshwater fish and miscellaneous aquatic invertebrates (not molluscs or crustaceans) which would merit assigning an appropriate target assemblage.

The species list can be used as a reference to how the species have been classified in the ISSCAAP code on different levels, and it also shows how other nations classifies a given species. Ideally a species would only be classified into one group, and a standardized list could be provided as a reference table; however discussions during this workshop showed that some species can be classified into several different groups, depending on fisheries or life stages. The species table constructed during the workshop is still useful as a guidance when grouping species.

4.3 RCG métier reference list

A comma separated file was constructed that collate all métier names currently agreed by the regional coordination groups (RCGs) and their predecessors. For the Baltic Sea, North Sea and North Atlantic regions, an extraction from the regional database hosted by ICES was used (AreaCodeFACCodeRegion, containing ICES area code, region id and métier level 6 codes). For the Mediterranean RCM reports were consulted. A fifth area ‘Distant Waters’ was designated for all other areas. Métier names for this region were taken from the ‘long distance fishery’ RCM reports (RCMLDF 2010, RCMLDF 2011, RCMLDF 2016).

It should be noted that EU member states could have fisheries not mentioned by the long distance fishery RCM. This implies the current file needs updating once métier names are agreed for the outstanding métiers. Options for deriving the new names are a) through the relevant RCG or b) by consulting data supplied to DCF data calls.

Each row contains the métier name, the region code and long name and the component parts of the métier name stored in separate columns. It also contains any associated minimum and/or maximum mesh size and states whether the gear code used is for an active or passive gear. Another column places an identifier on whether the mesh range derives from legislation for the region. This has only been completed for the North Sea and Eastern Arctic region for now and the legislative mesh ranges were derived from the 2009 North Sea and Eastern Arctic RCM report (RCM NS&EA, 2009).

The table “Metiers_with_components_inc-RegMesh.csv” is too big to insert in the report, and is therefore provided together with this report.

The list is useful as a reference list for generating level 6 métiers or for checking the métier codes, as it is possible to use directly as a lookup table. At the ICES website the list of approved métiers is available (http://ices.dk/marine-data/Documents/RDB/RDB%20Metiers%20in%20allowed%20areas.csv). It is also available in an overview format at (http://ices.dk/marine-data/Documents/RDB/RDB%20Metiers%20by%20fishing%20grounds.csv). The metier list in the lookup format needs to be updated when RCG's makes changes on the list of approved métiers, see section 6.

Overlapping mesh size ranges in the same area and between areas should be avoided. If due to historical reasons, a date start and end could be added to the list. Métiers can be standardized across regulations in order to harmonise. For example there are codes for OTB_CRU_0_0_0 in the North Atlantic and codes for OTB_CRU_>0_0_0 in the Baltic Sea. Likewise there are codes for DRB_MOL_>=0_0_0 for the North Sea and Eastern Arctic and codes for DRB_MOL_0_0_0 for the North Atlantic.

5 ToR 5: Evaluate standard format/or suggest appropriate existing format (transversal data) for input into métier algorithm and develop a standard R/SQL/SAS/ script and pseudo code for métier calculation.

Existing formats for raw transversal data were evaluated (EFLALO, RDB format, format used for transversal workshops, FishPi) but it was found that none of them contained all the elements needed for constructing the métiers: vessel-id, trip-id, haul-id, area, gear codes, mesh size, selection panel, species codes, landed weight and value. Therefore, a simple data format was suggested for the purpose of the workshop that included the elements relevant to construct the métiers, using an output-based method. It is found in Annex 2. The intention was that data could be kept at a national level, and not exchanged, but that it would be easy to run the same analysis on the data across countries.

At the workshop, it was decided to focus on descriptions of current setups and general discussions on the issues and methods, and to work on standardised reference lists that can be placed at a public repository. Developing common scripts for assigning the métiers was not possible during this workshop, as it was realized that other auxiliary data and expert knowledge is used in the process, on a national level.

Instead, a general flowchart was developed, illustrating the process and inputs for constructing the métiers, which can be used as a template for setting up the system of assigning métiers, with background information from ToR 2 and 3 and the reference tables.

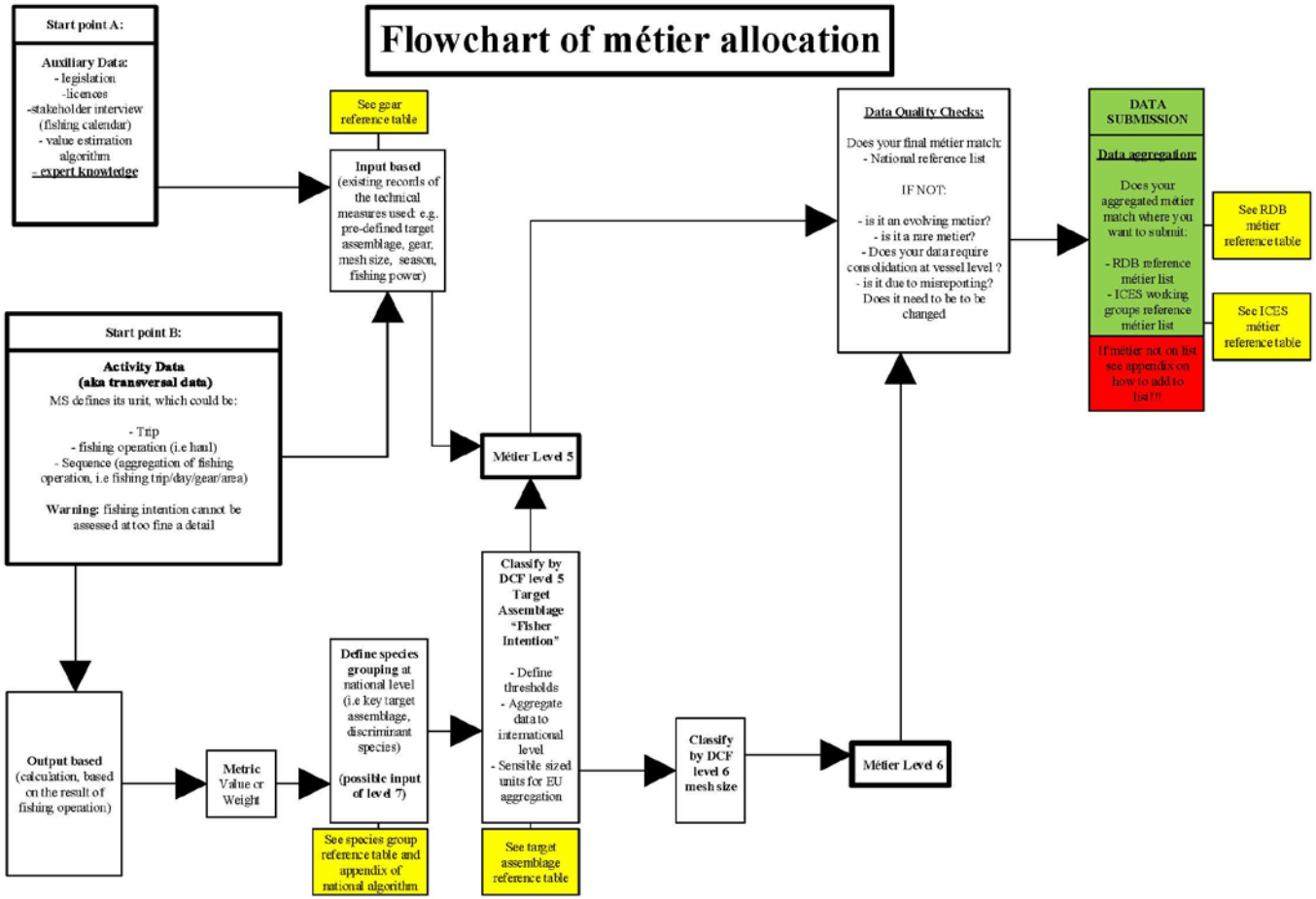

Figure 5.1: General workflow of métier assignment

Two types of data are needed for assigning métiers to transversal data: Activity Data (aka Transversal Data), which normally is logbook data and/or sales notes data, and Auxiliary Data, which it other forms of input data (legislation, licences, stakeholder interviews, fishing activity calendar, value estimation, algorithms and expert knowledge).

In the activity data, the MS chooses the appropriate unit on which to assign the métier, which can be a trip, fishing operation (i.e. haul) or a sequence (aggregation of similar fishing operations within a fishing trip by e.g. day/gear/area). The métier can be assigned to any of these levels within a trip, meaning that one trip can consist of several métiers, see section 3.1.

From the Activity Data there is Input based information like gear, mesh size, season, fishing power or pre-defined target assemblage from the logbooks, see section 3.3.2.2. The gear types can be merged based on the Gear Reference table, see section 4.1.

If the target assemblage has not been pre-defined, they need to be estimated with output-based methods, based on the landing profile by species (see section 3.3.2). The metric can be either weight or value landings (see section 3.3.2.1). The species grouping need to be defined using key target assemblage or discriminant species, using species reference table (see section 4.2) and algorithms, at the national level. To define the métier at level 5, the target assemblage group is defined from the species groups using thresholds, and the national level should be aggregated into the international level.

To obtain the métier at level 6, it is classified by mesh sizes, and the métier should be checked against a national reference list. If it doesn't match, it should be investigated if it is an evolving métier, a rare métier, if data require consolidation at vessel level or it is due to mis-reportting.

For data submissions, the métiers are aggregated to the international métiers (RDB métiers or ICES métiers), using métier reference tables. If a métier is not on the list, but it should be, procedures on how to add a métier to a list should be followed.

Auxillary data, especially expert knowledge, is an important input for the whole process.

6 ToR 6: To define a strategy for storing and maintaining metadata (methods and tables) that define the métiers.

6.1 Strategy and control

The group considered how the different RCGs could easily share and administer code or common algorithms; to share common reference lists for species groups, gears and mesh ranges and store métier descriptions whilst maintaining version control across regions and allow and manage public access to agreed documents. What is needed is a ready reference that end-users, the public and data managers and practitioners can get access to or refer to and RCGs can administer and keep updated and maintained.

Four options are considered below – the JRC website, an ICES external Sharepoint, the RDB, and a dedicated GitHub site. Metier descriptions and a standard format that might be considered is also reviewed and a recommendation on how RCGs might manage this is provided as a conclusion

6.1.1 JRC website

The JRC maintains a website, which provides public access to MS annual reports on data collection under the data collection framework and EU-MAP, STECF evaluations and RCG and related Expert Workshop Reports. The EU and JRC websites are open source but the administration and support is restricted to their administrators, which would limit the RCGs on how they manage and control these key reference lists and share code.

6.1.2 ICES external Sharepoint

North Eastern Atlantic Regional Coordination Groups are supported by ICES who annually create sharepoints on the ICES network to help administer meetings and share documents. These sharepoints are restricted to members of the groups and attendees of the meeting and therefore are not appropriate for public access and might not be appropriate for MS and RCGs supported by GFCM.

6.1.3 Regional database

ICES support North East Atlantic RCGs Regional Databases, which require métier as an input for transversal and sample data. Currently two versions of the RCG approved métiers are available on the ICES website through links on the RDB page. One gives an overview of the valid métier codes by RCG region (BS, NA, NSEA) and ICES area - http://ices.dk/marine-data/Documents/RDB/RDB%20Metiers%20by%20fishing%20grounds.csv. -The other provides a list of the valid métier codes and associated ICES areas and is the same version - http://ices.dk/marine-data/Documents/RDB/RDB%20Metiers%20in%20allowed%20areas.csv - that was used in section 4.3 but downloaded from the RDB. Although not linked directly to an RCG region the latter list is more practical to use as a reference or lookup table.

The RCGs have nominal control over the metier lists but are reliant on the RDB administrators to keep them up to date. The RDB is not open source and in its current form will not host multiple metier descriptions or explanatory notes.

6.1.4 GitHub sharepoint

ICES use GitHub for sharing code and in some instances managing and coordinating meetings. It is a web based hosting service, which is usually used for open source software development, but the key feature is version control. ICES have a GitHub site, which, as it is open access, would not be limited to RCGs within the ICES region. Setting up a site is relatively simple (Colin Millar, ICES, pers comm) and a webpage is provided if needed. Limiting the administration and updates to representatives from each RCG would provide the control RCGs might want in administering the reference lists and any associated documentation. There is a limit to the size of files that can be stored or shared and with the version control feature any minor changes to a file duplicates the space needed. To save space, for presentation and ease, any documents are best restricted to pdf or rtf. However, the site would only need relatively limited documentation – read me files but could also store the métier descriptions collated over the years.

6.2 Métier descriptions

In 2009, the regulation 199/2008 required sampling by métier and a ranking procedure was used to ensure the main métiers in a region were sampled by national programmes. RCMNSEA 2009 recommended that métier descriptions by fishing ground would be required for each MS to be able to evaluate the comparability of fishing activities and the potential for task sharing and sampling for discards. A simple template was designed to be completed in time for the RCM meetings in 2010 and the resubmission of national programmes (Figure 6.7.1). These National descriptions were extensive but only covered the métiers ranked as significant at the time. Subsequent updates were carried out in 2013 but there was no shared or easily accessible repository for them.

These national descriptions are still an important reference for any potential user who is considering merging métiers across areas, regions and countries. They may be time consuming to compile but once complete regular refreshes of the descriptions could be relatively simple and even automated to a degree. The workshop reviewed the old template for Metier description and have suggested changes to make it simpler but also to provide provenance in terms of their advent, mergers and even demise (Figure 6.7.2). The RCGs should decide on the final template but one of the key reasons for making the changes was to make it simpler and easier to automate. If there was a simple way of categorising the way MS define metiers then an additional field should be added as well to capture that category. That would then make it easier to group metiers and countries that could be harmonised or more readily compared. The proposed fields include:

EU-MAP region: The region according to table 5C, Level II from Commission Decision 2016/1251

Fishing grounds or FAO codes: Fishing grounds are defined in Commission Decisions and the RCMs 2009. A reference list needs to be defined. The ICES areas of activity could be listed and could be compared but limited to those in the agreed Metier list. http://ices.dk/marine-data/Documents/RDB/RDB%20Metiers%20in%20allowed%20areas.csv

Name of métier: Metier name

Flag country: Flag country

Harmonised with: This field may be an important 'second phase'. This would provide reference to the Countries where the metier is harmonised and is comparable.

Merged with: Any metiers or lower level metiers that have been subsumed within this metier description with the date they were subsumed.

Date of update: The date the description was first made or revised

Date of next review: The agreed date for next intended review.

Description of the métier

Reference period: The period from which the data comes that is used to describe the metier.

Detailed gear types and selectivity devices used in metier: Use Master Data Register descriptors

Target species included: Core and key species targeted by this fleet. This may be different to the key species that define the metier in which case - ***Should we include an additional field to account for this?***

Mesh size ranges included: Can account for a number of ranges within the final definition or the full range of the definition.

Main by-catch species: If bycatch whether wanted or unwanted is significant <5% of the total catch then some reference could be useful.

Number of vessels involved in metier during reference period: Countries provide the number of vessels over the period by defined length ranges. This may provide another metric to compare fleets across countries but may also be used to define the metier.

Seasonal pattern of the fishing activity of the metier: Describe the main annual quarters of activity. Historically quarter was used because the data is reported by quarter. Information about seasonality is important when defining a métier.

6.3 Recommendation

The workshop recommends that the list of approved métiers is maintained and publicly available at the ICES website, and that additionally a GitHub sharepoint be set up for other reference lists, documentation and Metier descriptions. ICES are happy to support a site within the ICES GitHub. It would need a little expertise and dedicated pan-regional RCG effort to design and set up. RCG Chairs should consult with ICES as to the process by which ICES RDB administrators maintain the metier lists and RCGs maintain the information on the Github. A procedure would need to be drawn up for updating the content of the GitHub and should form part of an annual cycle.

Métier description template			
Name of métier:	*(E.g. OTB_DEF_100-119_0_0)*		
Flag country:			
Date of update:	*(ddmmyy)*		
Description of the métier			
Spatial distribution of the fishing activity of the métier			
Temporal distribution of the fishing activity of the métiers	*(Text)*		
List the fisheries within the métier, including main target and by-catch species:	*(text)*		
Indicate level of discard of major species (mostly subset of G1 or G2 species): *(Text. e.g. Significant, Insignificant, Occasional high)*	Stock	Level of discarding	
Vessels involved in métier Magnitude in No. and predominant size : *(Text)*			
Is significant part of the catches landed in foreign countries?	Landing country	Sampling agreement (y/n) ref. to table	
Sampling of the métier			
Indicate if this Métier is merged with other métiers for sampling	(list which other métiers are included in the sampling métier)		
Justification for merging:			
Intended annual sampling level and sampling method:	Catch category	Sampling effort (Primary sampling unit)	Sampling method (concurrent, other)
	Landings		
	Discards		
	Catch		
Indicate if the Métier is associated with particular sampling problems:			

Figure 6.7.1: Old Template for métier descriptions

Metier description template		
EU-MAP region	North Sea	
Fishing grounds		
Name of métier:	DRB_MOL_0_0_0	
Flag country:	UK-ENG	
Harmonised with	UK-Wales; UK-Scotland; UK-Northern Ireland;	
Merged with	UK - HMD_MOL	14/02/10
Date of update:	13/06/2015	
Date of next review:	12/06/2017	
Description of the métier		
Reference period	2013 - 2015	
Detailed gear types and selectivity devices used in métier	Boat dredge	
Key target species included	Scallops, clams, oysters, mussels	
Mesh size ranges included	All	
Main by-catch species	Limited by-catch (<5% of total catch)	
Number of vessels involved in metier during reference period	1 vessel <10m, 2 vessels 10 - <12m, 10 vessels 12 - <18m, 1 vessel 24 - <40m	
Seasonal pattern of the fishing activity of the métier	Main fishery in Q3 and Q4	

Figure 6.7.2: Proposed Template for métier descriptions

7 Recommendations

- **Documentation of logic** – There is a requirement to document the logic applied by MS to determine the target assemblage. This documentation will provide a road map towards harmonising data across MS, ensuring possible aggregation and analysis at a European level (see flowchart in section 5).
- Generation of métiers need to include national **expert knowledge and auxiliary information** and analysis of vessel behaviour on an annual basis. It is possible to have **more than one métier during a trip**.
- **Gear codes** - avoid gear codes that are not specified (OT, GN, PT, SX, TB) in the declarative forms.
- **Species reference list** - Needs to be reviewed by relevant experts in RCGs - Long Distance RCG, Large Pelagic RCG. Deep water species lists and anadromous, catadromous, freshwater and miscellaneous categories would also benefit from scrutiny.
- **Clear definition of target species assemblage** - There needs to be a clear description of *target species assemblage*, which defines target assemblage as a fishing intention.
- **Input on declarative form for fisher intent:** As in the Nantes series of workshops we recommend that target assemblage is logged by fishermen, in the declarative form before leaving the port. And that MS continue to assess the quality of this data.
- **Value as a metric** – This group recommends value to be used as the metric to define métiers and fisher intention. There are however a number of instances where weight must also be considered.
- **Métier reference list -** Overlapping mesh size ranges in the same area and between areas should be avoided if possible. If due to historical reasons, a date start and end could be added to the list. Métiers can be aggregated across regulations in order to harmonise. RCGs to consult member states for proposed codes for new selective devices. If new codes are considered necessary, to define those codes (common across RCGs).
- For the **small-scale fleet**, with no logbook information, MIS_MIS classification should be avoided. Métier classification can be based on auxillary data, expert knowledge, algorithms, sampling. If the information is not available on the trip level, métiers could be estimated on the available level. If it cannot be classified, the proportion without a métier classification should be reported when submitting data.
- **Polyvalent small-scale fleet** – There is a need for classification of métier used per trip. In trips that use more than one gear/métier, efforts should be made to derive one main métier for that trip or, according to the expert knowledge/algorithm, to try to create two or more sequences for the same fishing trip, assigning to each of them one single métier and using practical assumptions to determine the part of the landings to be assigned to each sequence. When the separation of métiers used in a trip is difficult to accomplish, the possibility of maintaining the names of the métiers used in the trip combined in the naming of the trip métier (e.g GNS_LLS) is preferable to using the MIS_MIS assignment.
- **Testing and development:** Fisheries and fisher behaviour are in a constant state of evolution, and therefore métier typologies and algorithms for allocation of these should reflect this development. Evolvements in fisheries should be reflected in métiers, and be picked up by the RCG's.
- **Storing and maintenance of reference lists and documentation**: The workshop recommends that the list of approved métiers is maintained and publicly available at the ICES website, and that additionally a GitHub SharePoint be set up for reference lists and documentation. ICES are happy to support a site within the ICES GitHub. It would need a little expertise and dedicated pan-regional RCG effort to design and set up. RCG Chairs should consult with ICES as to how ICES RDB administrators might use this if the GitHub was to be the key source for the restricted lists. A procedure would need to be drawn up for updating the content of the GitHub.

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Annex 1: Gear aggregations

Gear aggregations for métier assignment by MSs. Orange: "MDR Code different from DCF, green colour means", Green: "Not included in current MDR", Blue: "Different from other MS"

Current MDR code	MDR Code name	UK Level 4	BE Level 4	POL Level 4	DNK Level 4	ES (AZTI) Level 4	SWE Level 4	LTU Level 4	DEU Level 4	ITA Level 4
OT	Otter trawls (not specified)	OTB								OTB
OTB	Otter trawls - bottom	OTB	OTB	OTB	OTB	OTB	OTB/OTT	OTB	OTB	OTB
OTM	Otter trawls - midwater	OTM		OTM	OTM		OTM	OTM	OTM / OTB*	OTM
OTT	Otter twin trawls	OTT			OTB	OTT	OTT		OTT	OTT / OTB
PEL	Pelagic by catch make-up	OTM								
PS	With purse lines (purse seines)	PS			PS	PS	PS			PS
PS1	Purse seine - one boat	PS								PS
PS2	Purse seine - two boats	PS								PS
PT	Pair Trawling (not specified)	PTB								OTB
PTB	Pair trawls - bottom	PTB		PTB	PTB	PTB	PTB		PTB	PTB / OTB
PTM	Pair trawls - midwater	PTM		PTM	PTM	PTM	PTM	PTM	PTM / PTB*	PTM
SB	Beach seines	SB					SB			SB-SV
SDN	Danish seines	SDN	SDN	GNS	SDN		SDN		SDN	SDN / SB-SV
SPR	Pair seines	SPR								SPR/ SB-SV /MIS
SSC	Scottish seines	SSC	SSC		SSC		SSC		SSC	SSC / SB-SV
SX	Seine nets (not specified)	SSC								SB-SV
TB	Bottom trawls (not specified)	OTB			OTB		OTB/OTT		TBB	OTB
TBB	Beam trawls	TBB	TBB		TBB				TBB / OTB*	TBB

TBN	Nephrops trawls	OTB	OTB		OTB		OTB/OTT			OTB	
TBS	Shrimp trawls - bottom	OTB	TBB		OTB		OTB/OTT	OTB		OTB	
TM	Midwater trawls (not specified)	OTM			OTM		OTM	OTM		OTM	
TMS	Shrimp trawls - midwater	OTM								OTB	
TX	Other trawls (not specified)	OTB								OTB	
SV	Boat or vessel seines	SSC								SB-SV	
FSN	Stow Nets	GNS									
GEN	Gillnets and entangling nets (not specified)	GNS					GNS			GNS	
GN	Gillnets (not specified)	GNS			GNS		GNS		GNS	GNS	
GNC	Encircling gillnets	GNS								MIS	
GND	Driftnets	GND		GNS			GND		GNS	GND	
GNF	Fixed gill nets	GNS								GNS	
GNS	Set gillnets (anchored)	GNS	GNS	GNS	GNS	GNS	GNS	GNS	GNS	GNS	
GTN	Combined gillnets-trammel nets	GTN								GNS	
GTR	Trammel nets	GTR	GTR	GTR	GNS	GTR	GTR		GTR	GTR	
LN	Lift nets (not specified)	GNS								MIS	
LNB	Boat-operated lift nets									MIS	
LNP	Lift nets	GNS								MIS	
LNS	Lift nets shore operated	GNS								MIS	
DRB	Boat dredges	DRB	DRB		DRB		DRB			DRB	
DRH	Hand dredges	DRB					DRB			DRB	
FIX	Traps nes	FPO			FPO		FPO	FPO		FPO	
FPO	Pots	FPO	FPO	FPO	FPO	FPO	FPO	FPO	FPO	FPO	
FYK	Fyke nets	FYK			FYK		FYK		FYK	FYK	
HF	Hand fishing	LHP					LHP				
HMD	Mechanized dredges	HMD								DRB	

HMP	Pumps	HMD								DRB
HMX	Harvesting machines (not specified)	HMD								MIS
LHM	Handlines and pole-lines (mechanized)	LHM				LHM				LHP-LHM
LHP	Handlines and pole-lines (hand-operated)	LHP	LHP	LHP	LHP	LHP	LHP		LHP	LHP-LHM
LL	Longlines (not specified)	LLS			LLD/ LLS			LLS	LLS	LLS
LLD	Drifting longlines	LLD		LLD	LLD	LLD	LLD		LLD / LLS*	LLD
LLS	Set longlines	LLS	LLS	LLS	LLS	LLS	LLS	LLS	LLS	LLS
LTL	Trolling lines	LTL				LTL	LHP			LTL
LX	Hooks and lines nes	LLS								LLS
MIS	Miscellaneous gear	NK		MIS			MIS			MIS
NK	Not known	NK						NK		MIS
SFH	Shell fishing by hand	NO								
FAR	Aerial traps	FPO								FPO
FPN	Stationary uncovered pound nets	FPO		FPN	FPN		FPN		FPN	FPN
LA	Without purse lines (lampara)									LA
FCN	Cast nets									
FG	Falling gear (not specified)									
FWR	Barriers, fences, weirs, etc.								FPN	FYK
HAR	Harpoons									MIS
RG	Recreational fishing gear									
TBE	Pulse trawl (16-31mm)		TBB							
XXX	Other		PTM							
BTF				FPO						

BMS	Blue mussel dredge				DRB						
DRC	Oyster dredge				DRB						
DRO	Oyster dredge				DRB						
LHP-LHM										LHP-LHM	
SB-SV										SB-SV	
GNS+GND											

Annex 2: Data format for métier workshop

To be able to run common scripts, we ask you to bring national data for the métier workshop. The data will not be shared, only methods/scripts.
Data should be stored as a csv file in the format specified below and should cover 2016.

Variable	Format	Comment
Country	Character field (3)	ISO 3 code.
Year	YYYY	2016
Vessel_id	Character field	Vessel id
Vessel_length	Numeric	Overall length of the vessel
Trip_id	Character field	Trip id
Haul_id	Character field	Haul id (optional)
Area	Character field	ICES subarea, division or subdivision Please provide at the finest resolution possible using the FAO area codes. e.g. ICES subdivision 27.4.a
Gear	Character field (3)	Master Data Register ERS Gear Type. If gear is not available, write NK
Mesh	Numeric	Mesh size
Selection	Character field	Follow the selection device code in the métier coding. 0: Not mounted, 1: Exit window/ Selection panel, 2: Grid _<Mesh size of the selection device>. E.g. 1_120
FAO_species	Character field (3)	FAO species code
Métier_ Level_6	Character field	Level 6 métier code assigned using current national method
KG	Float	Weight of landings
EUR	Float	Value of landings

Annex 3: Working document: Allocation of trips to métiers for the Spanish fleet operating in ICES areas under the IEO data collection programme

Allocation of trips to métiers for the Spanish fleet operating in ICES areas under IEO data collection programme

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1. Abstract

A need to understand and identify current practices used by Member States to allocate trips to métiers has arisen in recent years in experts groups related to European data collection work.

Spanish fleets operating in waters of the northeast Atlantic are classified into censuses, fisheries and métiers using their landings per fishing day recorded in the official fishing logbooks and first sale notes. The censuses classify the ships by fishing grounds; the fisheries are sets of trips in a certain fishing ground and the métiers are the groups of fishing operations targeting a species or group of species and they are classified according to the Decision of the Commission of November 6, 2008 (2008/949/EC).

This working document contributes to this discussion presenting the fisheries classification of the Spanish fleets operating in ICES waters and the methodologies used by the Spanish Institute of Oceanography (IEO) to identify métiers in these waters. Métiers are identified by the application of multivariate techniques (CLARA) to find homogeneous groups of catch profiles. The Spanish fleets operating in the ICES area totalize 33 métiers DCF.

2. Scope

The classification in métiers is done using as source of information the fishing logbooks, the landing declarations and the first sale notes.

The agreed definition of métier is a group of fishing operations targeting a similar (assemblage of) species, using similar gear, during the same period of the year and/or within the same area and which are characterised by a similar exploitation pattern (ICES 2003, 2004; Commission Decision 2008/949[1]). The collection of fishery data in sampling programs is usually associated with a fishing trip. So, catches, discards, efforts, etc. can be linked to variables of interest such as the gear used, the geographic area, the season and the target species using logbooks as source of information.

Council Regulation (EC) No 2847/93[2] established the obligation to complete a logbook along with a landing declaration for all vessels above of 10 meters' length overall. In addition, the regulations stipulated that Member States must present the first sale notes for all vessels, including those less than 10 meters in length overall. These requirements are currently in force under Council Regulation (EC) No. 1224/2009[3].

The Spanish Administration classifies fishing vessels in censuses, fishing grounds and registration modalities. The "censuses" are lists of vessels by fishing grounds that together constitute the so-called "*Operational Fishing Fleet Census*" (CFPO, by its Spanish acronym); "fishing ground" refers to a geographical area subject to management or conservation measures, while the way of use of a particular gear is called "modality" (Castro *et al*., 2011). The jurisdiction of the waters makes it possible to differentiate the fishing grounds of national waters from free or third countries waters. In this document, only the fleets whose activity is carried out in the Atlantic waters under Spanish national jurisdiction (except the Canary Islands fishing ground) and in EU waters within the scope of the International Council for the Exploration of the Sea (ICES) will be considered.

In Atlantic national waters, the Spanish Administration differentiates two fishing grounds: Northwestern- Cantabrian fishing ground (ICES Divisions IXa-North and

VIIIc) and Gulf of Cádiz fishing ground (ICES Division IXa-South). In the first, there are six types of fishing modalities: bottom trawling, purse seine, set longline, set gillnet ("*volanta"* and "*rasco")* and minor-gear fleet (small scale fleet using a variety of gears and traps). The bottom trawl can be used with one or two boats (pairs). "*Volanta"* is a type of gillnet targeting hake (*Merluccius merluccius*) and "*rasco"* is another type of gillnet targeting monkfish (*Lophius* spp.). The modality of minor-gear fleet includes a variety of fishing gears targeting both demersal and

[1] OJ L 346, 23.12.2008, p. 37–88

[2] OJ L 261, 20.10.1993, p. 1

[3] OJ L 343, 22.12.2009, p. 1-50

pelagic species. In the Gulf of Cádiz, there are three types of fishing modalities: bottom trawling, purse seine and minor-gear fleet. In this fishing ground the bottom pair trawl is not allowed and the minor-gear fleet include dredges, gillnets, trammel nets, hooks and traps.

In the EU waters –Subareas ICES VI, VII and Divisions VIIIabde and part of IXa— Spanish fleets operate with fishing licenses in the waters of the United Kingdom, Ireland, France and Portugal. In these fishing grounds the gears used are bottom trawl, purse seine (seasonally), gillnets and set longline.

In addition to these modalities, the Spanish Administration through the Fishing General Secretariat (SGP, by its Spanish acronym), grants temporary licenses for the use of seasonal resources in national waters and in free waters (albacore tuna, *Thunnus alalunga*).

3. Material

In both the EU data collection and ICES context, to provide estimates of the annual fishing activity of the Spanish fleet, it is necessary to disaggregate into measurable units such as the métiers. This task is only possible through the use of official fishery statistics, specifically fishing logbooks, landing declarations (integrated into the fishing logbooks), and first sale notes. In addition, the classification of the fleet in censuses by fishing grounds allows quick and easy extraction the official information from fishing logbooks and first sale notes. As a final complement to the integration of all information, a hierarchical database[4] nominates each fishing trip at the level of métiers DCF. Table 1 shows the structure of the database and the relationships between the different sources of information.

3.1 Fishing logbooks (DP)

The fishing logbook records the daily activity of the fishing vessel; the element that identifies the fishing trip is a unique numeric key that distinguishes the different trips of the vessel. Fishing logbooks contain fishery information with a level of disaggregation determined by four variables: vessel, gear, day and statistical rectangle (ICES squares of 1º of longitude x 0.5º of latitude).

3.2 Landing declarations (DD)

Landing declarations are the official declaration of the activity of the vessel with the landings of each species in live weight. It is a summary of the activity carried out during the fishing trip with the landings in port.

3.3 First sales notes (NV)

The first sale notes record less information than the fishing logbook. The Fishing General Secretariat provides a database with information of the national vessel code (CFR), port of landing and place of sale with their respective dates, value (€) and live weight (kg) by species. Unlike fishing logbooks, there is no unique numeric key assigned to the fishing trip or fishing operation from which the landings come from.

3.4 Operational Fishing Fleet Census (CFPO)

The CFPO allows us to know the technical characteristics of the vessels that are assigned to the fishing grounds and registration modalities. Each vessels is assigned into strata of length (or fleet segments defined by the DCF) on the basis of a homogeneous fishing activity and similar technical characteristics.

3.5 Table of métiers classification (OFIDAT)

Table that classifies the fishing trips in métiers DCF. It is a hierarchical classification database of métiers that relates the information of the fishing activity with the métiers DCF. It is also the basic element for the extraction of weighting conglomerates (métier, area, month, port, etc.).

[4] Table "OFIDAT", acronym of *official data*.

4. Methodology

The methodology and subsequent hierarchical classification in métiers was developed along different national works (Punzón *et al*., 2001; Bellido *et al*., 2003; Castro and Punzón, 2005; Abad *et al*., 2007; Castro *et al*., 2007) partly based on some expert groups recommendations (ICES, 2003). From a legal framework perspective the system was finally conceived in 2009 in accordance to Commission Decision 2008/949[5], and it's currently in accordance with regulation Commission Decision (EU) 2016/1251[6].

The disaggregation of the fishing activity of the Spanish fleets in métiers DCF requires a series of previous steps: (i) the extraction of the relevant information from the fishing logbooks and the first sale notes; (ii) develop an *ad-hoc* database; (iii) identify the fishing trips and, (iv) the classification of each fishing trip in métier DCF.

4.1 Selection of relevant information

Grouping fishing trips into homogeneous sampling units present three problems: ensure that the sampling units are homogeneous (Cochran, 1977); define the fishing units with a similar exploitation pattern (métiers) and group the different fishing units into a hierarchical structure to enable handling and treatment at different levels of disaggregation. The analysis of the landings of a trip can be difficult when these landings result from a combination of gears and/or areas. A good candidate to solve this problem is the fishing operation or the haul. However, fishing logbooks do not currently record the catches at the haul level and, for that reason, the primary sampling unit is the fishing trip. In Spain, fishers can only use one fishing gear by trip. The fishing trip is identified in the logbooks with a unique numerical code (Id_trip). Table 2 shows the fields selected from the fishing logbooks for the segmentation process in métiers DCF.

4.2 Matching fishing logbooks and sales notes.

The first sale notes do not provide an ID that relates them to the corresponding fishing trips in logbooks, so a matching process to link both sources of information is required. In order to achieve this objective, an algorithm has been developed that assigns the "*Id_trip"* code from the fishing logbooks to the first sale notes. However, sometimes differences of one or several days are observed due to assignment errors or due to logistical and commercial issues (e.g. transhipments in ports other than the port of sale). To correct these discrepancies, the algorithm searches progressively for matching landing dates in a range of +/- 5 days. At the end of the process, all those records without "*Id_trip"* are considered equally valid for the purposes of landing and effort calculations and they are also assigned an "*Id_trip"*. This identifier is numeric and consists of a correlative number whose first two digits correspond to the last two digits of the current year.

4.3 Métier identification: methodology

The objective is to identify groups of vessels with similar technical characteristics (gear) and similar exploitation patterns. There are several methodologies to achieve this objective, however, in ICES waters, multivariate statistical techniques are used. Through these techniques the métiers are inferred using catch profiles. There are two relevant factors to consider when using these techniques: (i) the large volume of information, since the appropriate multivariate method must have a high capacity for analysis; (ii) ensure that it must provide an index that can be used objectively in the analysis and reproducible by any user.

In 2003, an ICES study group agreed on a common methodological basis applicable to the identification of métiers of European fleets: "*Study Group for the Development of Fishery-based Forecasts*" (SGDFF) (ICES, 2003). This group recommended the use of multivariate analysis techniques on catches, landings or on the sale value of the landed species. Cluster analysis (Hair *et al*., 1999) is an appropriate methodology that allows searching groups of common catch profiles. This methodology consists in searching of homogeneous groups, so that the objects belonging to the same group resemble each other, maximizing the differences with respect to the objects belonging to other groups. CLARA (*Clustering Large Applications*, Kaufman and Rousseeuw, 1990) is an algorithm that allows working with large data sets. CLARA randomly samples smaller subgroups within the original data set, to which they are assigned, and applies the PAM (*Partitioning Around Medoids*) algorithm. The PAM function is more robust than other techniques because it minimizes a sum of dissimilarities instead of a sum of squares of distances (called "*centroid*"), which makes it more robust with respect to outliers (Kaufman and Rousseeuw, 1990). The characteristic object of the cluster obtained is the "*medoid*" that would be the central point with respect to which the distances of the other objects of the same cluster are minimum and, at the same time, the distances are maximum with respect to other objects of other clusters.

[5] OJ L 346, 23.12.2008, p. 37–88

[6] OJ L 207, 1.8.2016, p. 113–177

4.4 Métier identification: protocol

The procedure for the identification of métiers has the following steps:

(i) Creation of a trip matrix by registration modalities

The trip matrix groups the activity of each vessel by fishing trip selecting the fishing modalities and putting special attention that there are no duplicate values. The catch values (kg/€) are converted into relative values (%) with respect to the total trip.

(ii) Application multivariate analysis (CLARA) to the trip matrix in percentages

In the application of the CLARA algorithm, a series of combinations of sample size are tested with different numbers of groups of samples. In this way the results of each combination are analyzed. By comparing their respective silhouette values (SC), the one with the highest coefficient is chosen (Castro, J. *et al*., 2010; 2011). Since the input data are relativized to percentages, the Euclidean distance is used as a measure of dissimilarity between the objects (Holley and Marchal, 2004). According to Kauffman and Rousseeuw (1990) a cluster structure is found when the SC coefficient is greater than 0.5; with some structure of cluster when the SC takes values between 0.25 and 0.50 and without cluster structure when it is less than 0.25. The statistical programming language R (R Core Team, 2017) and the "cluster" package (Maechler *et al*., 2017) are used for the analysis.

(iii) Identification of métiers DCF

Significant clusters obtained from the CLARA analysis ("Métier IEO", table 3), are confirmed by their catch profile. Catch profiles are characterized by being represented by one or a small number of species and offer information on the degree of specialization of the vessels. Once the métiers are assigned to the fishing trip, spatial and temporal analysis of the captures and associated efforts are carried out to confirm their consistency not only at the statistical analysis level but also due to their persistence over time. For this purpose, prior knowledge of the fisheries is also useful and it may even be necessary to implement confirmatory interviews directed at the industry.

Furthermore, since the matrix of fishing activities of the DCF contemplates the segmentation of vessels by length category (LOA), a threshold of 50% of fishing trips has been established from which it is considered that the vessel has a high degree of specialization in an activity (gear group and length category) (table 4).

(iv) Regrouping "Métier IEO" to métier DCF

"Métier IEO" is a higher degree of segmentation beyond those required by the DCF. In most cases the CLARA analysis determines the métier IEO however for those trips whose modality is univocal with the mesh used, the assignment of the métier DCF is done directly (step "*v*" of this procedure). "Métier IEO" are useful to obtain index (effort, CPUE, etc) for specific fisheries or for more generic levels such as DCF métiers when they are regrouped at such level. Table 4 shows the entire hierarchical identification structure of the Spanish métiers and the analytical identification method.

(v) Assignment of métiers at level 6 DCF

DCF métiers are obtained regrouping the métiers IEO. Specific assignments are shown in Table 4.

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Annex to WD IEO Allocation of trips to métiers: tables

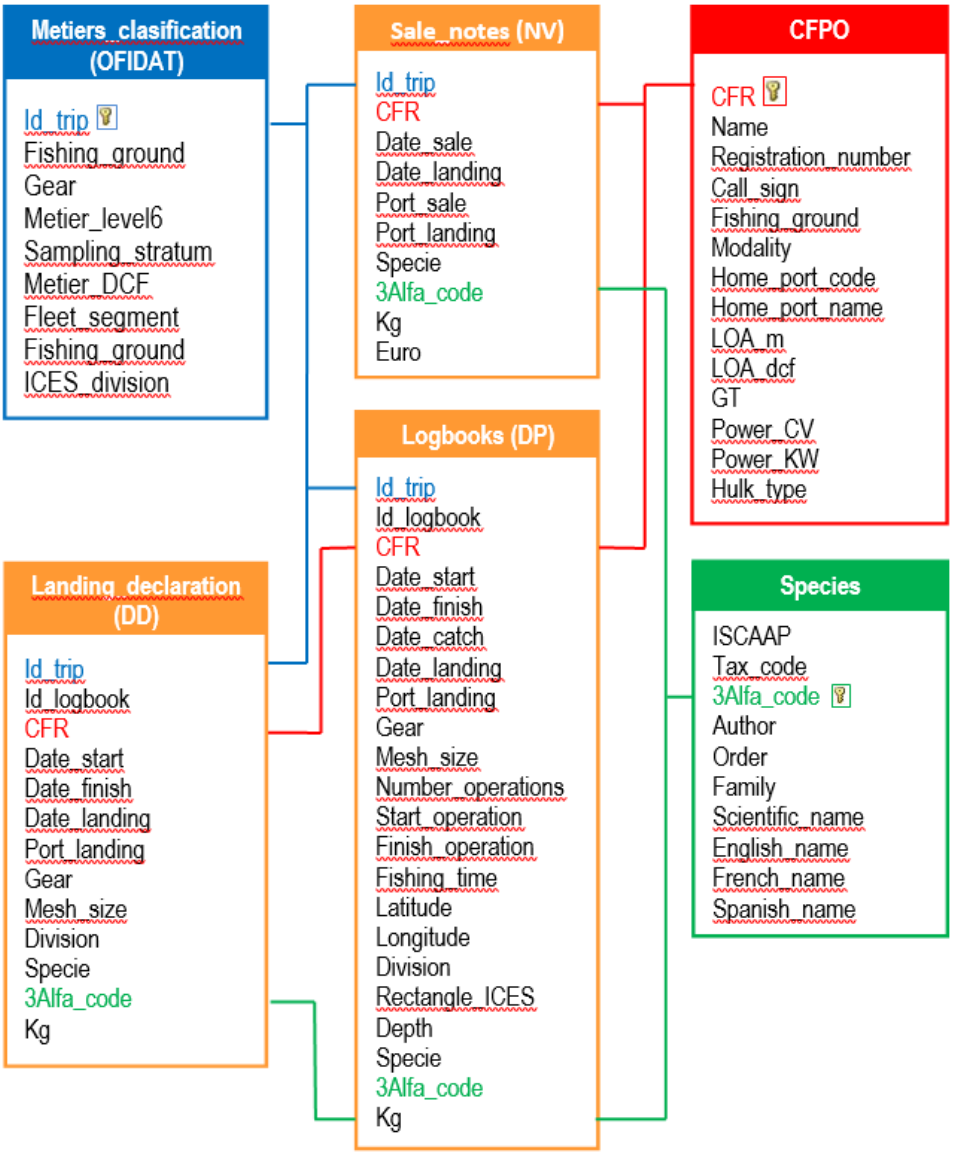

Table 1. Integration design of the official databases and the hierarchical métiers DCF. Notes: *CFR*, Community Fleet Register code; *Sampling_stratum*, Spanish sampling stratum DC

Table 2. Description of the fields selected from the logbooks.

Field	Data	Description	Value
Id_trip	Integer	A primary key with values that are unique throughout a table	Last two digits of the actual year + sequential numbers
CFR	Integer	European fleet registry code	Country code + numeric
Date_start	Date/time	Trip start date and time	dd/mm/yyyy hh:mm
Date_finish	Date/time	Trip finish date and time	dd/mm/ yyyy hh:mm
Date_catch	Date/time	Catch date and time	dd/mm/ yyyy hh:mm
Date_landing	Date/time	Landing date and time	dd/mm/ yyyy hh:mm
Month	Integer	Month code	Range from 1 to 12
Port_landing	Character	Landing port	Name of port
Gear	Character	Name of the fishing gear	National name
Dimension1	Integer	Length of nets, lines, etc.	Meters or centimetres
Dimension2	Integer	Height of panels, number of hooks, etc.	
Dimension3	Integer	Number of nets, number of lines, etc.	
Mesh_size	Integer	Mesh size of the codend, hook size, etc.	Millimetres
Start_operation	Date/time	Start operation date and time	dd/mm/ yyyy hh:mm
Fishing_time	Double	Soaking time	hh
Number_operations	Integer	Number of sets	Number by day
Latitude	Double	Latitude	Decimal degrees
Longitude	Double	Longitude	
Division	Character	ICES Division	ICES coding
Rectangle_ICES	Character	Statistical rectangle	ICES coding
Depth	Integer	Fishing depth	Soaking depth
Specie	Character	Scientific name	FAO-ASFIS
3Alfa_code	Character	3 Alfa code from FAO	
Kg	Double	Weight by specie retained onboard	Fish live weight

Table 3. List of métiers and technique used for identification.

Fishing ground	Modality	Ug[7]	Métier IEO	Description	Métier DCF	Analytical method
1 (VIIIc and IXa-north)	Trawl	OTB10	OTB11	Otter trawl targeting mix-species	OTB_DEF_>=55_0_0	CLARA
			OTB12	Otter trawl targeting horse mackerel	OTB_MPD_>=55_0_0	
			OTB13	Otter trawl targeting Atlantic mackerel		
		PTB10	PTB11	Pair trawl targeting blue whiting	PTB_MPD_>=55_0_0	CLARA
			PTB12	Pair trawl targeting hake		
			PTB13	Pair trawl targeting Atlantic mackerel		
	Purse seine	PSX10	PSX11	Purse seine targeting sardine	PS_SPF_0_0_0	CLARA
			PSX12	Purse seine targeting horse mackerel		
			PSX13	Purse seine targeting anchovy		
			PSX14	Purse seine targeting Atlantic mackerel		
			PSX15	Purse seine targeting Atlantic chub mackerel		
			PSX1X	Purse seine targeting mix-species		
	Set longline	LLS10	LLS11	Set longline targeting hake	LLS_DEF_0_0_0	CLARA
			LLS12	Set longline targeting european conger		
			LLS13	Set longline targeting pollack		
			LLS14	Set longline targeting seabass		
			LLS15	Set longline targeting forkbeard		
			LLS1X	Set longline targeting mix-species		
	"Volanta"	GNS11	GNS11	Gillnet ("volanta") targeting hake	GNS_DEF_80-99_0_0	DIRECT
	"Rasco"	GNS12	GNS12	Gillnet ("rasco") targeting monkfish	GNS_DEF_>=100_0_0	DIRECT
	Small scale	BET10	BET10	Gillnet targeting mix-species	GNS_DEF_60-79_0_0	CLARA
			XEI10	Drifting gillnet targeting sardine	GND_SPF_<40_0_0	
		DRB10	DRB10	Dredge targeting clams	DRB_MOL_0_0_0	CLARA
			DRH10	Dredge targeting common cockle		
		FPO10	FPO11	Traps targeting octopus	FPO_MOL_0_0_0	CLARA
			FPO12	Traps targeting fishes	FPO_FIF_0_0_0	
			FPO13	Traps targeting crustaceans	FPO_CRU_0_0_0	
		GTR10	GTR10	Trammel nets targeting mix-species	GTR_DEF_60-79_0_0	DIRECT
		LHP10	LHP11	Hand line targeting albacore	NO_ICES*	CLARA
			LHP12	Hand line targeting mackerel	LHM_SPF_0_0_0	
			LHP13	Hand line targeting hake	LHM_DEF_0_0_0	
			LHP14	Hand line targeting squid	LHM_CEP_0_0_0	
			LHP1X	Hand line targeting mix-species	LHM_DEF_0_0_0	
		LTL10	LTL10	Trolling lines targeting albacore	NO_ICES*	DIRECT
		PAL10	PAL11	Set longline targeting hake	LLS_DEF_0_0_0	CLARA
			PAL12	Set longline targeting conger		
			PAL13	Set longline targeting pollack		
			PAL14	Set longline targeting seabass		
			PAL15	Set longline targeting greater forkbeard		
			PAL1X	Set longline targeting mix-species		
		RAC10	RAC11	Purse seine targeting sardine	PS_SPF_0_0_0	CLARA
			RAC12	Purse seine targeting horse mackerel		
			RAC13	Purse seine targeting anchovy		
			RAC14	Purse seine targeting Atlantic mackerel		
			RAC15	Purse seine targeting Atlantic chub mackerel		
			RAC1X	Purse seine targeting mix-species		
		RECSP	RECSP	Others methods (e.g., commercial dive fisheries...)	RECSP**	DIRECT
		SDN10	SDN10	Danish seining targeting common cuttlefish	SDN_MCF_<55_0_0	DIRECT
		TBB10	TBB10	Beam trawls targeting scallops	TBB_MOL_<55_0_0	DIRECT

* Métiers allocation for other projects (ICCAT)

** There is no DCF métier for this group of fishing trips

[7] This hierarchical level is necessary to establish a connection between the fleets and their fishing activity.

Continuation

Fishing ground	Modality	Ug	Métier IEO	Description	Métier DCF	Analytical method
2 (IXa-south)	Trawl	OTB20	OTB21	Otter trawl targeting Norway lobster	OTB_MCD_>=55_0_0	>10% NEP
			OTB22	Otter trawl targeting mix-species		DIRECT
	Purse seine	PSX20	PSX21	Purse seine targeting sardine	PS_SPF_0_0_0	CLARA
			PSX22	Purse seine targeting anchovy		
			PSX23	Purse seine targeting Atlantic mackerel		
			PSX24	Purse seine targeting Atlantic chub mackerel		
			PSX2X	Purse seine targeting mix-species		
	Small scale	DRB20	DRB20	Dredges targeting clams	DRB_MOL_0_0_0	DIRECT
		FPO20	FPO20	Traps targeting octopus	FPO_MOL_0_0_0	DIRECT
		GNS20	GNS20	Gillnets targeting mix-species	GNS_DEF_50-59_0_0	DIRECT
		GTR20	GTR20	Trammel nets targeting mix-species	GTR_DEF_50-59_0_0	DIRECT
		HMD20	HMD20	Mechanized dredges targeting striped venus	HMD_MOL_0_0_0	DIRECT
		LLS20	LLS21	Hand line targeting seabream	LHM_DWS_0_0_0	CLARA
			LLS22	Set longline targeting silver scabbardfish	LLS_DWS_0_0_0	
			LLS2X	Set longline targeting mix-species	LLS_DEF_0_0_0	

Fishing ground	Modality	Ug	Métier IEO	Description	Métier DCF	Analytical method
5 (VI, VII and VIIIabde)	Trawl	OTB50	OTB51	Otter trawl targeting megrims	OTB_DEF_70-99_0_0	DIRECT
			OTB52	Otter trawl targeting hake	OTB_DEF_100-119_0_0	
			OTB53	Otter trawl targeting Norway lobster	OTB_DEF_100-119_0_0	
			OTB54	Otter trawl targeting hake (ICES VIa)	OTB_DEF_100-119_0_0	
			OTB55	Otter trawl targeting mix-species (ICES divisions VIIIabd)	OTB_DEF_>=70_0_0	DIRECT
				Otter trawl targeting pelagic and demersal fishes (ICES divisions VIIIabd)	OTB_MPD_>=70_0_0	
				Otter trawl targeting small pelagic fish (ICES divisions VIIIabd)	OTB_SPF_>=70_0_0	
				Otter trawl targeting cephalopods and demersal fishes (ICES divisions VIIIabd)	OTB_MCF_>=70_0_0	
			OTB56	Otter trawl targeting monkfish (ICES divisions VIIIabd)	OTB_DEF_>=70_0_0	DIRECT
		PTB50	PTB50	Pair trawl targeting hake (ICES divisions VIIIabd)	PTB_DEF_>=70_0_0	DIRECT
	Fixed fishing gear	LLS50	LLS51	Set longline targeting hake	LLS_DEF_0_0_0	CLARA
			LLS52	Set longline targeting european conger	LLS_DEF_0_0_0	CLARA
			LLS53	Set longline targeting forkbeard	LLS_DEF_0_0_0	CLARA
			LLS5X	Set longline targeting mix-species	LLS_DEF_0_0_0	CLARA
		GNS50	GNS50	Gillnet targeting hake (ICES divisions VIIbcjk)	GNS_DEF_120-219_0_0	DIRECT
				Gillnet targeting hake (ICES divisions VIIIabd)	GNS_DEF_>=100_0_0	
6[8] (VIIIabde)	Fixed fishing gear	LLS60	LLS61	Set longline targeting hake (ICES divisions VIIIabd)	LLS_DEF_0_0_0	CLARA
			LLS62	Set longline targeting european conger (ICES divisions VIIIabd)	LLS_DEF_0_0_0	CLARA
			LLS63	Set longline targeting forkbeard (ICES divisions VIIIabd)	LLS_DEF_0_0_0	CLARA
			LLS6X	Set longline targeting mix-species (ICES divisions VIIIabd)	LLS_DEF_0_0_0	CLARA
		GNS60	GNS60	Gillnet targeting hake (ICES divisions VIIIabd)	GNS_DEF_>=100_0_0	DIRECT
7 (IXa-Portugal)	Trawl	OTB70	OTB71	Otter trawl in the northern of parallel 39ºN (in waters under Portugal jurisdiction)	OTB_DEF_>=55_0_0	DIRECT
			OTB72	Otter trawl in the southern of parallel 39ºN (in waters under Portugal jurisdiction)	OTB_MCD_>=55_0_0	DIRECT
	Set longline	LLS70	LLS70	Set longline targeting Atlantic pomfret (in waters under Portugal jurisdiction)	LLS_DEF_0_0_0	DIRECT

[8] The Spanish administration maintains a specific census for vessels under 100 GRT

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Continuation

Id	Métier DCF	Definition	Description
1	DRB_MOL_0_0_0	Dredges targeting molluscs	Dredges targeting molluscs and bivalves in the ICES divisions IXa and VIIIc
2	FPO_CRU_0_0_0	Traps targeting crustaceans	Traps targeting crustaceans in the northern of the ICES division IXa
3	FPO_FIF_0_0_0	Traps targeting fishes	Traps targeting fishes in the northern of the ICES división IXa
4	FPO_MOL_0_0_0	Traps targeting cephalopods	Traps targeting cephalopods in the ICES divisions IXa and VIIIc
5	GNS_DEF_50-59_0_0	Gillnets targeting demersal fishes with mesh size between 40 y <60 mm	Gillnets of the small-scale fleet in the southern of the ICES division IXa
6	GNS_DEF_60-79_0_0	Gillnets targeting demersal fishes with mesh size between 60 y <80 mm	Gillnets ("*betas*") of the small-scale fleet in the northern of the ICES division IXa
7	GNS_DEF_80-99_0_0	Gillnets targeting demersal fishes with mesh size between 80 y <100 mm	Gillnet ("*volanta*") in the northern of the ICES división IXa
8	GNS_DEF_>=100_0_0	Gillnets targeting demersal fishes with minimum mesh size of 100 mm	Gillnet ("*rasco*") in the northern of the ICES división IXa and ICES divisions VIIIabd
9	GNS_DEF_120-219_0_0	Gillnets targeting demersal fishes with mesh size between 120 y <220 mm	Gillnet in ICES subarea VII
10	GTR_DEF_50-59_0_0	Trammel nets targeting demersal fishes with mesh size between 40 y <60 mm	Trammel net in the southern of the ICES division IXa
11	GTR_DEF_60-79_0_0	Trammel nets targeting demersal fishes with mesh size between 60 y <80 mm	Trammel net in the northern of the ICES division IXa
12	HMD_MOL_0_0_0	Mechanized dredges targeting molluscs	Mechanized dredges in the southern of the ICES division IXa
13	LHM_CEP_0_0_0	Hand line targeting cephalopods	Hand line targeting squid in the northern of the ICES division IXa
14	LHM_DEF_0_0_0	Hand line targeting demersal fishes	Hand line targeting hake in the northern of the ICES division IXa
15	LHM_DWS_0_0_0	Hand line targeting deep-sea fish	Hand line ("*voracera*") targeting seabream in the southern of the ICES division IXa
16	LHM_SPF_0_0_0	Hand line targeting small pelagic fish	Hand line targeting mackerel in the northern of the ICES division IXa
17	LLS_DEF_0_0_0	Set longline targeting demersal fishes	Set longline in Iberian and Community waters
18	LLS_DWS_0_0_0	Set longline targeting deep-sea fish	Set longline targeting silver scabbardfish in the southern of the ICES division IXa
19	OTB_DEF_>=55_0_0	Otter trawl targeting demersal fishes with minimum mesh size of 55 mm	Otter trawl targeting demersal fishes in the northern of the ICES division IXa (included Portugal waters)
20	OTB_DEF_>=70_0_0	Otter trawl targeting demersal fishes with minimum mesh size of 70 mm	Otter trawl in the ICES divisions VIIIabd
21	OTB_DEF_70-99_0_0	Otter trawl targeting demersal fishes with mesh size between 70 y <100 mm	Otter trawl targeting flat fishes in Community waters
22	OTB_DEF_100-119_0_0	Otter trawl targeting demersal fishes with mesh size between 100 y <120 mm	Otter trawl targeting hake in Community waters
23	OTB_MCD_>=55_0_0	Otter trawl targeting demersal fishes and crustaceans with minimum mesh size of 55 mm	Otter trawl in the southern of the ICES division IXa (included Portugal waters)
24	OTB_MCF_>=70_0_0	Otter trawl targeting cephalopods and fishes with minimum mesh size of 70 mm	Otter trawl in the ICES divisions VIIIabd
25	OTB_MPD_>=55_0_0	Otter trawl targeting pelagic and demersal species with minimum mesh size of 55 mm	Otter trawl targeting in the northern of the ICES division IXa
26	OTB_MPD_>=70_0_0	Otter trawl targeting pelagic and demersal species with minimum mesh size of 70 mm	Otter trawl in the ICES divisions VIIIabd
27	OTB_SPF_>=70_0_0	Otter trawl targeting small pelagic fishes with minimum mesh size of 70 mm	Otter trawl in the ICES divisions VIIIabd
28	PS_SPF_0_0_0	Purse seine targeting small pelagic fishes	Purse seine in the ICES divisions IXa and VIIIc
29	PTB_DEF_>=70_0_0	Pair trawl targeting demersal fishes with minimum mesh size of 70 mm	Pair trawl in the ICES divisions VIIIabd
30	PTB_MPD_>=55_0_0	Pair trawl targeting mix pelagic and demersal species with minimum mesh size of 55 mm	Pair trawl in the ICES division IXa
31	SDN_MCF_<55_0_0	Danish seining targeting molluscs and fishes	Danish seining in the northern of the ICES division IXa
32	TBB_MOL_<55_0_0	Beam trawl targeting molluscs with minimum mesh size of 55 mm	Beam trawl in the northern of the ICES division IXa
33	GND_SPF_<40_0_0	Drifting gillnet targeting sardine	Drifting gillnet ("*xeito*") in the northern of the ICES division IXa

WD presented at the DCF Métier Workshop. Lyngby, Denmark, 22-26 January 2018

Table 4. Specialization: number of fishing vessels by length (LOA) and gear categories.

			LOA (m)					
			VL0010	VL1012	VL1218	VL1824	VL2440	VL40XX
			< 10	10- <12	12- <18	18- <24	24- <40	> 40 m
Fishing gear categories	DFN	Gillnets and trammel nets	DFN0010 (number of vessels)	DFN1012 (number of vessels)	DFN1218 (number of vessels)	DFN1824 (number of vessels)	DFN2440 (number of vessels)	DFN40XX (number of vessels)
	DRB	Dredges	DRB0010 (number of vessels)	DRB1012 (number of vessels)	DRB1218 (number of vessels)	DRB1824 (number of vessels)	DRB2440 (number of vessels)	DRB40XX (number of vessels)
	DTS	Trawls	DTS0010 (number of vessels)	DTS1012 (number of vessels)	DTS1218 (number of vessels)	DTS1824 (number of vessels)	DTS2440 (number of vessels)	DTS40XX (number of vessels)
	FPO	Pots and Traps	FPO0010 (number of vessels)	FPO1012 (number of vessels)	FPO1218 (number of vessels)	FPO1824 (number of vessels)	FPO2440 (number of vessels)	FPO40XX (number of vessels)
	HOK	Hooks	HOK0010 (number of vessels)	HOK1012 (number of vessels)	HOK1218 (number of vessels)	HOK1824 (number of vessels)	HOK2440 (number of vessels)	HOK40XX (number of vessels)
	PGO	Others polyvalent gears	PGO0010 (number of vessels)	PGO1012 (number of vessels)	PGO1218 (number of vessels)	PGO1824 (number of vessels)	PGO2440 (number of vessels)	PGO40XX (number of vessels)
	PGP	Polyvalent gears	PGP0010 (number of vessels)	PGP1012 (number of vessels)	PGP1218 (number of vessels)	PGP1824 (number of vessels)	PGP2440 (number of vessels)	PGP40XX (number of vessels)
	PSX	Purse seine	PSX0010 (number of vessels)	PSX1012 (number of vessels)	PSX1218 (number of vessels)	PSX1824 (number of vessels)	PSX2440 (number of vessels)	PSX40XX (number of vessels)
	TBB	Beam trawl	TBB0010 (number of vessels)	TBB1012 (number of vessels)	TBB1218 (number of vessels)	TBB1824 (number of vessels)	TBB2440 (number of vessels)	TBB40XX (number of vessels)

Annex 4: French procedure and proposal to assign métier into data by fishing trip' sequence.

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1. Context and background

There is a general understanding that mixed-fisheries aspects are a key issue in the traditional single-stock management approach, because of the evidence that catches of the various species are interlinked due to technical interactions between different fleets and gears. In addition, availability, abundance and economic attractiveness differ across species, adding to the complexity of the problem *(Ulrich et al, 2012)*. Furthermore, the European Common Fisheries Policy *(CFP)* calls for the implementation of an ecosystem-based approach to fisheries management, with increasing focus on limiting the impact of fisheries on the environment and shows an obvious will to move away from single stock towards fleet-based management *(EC, 2011)*. As part of the process, the CFP recognizes the importance of accounting for heterogeneity in fishing practices, and métier based sampling has been put at the core of the EU Data Collection Framework *(Deporte et al., 2012)*.

Indeed, referring to fisheries was too broad of a definition and could lead to as many interpretations as actors in the system. The notion of Métier appeared in 2003 *(ICES, 2003)*. In 2008, the European Data Collection Framework (*DCF, Reg. (EC) N° 949/2008 and Commission Decision 2010/93/UE)* retained only two concepts:

- **A métier** which was defined as a group of fishing operations targeting a similar assemblage of species, using similar gear, during the same period of the year and/or within the same area and which are characterized by a similar exploitation pattern.
- **A fleet** *(or fleet segment)* defined as a group of vessels with the same length class and predominant fishing gear during the year.

The link between these two definitions is that vessels can only be part of one fleet segment, however within this fleet segment a vessel can exhibit many behaviours during the year, these behaviours and shifts in fishing activities are defined as métiers. As such, the fleet describes the vessels *(vessel' master strategy)* while the métier(s) describes the fishing activity(ies) in which the fleet engages *(Ulrich et al, 2012)*.

The definition of the DCF métiers were initiated during two pan-European workshops *(EC, 2005, 2006)*, and are still extensively debated *(ICES, 2010)*, leading recently to a less prescriptive Data Collection Regulation *(EU-MAP EC 2017)*. No unified method and no common reference tables, to assign data into métier, have been yet agreed at EU level, leaving some room for interpretation at the national level. This has slowed the development of a standard, generic EU approach, leading to continuing national differences in métier definitions within the same EU region *(Ulrich et al, 2012)*.

Fleet and métiers are now commonly employed in European fisheries and form the building blocks by which to describe the heterogeneity of fishing activity in both biological and economic terms. These building blocks facilitate the partitioning of landings and effort into ‘sensible’ sized units reflecting the fishing activities within them *(ICES, 2003)*. The functionality of métiers is evident in the number of groups *(i.e. DCF, ICES, RCG, ...)* who employ them for a variety of programs, such as the pre or post stratification/aggregation of national sampling programs, bio-economic modelling *(e.g Ulrich, Reeves, Vermard, Holmes, & Vanhee, 2011)* and management strategy evaluations *(e.g. Vermard et al., 2008)*.

Ultimately, well defined métiers provide the building blocks of more effective management *(Davie & Lordan, 2011)*, constitute a potent tool to improve biological[8] and bio-economic expertise and makes also possible the definition of efficient sampling plans to structure the routine data collection.

It is to be mentioned that ICES WKPICS *(ICES, 2011)* advised against using the widely adopted sampling method of setting "quotas" for numbers of fishing trips or fish to sample within multiple, highly resolved and dynamic fleet activities *(e.g. EU Level-6 métiers)*. This method involves searching for specific types of trip to sample in order to meet a quota for a specified time period, and as a consequence alters the selection probabilities for all other métiers in the sampling frame. This can lead to bias and reduced precision. Keeping the Métier as a domain of interest, WKPICS recommended that a more suitable approach to achieving a desired sampling rate per métier was to set up the frame and PSUs as a list of vessels or sampling sites which are relatively stable and predictable, and then stratify them according to their predominant métier or other characteristics of interest. The allocation of sampling effort between strata can then be optimized to provide a balanced sampling design.

Recalling that métiers should reflect the fishing intention but that this often cannot be observed directly, Marchal *(2008)* described the classification approaches as being either input-based, output-based, or combined methods. Input-based methods either make use of existing records of the technical features of fishing trips, e.g. gear and mesh size used, fishing grounds visited, season, fishing power; or build on direct interviews with stakeholders. Output-based methods assume that catch profiles perfectly reflect fishing intention, and build therefore on empirical or statistical analyses of landings or catches in weight or in value. Combined methods relate catch profiles *(outputs)* to fishing trip characteristics *(inputs)*.

Marchal *(2008)* compared some of these approaches analytically, and concluded that they could result in contrasting outcomes for a number of fleets. Species assemblages cannot be easily defined from logbooks, since (1) as primary issue, discards are usually not included in these analyses due to low sampling levels, and therefore the data available provide an imperfect estimate of the actual catch compositions. This can furthermore be biased by factors such as quota availability, market prices, traditions, etc., (2) species assemblage is an outcome of the fishing action, but may not accurately reflect the true targeting intention of the fishers due to imperfect knowledge of the underlying resource distribution, being therefore significantly influenced by skipper skills *(Mahévas et al., 2011)* and (3) clustering of fishing operations based on species assemblage is not very robust when a continuum is observed between different types of target species *(e.g. "mixed categories" in between clear "Nephrops" operations and clear "demersal fish" operations)*. Clusters are also not necessarily constant over time if species abundance varies.

Deporte *(2012)* developed a generic open-source workflow to categorize landings profile and even if proved that no method is infallible, it showed that combining PCA with either CLARA or HAC is the ones which performed best. Discriminant analysis was also used to allocate new declarative data into an existing landings profile. This quantitative method was directly operational but, in order to assign data into métiers, the cluster simple allocation rules defined need to be linked with an expert' knowledge of fishers' behaviour as they generally include some element of subjectivity in the choice. Furthermore, they do not take into consideration the targeting intention of the fishers and would require to agree on a standard regional métier definitions.

The original French approach to run an annual collection of fishing activity calendars for all vessels listed in the fleet register *(Berthou et al. 2008)* performed since 2000 by the Fisheries Information System (FIS) of Ifremer *(Leblond et al. 2008*) showed a relative inter-annual stability of the fishing strategy develop by a vessel' master during a year. Vessel' master invest in specific equipment *(fishing capacity, fishing power, gear, ...)* to implement his fishing strategy *(sequence of decisions, which includes métier choice, at monthly, seasonal and yearly scale)* and do not often change it. Furthermore, not only biological aspects of the fisheries drive the fishers' behaviour and his associated strategies, economic and socio-cultural aspects should be also taken into account *(Robinson and Pascoe, 1997; Marchal et al., 2009; Andersen et al., 2012; Cambié et al., 2015)*. Two consequences may be derived from this work: (i) the value of the catches should be preferred to the mass weight

8 Allowing notably for more accurate estimates of partial fishing mortality induced by the various fleets.

for defining the targeted assemblage and (ii) a Métier defined a posteriori should have a certain limit in its polyvalence, and be bounded for example in a list of Métiers.

Given these different aspects, Ifremer developed a combined approach *('métier' algorithm)* taking into account the common practices of the vessel' master, the technical features of fishing trips *(e.g. gear and mesh size used) (inputs)* and a quantitative method to evaluate the landings profile *(outputs)*. All of that being also based on standard reference tables well defined in order to aggregate species into target species or assemblage of species, to define a regionalized frame of references of national DCF level7 métier and to aggregate fishing gear into gear category.

The present working paper describe this approach in order to contribute to the DCF Métier workshop and the definition of more objective and consistent métier across European fisheries. Indeed having common standard reference tables and basic principles/criteria/methods/rules *(best practice guidelines, DCF standards)* agreed at a EU level to assign fishing data into métiers will be a significant step to achieve a better interoperability and compatibility between data send by the different Member States.

2. Annual fishing activity calendars of the vessels

Since 2000, Ifremer has implemented a Fisheries Information System (FIS), a permanent, operational and multidisciplinary national monitoring network for the observation of marine resources and their uses, allowing an integrated and comprehensive view of fishery systems including biological, technical, environmental and economical components. The FIS covers all the French fisheries, including small-scale and overseas fisheries *(Leblond et al. 2008)*.

One of the originalities of the FIS lies in the fleet monitoring procedure: a comprehensive collection of annual fishing activity calendars of the vessels aiming at characterizing the inactivity or activity of the vessels each month of the year and, in the latter case, the métiers practiced *(use of a gear to target one or several species)* and the main fishing areas *(Berthou et al. 2008)*.

This survey covers all the French fishing fleets *(exhaustive characterization of the national fishing fleet register)* and provides minimum but exhaustive information on the vessels, giving structural information of the fisheries surveyed. The objective is to have a complete picture of the whole fleet in terms of monthly fishing activity schedules indicating notably the main fishing grounds and métiers operated by the vessels.

The data required on an annual fishing activity calendar for each vessel are the following *(Berthou et al. 2000; Berthou et al. 2008)*: (i) Main port of exploitation, (ii) Number of fishermen on board, (iii) Fishing activity or inactivity in the month, (iv) Number of days at sea in the month estimated, (v) Number of fishing days in the month estimated, (vi) Métiers : up to 5 métiers can describe monthly the fishing activity of a vessel, (vii) Per métier, the two main fishing areas and the corresponding range of operation *(distance to the coast or depth of operation)*. The questionnaire used is presented in the *annex1*.

The collection of the calendars is carried out by the observers' network of the FIS in the beginning of the year N+1 for the previous year N *(completed in march N+1 for the year N)*. Observers' task consist in monitoring a selected list of vessels for which they have an expert' knowledge. It is built on a previous analysis of the different sources of data available ; 'pre-documentation' based on 1) declarative information available in EU logbooks and national monthly declarative fishing forms *(which provide information on the gear(s) used, the area(s) visited, the time fishing and the species caught)*, 2) landings statistics from auction markets, 3) geo-localization data, e.g. issued from VMS devices and 4) previous year fishing activity calendar. For the vessels satisfying completely their obligations, based on the expertise of the observers and the 'pre-documentation', annual fishing activity calendars are easy to documented very precisely. Unfortunately, these data are not exhaustive for all the active vessels *(and their reliability sometimes difficult to assess)* and for these vessels, the annual fishing activity calendars are filled in, specified and completed through direct *(fishermen or his wife)* and indirect *(local fishing network)* observers' interviews. Good knowledge of the vessels' activity and close relationship between fishermen and the observers are key elements to obtain quality information. It is particularly instructive for the small-scale fleets *(often characterized as a heterogeneous multi-gear, multi-species, geographically widespread fleet)*, where catches and effort data are regularly incomplete.

Such survey provide input each year for the typological classifications of vessels by fleet and a complete description of them in term of activity/inactivity, gears used and métiers operated, target species, main fishing areas, seasonality, interactions and métiers' polyvalence. It makes also possible the definition of efficient sampling plans to structure the routine data collection and are used to assess the completeness, reliability, accuracy and pertinence of declarative data available and, if necessary to re-evaluate them *(estimate the part of fishing activity not included in available data).*

3. Reference tables

Under the Common Fisheries Policy, fisheries data are collected via the Electronic Reporting and Recording System (ERS), including catch data, landings, sales and transshipment. All those information are recorded using the European standards available via the Master Data Register. More than 130 technical files of fisheries codes are available to record species, gears, locations, etc.

For example, the International Standard Statistical Classification of Aquatic Animals and Plants *(ISSCAAP/FAO)* and now the ASFIS file is used to record commercial species and International Standard Statistical Classification of Fishing Gear *(ISSCFG/FAO)* for fishing gear.

However, the notion of métier is not implemented by the ERS and there is no list of standard statistical classification of agreed "Métiers" available at the European level. Therefore, the information available doesn't allow computing catches by métier directly and a method to assign data *(fishing trip or fishing sequence/operation)* into métiers is required.

The use of international nomenclatures for recording fisheries data is a good procedure as it normalizes the data recording and allows exchanges between Member States. However, the large number of valid occurrences/modalities when entering the data leads to increased probability of misreporting data. This is particularly sensitive for commercial species because the number of species exploited by fleets of a member state is often less than 1000 whereas the ASFIS classification proposes more than 12000 occurrences. The situation is less so for fishing gear, but the use of generic codes as *"OT."* for trawls may lead to confusion.

The first step to identify the métier is to group the fishing gear and the species into target species or assemblage of species *(groups of commercial species)* for each fishing operation or fishing sequence by trip. By crossing all species with all gears, the number of possible combinations would be very high and the quality of the information used has a strong impact on the recognition of métiers.

To control the quality of fisheries data and to reduce the number of métiers generated, we implemented a regionalization process for commercial species and fishing gears. The regionalization of reference tables allow to reduce significantly the number of modalities available for commercial species *(less than 500 species per region, 4% of ASFIS Species list from FAO)* and for fishing gears *(generic code removed).* First of all, a transcoding of non-regionalized species or fishing gears is carried out to update the dataset as long as implementation of the regionalized reference tables is not performed in the data entry forms.

Then, a reference table was developed to aggregate species into target species or assemblage of species *(flat fish, demersal fish, crustaceans, …)* through a cluster tree. For each regionalized commercial specie, four levels of grouping were defined.

Level 0: list of regionalized species from ASFIS file *(500 records)*

Level 1: commercial groups of species *(e.g. megrim., 200 records)*

Level 2: commercial groups of species or target species *(e.g. megrim nei, 134 records)*

Level 3: national target assemblage of species *(e.g. flat fish, 47 records)*

Level 4: EU agreed target assemblage of species *(e.g. demersal fish, 15 records)*

The 'Métier' algorithm consider each level of target species or assemblage of species *(level 1 to 4).*

Furthermore, a reference table *(based on ISSCFG/FAO)* was developed to aggregate fishing gear into gear category *(e.g. trawls, traps, hooks and lines, ...)* in order to be able to specify potential declared generic code *(e.g. OT.- Otter trawls (not specified))* or to avoid some misreporting *(e.g. OTB-bottom otter trawls for OTM-midwater otter trawls or OTT-otter twin trawls).*

The DCF regulation (*DCF, Reg. (EC) N° 949/2008 and Commission Decision 2010/93/UE)* defines métiers according to a hierarchical structure using six nested levels: *level 1*, activity *(fishing/non-fishing)*; *level 2*, gear category *(e.g. trawls, dredges)*; *level 3*, gear group *(e.g. bottom trawls, pelagic trawls)*; *level 4*, gear type *(e.g. bottom otter trawl (OTB), bottom pair trawl (PTB))*; *level 5*, target assemblage of main species type *(e.g. demersal fish (DEF), crustaceans (CRU))*; *level 6*, mesh size and other selective devices. A further disaggregation, distinct from level 5, could be define as level 7 aiming at distinguish targets at the true species level *(e.g. Nephrods, Flat fishes, ...).* This could be agreed at national or regional *(RCG)* scale and expect to describe more accurately the fishing activity and to be a more efficient tool to represent the heterogeneity in fishing practices of the vessels.

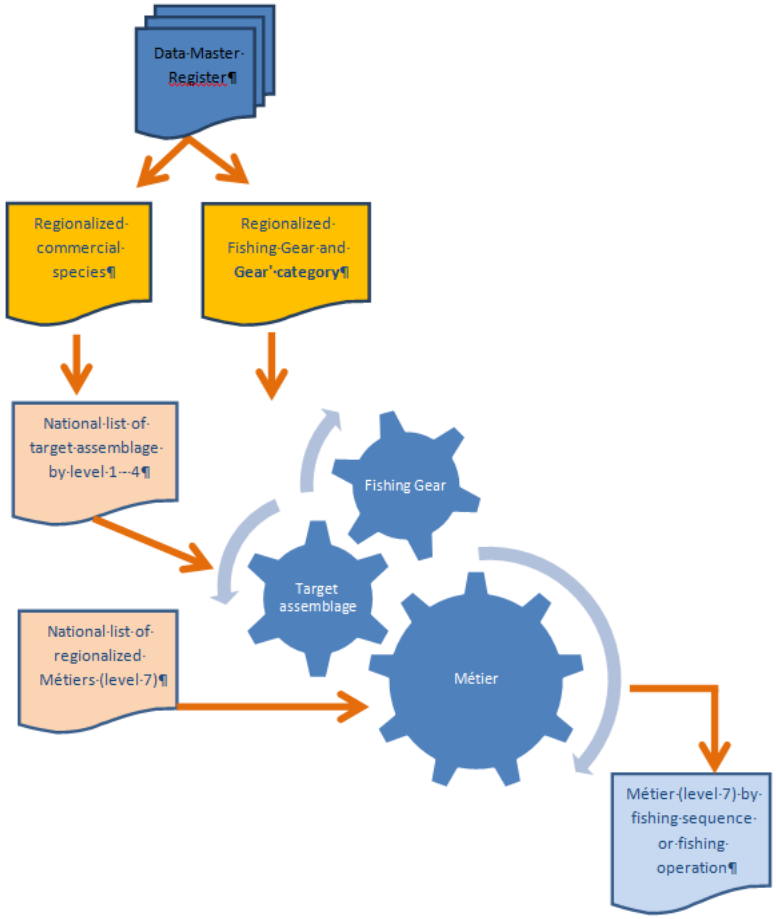
Following that, a national regionalized DCF level 7 list of métiers practiced by the French fleet was built. This list of métiers allows selecting the good aggregating level of target species or assemblage of species according to the fishing gear.

Gear	Species level 1	Species level 2	Species level 3	Species level 4	Métier (Gear_Target Species)	Métier allowed
OTB	MEG				OTB_MEG	No
OTB		LEZ			OTB_LEZ	No
OTB			FLX		OTB_FLX	Yes, National level 7, Flat fish
OTB				DEF	OTB_DEF	Yes, European level 5, Demersal fish

For example, in the table above, the métier that will be selected by the 'Métier' algorithm will be *"OTB_FLX"*.

The reference table of métiers was defined by region *(by FAO area)* crossing different levels of target assemblage of species or gears. The objective pursue, in elaborating this list, was to do an extensive 'scientific' list of all the on-going métiers in used by the French fleet in the region *(based on the expertise of the fishery observers' network of the Ifremer FIS)* supported by the agreed EU DCF standard codification in order to structure the hierarchical tree to aggregate the national métier into more aggregated level of métier agreed at EU level *(e.g. from DCF level 7 to DCF level 5)*. On-going legislations define then the mesh-size range linked to each métier.

The following scheme resumed the reference tables used by the 'Métier' algorithm:



4. 'Métier' algorithm (French case study)

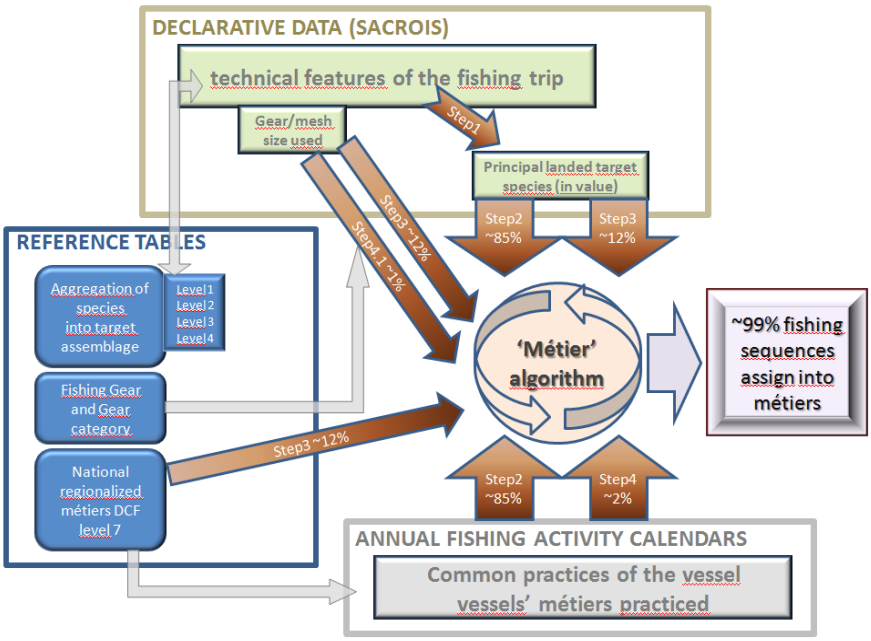
The definition of all the fishing trips of the French fleet with their associated features is based on a cross-validation tool of the different declarative sources: SACROIS *(Demanèche et al., 2013)* aiming to provide the best possible fishing statistics data. SACROIS cross-check data, at the most disaggregated level and as demanded in article 145 of the EU control Regulation *(EC Reg. 404/2011)*, from different declarative sources: fishing fleet register, logbooks, monthly declarative forms[9] *(for vessels less than 10m without logbooks)*, sales notes data, geo-localization data *(e.g. issued from VMS devices)* and the scientific census of fishing activity calendars, in order to build a dataset compiling the most accurate and complete information for each individual fishing trip. The application verifies and controls the different sources of data, with the aim of displaying validated and qualified landings per species and effort data series. The application provides several quality indicators and evaluates the completeness of the data flows. A specific algorithm is also included into this application to estimate the value of landings based on sales note data available *(sometimes directly deducted from them)* or estimation of an average price. For some fleet segment, estimated price based on expert' knowledge is used to estimate the value.

SACROIS data constitute then the main source of information on fishing activities, detailing for each trip of each vessel the quantity and value of the landed species per catch day, location and type of gear/mesh size/dimension used. Combined with the common practices of the vessel *(see above)*, they constitute the basis of the 'Métier' algorithm used in French case study to assign data into métier. The 'Métier' algorithm is applied by fishing "sequence" *("fishing trip*day*gear/mesh size/dimension")*. Each fishing "sequence" is determined by a fishing trip and a new sequence is calculated for any change of day or 'gear/mesh size/dimension'. A fishing "sequence"

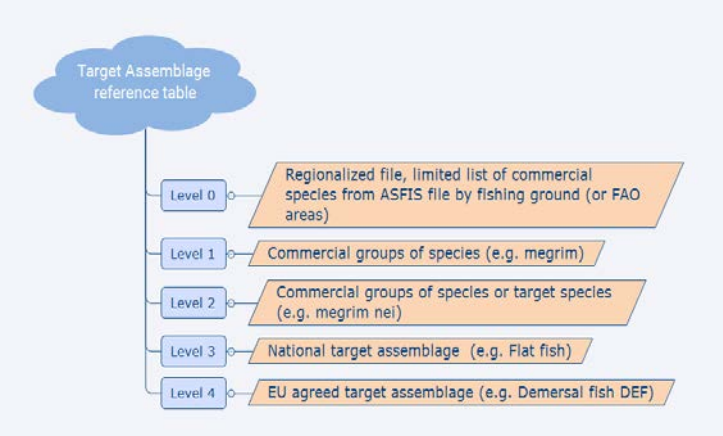
9 Declarative forms adapted to the special features of the small-scale coastal fisheries.

could thus aggregate different areas or different fishing operations for which fishing was performed during the same combination of *"fishing trip*day*gear/mesh size/dimension"*. The 'Métier' algorithm assigns data into métier according to the following steps.

Flowchart of the French method used to assign data into métiers



Step 1) Calculation by fishing "sequence" of the principal ***(in value)*** landed target species or assemblage of species at the different level *(up and down)* of aggregation defined in the reference table *(see above)*.



Step 2) The principal landed target species or assemblage of species *(iterative process[10])* are compared with those of the comprehensive list of métiers practiced by each vessel throughout the year[11]. Once there is a 'match', the métier corresponding is then assigned to the fishing "sequence" studied *(regardless the declared gear, possibly invalidated or specified by the algorithm)* and a new fishing "sequence" is treated. At this step, more

10 Target species and assemblage of species are iteratively tested at the different level of aggregation *(e.g. declared landed specie "SOL-Common sole" will be tested iteratively with the following codes SOX/FLX/DEF)*, when descendants could be also tested for declared species at a higher level of the tree *(e.g. declared landed specie "SOX-Soles nei" will be tested iteratively with the following codes FLX/DEF and the descendants SOL/SOS/OAL/MKG)*

11 Or the previous year until data from the current year are available.

than 85% of the fishing "sequences" have a métier assigned and the declared gear is invalidated or specified for more than 25%.

Priority is given to the principal landed target species or assemblage of species as it has been proved that it is the most discriminative factor to define the métier, taking also advantage to have access to the common practices of the vessel' master outlined in the fishing activity calendars *(see above)*. Furthermore, lots of inaccuracies or misreporting has been observed for the declared gear.

Step 3) For the remaining fishing "sequences", combinations of the declared gear and the principal landed target species or assemblage of species *(iterative process)* are compared with the possible list of national DCF level 7 métiers of the region outlined in the regionalized reference table *(see above)*. Once there is a 'match', the métier corresponding is then assigned to the fishing "sequence" studied and a new fishing "sequence" is treated. After this step, more than 95% of the fishing "sequences" have a métier assigned.

Métiers assigned at this step are: *1)* new métier performed by the vessel' master[12] or *2)* a complementary/non principal métier not specified/validated by the annual fishing activity calendar of the vessel.

Additional steps include the test of .fishing gear' codes linked with the declared gear in order to specify potential declared generic code *(e.g. SX- Seine nets (not specified))* or to avoid some misreporting, testing all the fishing gears belonging to the same fishing gear category *(see above)*.

Step 4) Finally and for the remaining fishing "sequences" (~3%), complementary steps are applied consisting of: *1)* compared the declared gear *(or gear' codes linked)* with those of the comprehensive list of métiers practiced by each vessel throughout the year *(regardless the landings profile of the fishing sequence, misreporting suspected)* or *2)* assigned the fishing activity calendar' métier of the *"vessel*month"* if there is only one. Lowest quality is given to métiers assigned at this step.

At this stage, mainly *(~99%)* a métier is assigned to each fishing "sequence". Additional works are underway aiming to design two different fishing "sequences" when data from one fishing "sequence" highlight obviousness the practice of two different fishing métiers by the vessel during it *(but summed up into only one sequence ; for example fish and molluscs for trawlers/dredgers)*. Examination of the second principal landed target species or assemblage of species combined with the common practices of the vessel is the methodology devised.

'Métier' algorithm is thus extensively based on the fishing activity calendars providing an efficient tool to: *1)* taking into account possible misreporting *(fishing gear, species landed, ...)*, in particular to assess the reliability and, if necessary, re-evaluate or specify the declared fishing gear, *2)* better reflect the fisher' fishing strategy assigning the good aggregating level of target species or assemblage of species[13] and *3)* limit the list of possible métiers practiced by each vessel to a validated/appraised frame of references avoiding multiplication of métiers based mainly on a raw ordination of principal landed target species or assemblage of species and gear used.

Finally, the 'métier' algorithm assign data into métier for more than 99% of fishing "sequences". The remaining fishing "sequences" could then benefit from an expert analysis. Following table present the main métiers assigned into data by region for French fleet.

12 Notably when data are compared with the vessel' common practices of the previous year.

13 For example, a vessel could have a very opportunistic fishing strategy targeting all the demersal fish species *(DEF)* when another could target specific specie as Anglerfish *(MNZ)*.

Table 1) Main métiers assigned into data by region for French fleet

Atlantic, Northeast (zone FAO 27)

Métier code	Métier	% quantity	% valu
DRB_SCE	Boat dredges _ Great Atlantic scallop	6.3%	8.5%
OTT_NEP	Otter twin trawls _ Norway lobster	2.4%	6.5%
OTB_MNZ	Otter bottom trawls _ Monkfishes	4.4%	6.0%
GTR_SOX	Trammel nets _ Soles	1.7%	5.7%
GNS_HKE	Set gillnets _ European hake	5.0%	5.6%
OTT_MNZ	Otter twin trawls _ Monkfishes	3.7%	5.4%
LLS_HKE	Set longlines _ European hake	2.7%	4.1%
...	...	73.80%	58.20%
		100.0%	100.0%

Mediterranean (zone FAO 37)

Métier code	Métier	% quantity	% v
OTB_HKE	Otter bottom trawls _ European hake	14.3%	13.
OTT_MZZ	Otter twin trawls _ Miscellaneous marine fishes	11.7%	9.
OTB_MZZ	Otter bottom trawls _ Miscellaneous marine fishes	11.6%	9.
OTB_OCT	Otter bottom trawls _ Octopuses	8.9%	8.
FPO_OCT	Pots _ Octopuses	4.3%	4.
GTR_VLO	Trammel nets _ Spiny lobsters	1.2%	4.
LLD_SWO	Drifting longlines _ Swordfish	1.7%	4.
...	...	46.30%	45.
		100.0%	100

Importance of the regionalization is highlighted here, fishing practices differ a lot from one region to another. In the two regions, ~10 métiers resume 50% of the value landed. To reach 95% of the value landed, ~100 métiers in Atlantic, Northeast and ~50 métiers in Mediterranean are needed.

Finally, a quality indicator is associated to each métier, métier assigned in the first step have a better quality indicator as those assigned in the other steps. Resume of quality indicators reach by the 'Métier' algorithm is presented hereafter.

Table 2) Resume of quality indicator reach by the 'Métier' algorithm

Quality indicator	Métier origin and reliability	% fishing trips	% quantity landed
A	Step 1) and gear validated	62 %	79%
B	Step 1) and gear specified/invalidated	22%	10%
C	Step 2)	12%	10%
D	Step 4.1)	2%	<1%
E	Step 4.2)	<1%	<1%
F	Expert analysis	< 0.5%	<0.5%

5. Conclusion

Métier is a descriptive tool, now commonly employed in European fisheries, forming the building blocks by which to describe the heterogeneity of fishing activity in both biological and economic terms. Well defined métiers provide the relevant component of more effective management, a potent tool to improve biological and bio-economic expertise and makes also possible the definition of efficient sampling plans to structure the routine data collection.

Convinced of all of this, Ifremer has developed since 2000 a Fisheries Information System (FIS) where métier occupies a pivotal position that runs notably through the comprehensive collection of the fishing activity calendars of the vessels.

'Métier' algorithm managed to deal with more than 99% of the fishing "sequences" of the French fleet, métier validated on an expert' knowledge in more than 85% of the cases. 'Métier' algorithm underlined the importance to take into account the common practices of the vessel' master *(outlined in the fishing activity calendars)* to improve the quality of the assigned métier and to avoid the multiplication of métiers limiting the list of possible métiers practices by each vessel to a validated/appraised frame of references.

This procedure has the benefit to give priority to the métiers as given by the fishermen himself or appraised by the observers' network expertise which could differ from the observed final principal landed target species or assemblage of species. 'Métier' algorithm prioritized the target métiers/fishing strategy of the vessel' master and not the results of its implementation.

Importance of reference tables to aggregate commercial species into target species or assemblage of species, to define a regionalized frame of references of national DCF level7 métier and to aggregate fishing gears into gear category have been also highlighted.

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Annexe 1

FISHING FLEET ACTIVITY CENSUS 2007 Individual annual fishing calendar

Registration Code	Starting date	Ending date	Vessel name	District Name	Port Name	Loa	Tonnage	Power (kW)	Owner code and name	EU main gear code and subsidiary gear code	Year building

							Métier 1						Métier 2						Métier 3						Métier 4						Métier 5					
Month	District	Port	Owner	Crew	Das	FD	Métier	O	AREA 1	R	AREA 2	R	Métier	0	AREA 1	R	AREA 2	R	Métier	O	AREA 1	R	AREA 2	R	Métier	0	AREA 1	R	AREA 2	R	Métier	O	AREA 1	R	AREA 2	R
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DAS = NB days at sea during the month / FD = NB fishing days / O = Origin of information (I = from Interview, L = from Logbook analysis) R = Fishing range of operation :Lagoon, Inshore, Mixed, ,Offshore

Reliability of information
❑ Direct
❑ Estimation
❑ Indirect

Activity Evolution	2006	2007
NB days at sea / year		
NB fishing days / year		
NB motor hours / year		

Panel	Owner data : address phone
Would you agree to participate an another enquiry, belong to the Panel ?	
Yes |__| No |__|	

Métiers in logbooks or fishing forms All |__| Some |__| (A) *No* |__|

First selling of auction |__| All through auction market |__| Partly through auction |__| (B) Totally

landings reliab : Y |__| N|__| NoAdjud |__|

Welc Quality : + |__| =|__| - |__| NoAdjud

Whole landings |__| (A + B)

Species completely sold through auction market : ..... / ..... / ..... / ..... / .....

Species completely sold out auction market : ..... / ..... / ..... / ..... / .....