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[3] The initials of the revising individual in capital letters

EcoFishMan

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1. Background

This deliverable consists of three separate texts: 1) Task 4.1: Conceptualization of the Responsive Fisheries Management system (RFMS) – Prototype 1, 2) task 4.2: Design and development of guidelines for making a general management plan and 3) the EcoFishMan Glossary updated at the annual meeting in FARO in February 2012. It should be kept in mind that the guidelines for making a general management plan (task 4.2) is continuously developed throughout the progress of the EcoFishMan project.

2. Task 4.1: Conceptualization of RFMS – Prototype 1

The purpose of this text is to propose an initial conceptual model of Responsive Fisheries Management Systems (RFMS) based on the notion of Results Based Management (RBM).

The term RFMS refers to the management system that will be proposed as the main outcome of the EcoFishMan project. RFMS is an adaptive management system that is results-based, ecosystem-based, and that seeks to reduce micro-management through a greater involvement of stakeholders in the management process.

This work draws on the insights of the review on existing RBM Systems performed in deliverable D1.1 as well as on the RBM definition launched and refined within the EcoFishMan project. The proposed model (fig. 1, p13) is deliberately kept generic at this stage; it will be the purpose of other work packages to allow for its elaboration and specification.

2.1 Introduction: What is Results Based Management?

Results Based Management (RBM) is focused on achieving specified results, and about documenting that they are achieved. This is to be viewed in contrast to a management system that is focused on specifying detailed requirements of a management process, which is often referred to as " micro-management". It is helpful to think of RBM as a type of contract between a management authority (henceforth referred to as the "authority") and an operating partner (henceforth referred to as the "operator"). If we for instance think of car manufacturing, RBM might imply that the authority specifies the minimum quality standards for the cars. As long as the operator (in this case the car manufacturer) adequately documents that these requirements are satisfied, the authority will not intervene in the way the operator chooses to work. The corresponding micro-management scenario would be that the authority species a long list of conditions for the way the operator should work (e.g. type of engine, working procedures, etc.).

Contemporary fisheries management in a European context has appropriately been characterized as micro-management (Degnbol 2005); it includes countless regulations that, among other things, specify what, where, how, when and with which gear specifications one may fish. The regulations have a tendency to spawn more regulations (Jentoft and Mikalsen 2004), and yet they often seem unable to achieve the main objectives of the CFP – namely a biologically, and socio-economically, sustainable fisheries (Froese and Proelß 2010; Piet and Rice 2004).

Simplistically, RBM in fisheries would imply that the authority specifies a set of minimum quality conditions for the marine (socio-economic) environment and then leaves it to the operators (i.e. the fishermen and other potential resource users) to use the resources in the way they see fit – as long as they document that their operations satisfy the minimum conditions . From the perspective of the operator RBM comes with flexibility and positive incentives for performing better in terms of their business as well as for inventing more efficient and workable management solutions. This, of course, is also an advantage from the perspective of the authority. The authority's main role in the work of managing simplifies to establishing standards and to evaluate the documentation supplied by operators, which informs about the operators performance with regard to the standards.

This description of RBM is not only highly simplistic; it is also rather idealistic. In fact, a range of practical considerations and complications have been left out of consideration. In the context of fisheries management a range of questions may be asked: What kind of agencies are, respectively, the "operator" and the "authority"? Which level of the EU administration are we talking about? Is the operator a fisherman or a particular type of group of fishermen? What kind of quality standards should the authority develop, and what kind of documentation should it accept from the operators with respect to these standards? Will the operators have capacity and resources to provide sufficient documentation? Which sanctions should the authority impose if the standards are not met?

Along with such practical considerations, the brief description of RBM calls for an articulation of important conceptual issues. Perhaps most importantly, the description implies a shift in the burden of proof as it makes the operator responsible for documenting state of affairs with respect to the quality standards established by the authority. As will become clear the placement of the burden of proof on the operator is not an explicit requirement of most conceptualizations of RBM that have been formulated in other contexts than that of fisheries management. However, the question of the burden of proof involves an important conceptual choice, not least for the EcoFishMan project. It will here be suggested that the EcoFishMan project indeed should develop a concept of RBM by which the burden of documentation rests on the operator[4]. Placing the burden of documentation on the operator (i.e. resource user) is in accordance with the definition of RBM that was included in the EcoFishMan project proposal (EcoFishMan 2010), and which we return to below. One of the tasks of the EcoFishMan project will be to articulate what this choice could entail in principle and in practice.

This text is organized into the following parts:

In *Section 2*, a selection of RBM concepts will be presented and discussed. Particular attention will be given to a discussion of the RBM definition presented in the EcoFishMan project description (EcoFishMan 2010)[5]. Main elements of the definition will be identified and it will be compared to RBM definitions promoted and adopted respectively by UN and the OECD. These inter-governmental organizations have been undergoing reform processes that are based on RBM and they have accordingly contributed with an extensive literature on conceptual frameworks and operational guidelines for RBM.

[4] Note that this is consistent with that the operator in practice may choose to outsource the work of documenting.

[5] The RBM concept related to this definition was explained further in the "EcoFishMan Glossary" (see EcoFishMan Deliverable 1.1).

Section 3 offers a selective review of RBM experiences. While extensive experiences with RBM have in particular been obtained and documented within intergovernmental organizations such as the UN and the OECD (section 3.1), particular emphasis here will be on presenting experiences related to RBM in the context of fisheries management (Section 3.2).

Section 4 presents a conceptual model of RFMS, which is based on the concept of RBM (Fig. 1, p 13). The model includes three agencies (authority, operator and assessor) and depicts their role in a RBM process.

2.2 RBM: background and concepts

RBM in public administrations is part of a loosely defined reform trend that, in particular in OECD countries, has been going on since the 1980s, and which is commonly referred to as New Public Management (NPM). This style of management had taken inspiration from result oriented management in the private sector. Characteristic thematic components of NPM include emphasis on accountability, decentralization, delivery of measurable results (rather than regulating and overseeing a particular process) and "value for money" (Binnendijk 2001; Hood 1991; Oladele 2010).

2.2.1 The RBM definition in the EcoFishMan project

There are two main difficulties with getting a good grip on RBM. First, in spite of that it has inspired management reforms in a number of public administrations there is little academic literature available about RBM. Second, the notion tends to be somewhat vaguely conceived of, and it is rarely defined explicitly (Martin and Jobin 2004).

In the EcoFishMan project proposal, RBM is defined as:

> Defining a maximum acceptable negative impact and then leaving it to those concerned to identify the means to meet the requirements and to document the effectiveness of the means (EcoFishMan 2010).

This definition, which is from the call text to which the EcoFishMan proposal was addressed[6], is appropriate for the EcoFishMan project. Before we examine it more closely, however, we propose three revisions of the formulation. First, we find that it is better not to specify that RBM is only about "maximum negative impact". For instance, socio-economic Outcome Targets might be defined as minimum positive impact. The formulation may hence be simplified by replacing "maximum acceptable negative impact" with "acceptable impact". Second, the phrase "leaving it to those concerned" is ambiguous with respect to what it means and who is refers to[7]. For the purposes of the EcoFishMan project, it is important that this phrase refers to those that wish to use the marine resource in question (e.g. fishermen or, generically speaking, the operators). For this purpose, the formulation is potentially misleading because other types of stakeholders than the operators are likely to be "concerned". The formulation can be improved by replacing "those concerned" with "resource

[6] The EcoFishMan project proposal refers this definition to FAO. (1996). *The Precautionary Approach to Fisheries and its Implications for Fishery Research, Technology and Management: An Updated Review.Precautionary approach to fisheries - Part 2: Scientific papers*. FAO, Rome. However, the mentioned FAO document does not contain a definition of RBM.

[7] The sentence can be misunderstood to have imply the opposite of the meaning it was intended to express: if a relevant stakeholder group, for instance a group of fishermen, is not "concerned" (i.e. in the non-intended sense of being concerned about the environment) the formulation may suggests that it should not be left to this group to "identify the means to meet the requirements and to document the effectiveness of the means".

users". For our research purposes, the term "operator" will often be used instead of "resource users". But since we wish to disseminate our definition broadly, it is preferable to use a definition that is immediately understandable to other readers. Third, the formulation may suggest that it is sufficient for resource users to propose means to meet requirements and documents the effectiveness of the means. However, resource users should also be held accountable for that the acceptable impacts (outcome targets) are indeed achieved. This point can be made explicit by adding the phrase "and ultimately achieve the requirements".

In sum, we propose the following definition of RBM:

> Defining an acceptable impact and leaving it to resource users to identify the means to meet the requirements and to document the effectiveness of the means, and ultimately achieve the requirements.

2.2.1 RBM in EcoFishMan – comparison with definitions from UN and OECD

The definition of RBM in EcoFishMan (as revised in section 2.1) includes 3 important elements:

- The specification of acceptable impact
- That operators have flexibility of choosing management means
- That operators are required to document the effectiveness of management means

As we will return to in section x the interpretation of RBM that is comprised by these elements is consistent with the way RBM is discussed in the EUs Green Paper on the reform of the CFP (Ref: Green Paper, 2009: 11-12) [8]. Each of these elements will play a significant role in the generic model that we will propose in section 4. It is important to note, however, that the explication of these three elements in EcoFishMan's definition of RBM sets it apart from two widely disseminated RBM definitions, namely the definitions of the UN and the OECD:

The UN defines RBM as:

> A broad management strategy aimed at achieving important changes in the way government agencies operate, with improving performance (achieving better results) as the central orientation (Binnendijk 2001; UN 2004).

In turn, the OECD defines RBM as:

> A management strategy focusing on performance and achievement of outputs, outcomes and impacts (OECD, 2002).

While the definitions of the UN and the OECD both stress that the focus of RBM is on improving performance, this is not mentioned in the EcoFishMan definition. We do not find that this absence is critical for the EcoFishMan definition since it is implicit that the point of a management strategy is to achieve better performance in some sense.

[8] Martin and Jobin (2004) introduce RBM much along the same lines as the EcoFishMan definition: "As its name indicates, RBM is an approach of public administration that aims at putting the focus on the results of the public action, allowing the administrators to be more flexible. RBM implies a measurement of the results, the integration of the information about the performance in the decision making process and the use of the information about results for a continuous improvement. RBM also implies that a governor accepts his/her responsibility over his/her results and informs the citizens by making reports" (Martin and Jobin 2004: 305 (translated)).

Conversely, we note that the UN's definition of RBM does not explicate the three elements listed for the EcoFishMan definition above: It does not articulate a requirement for a specification of performance levels (e.g. outcome targets), nor does is explicate a requirement of documentation of performance, and nor does it explicitly place the burden of documenting results on the agencies or elsewhere. The OECD definition refers to a specific and refined vocabulary for performances (i.e. "outputs, outcomes and impacts"), but it does not articulate a requirement of documentation nor which agency should be responsible for documenting.

The absence of these elements from the RBM definitions should not be taken to imply that these issues relating to these three elements are not given attention in the UN and the OECD. In both organizations, these issues are addressed in a number of documents on RBM concepts and practice such as text proposing conceptual frameworks, guidelines, list of key concepts, and reviews of practice. We find it preferable that these three elements are made explicit in the EcoFishMan definition as this makes it easier to communicate what RBM is and how it differs from the established resource management system. While the current resource management system in CFP is continuously undergoing reforms in order to improve performance (and hence could be understood as RBM), it is important for the EcoFishMan project to establish how RBM differs from current management systems in this context.

2.3 Experiences with RBM in fisheries and in other contexts

RBM has been extensively used as an instrument to reform public administration in major intergovernmental organizations such as the UN, OECD and the World Bank. In addition, national administrations and state governments in some countries have been conceived of and analysed in terms of RBM (Martin and Jobin 2004; Moynihan 2006). RBM has also been applied to administrative bodies such as regional management of forestry and national aid programs. Table 1 lists a number of useful references regarding experiences with RBM.

Table 1: List of selected works reporting on RBM concepts and experiences (in other contexts than that of fisheries management (see below for the latter))

RBM case	References
The UN system: UNDG UNDP UNESCO	 (UNDG 2010) (UNDP 2007) (Oladele 2010)
OECD	(OECD 2002)
World Bank	(WB 2002)
National administrations	(Martin and Jobin 2004)
Federal state administration	(Moynihan 2006)
Forestry (British Colombia)	(Fraser *et al.* 2006; MOFARFPB 2010)

2.3.1 Cross-cutting RBM experiences and lessons

An important and widely acknowledged experience with RBM in organisational development is the need for realistic expectations. One should not expect that RBM can perform miracles over short time spans; improving organisations based on RBM requires considerable investments of time and resources. Part of the reason why one needs to be patient with RBM reforms is that a transformation towards an efficient RBM system to some extent is premised on a cultural change in organizations; in practice, organizations may often resist the adoption of a "RBM culture".

RBM involves devolution of practical management responsibility (i.e. in our terms from authority to operator). The devolution of responsibility is conditioned on that results are achieved, and that this is documented. The possibility for the operator to achieve results may often depend on the invention of creative solutions. In this context it is important to note that adopting a focus on accountability for results without granting operators flexibility to do things differently may easily lead to disappointment (Moynihan 2006).

When designing a RBM system, the specific choice of indicators (in terms of which results are defined) becomes an important issue. A popular rule of thumb is that indicators should be "Specific Measurable Attainable Relevant and Trackable" (i.e. SMART) (e.g. Binnendijk 2001). The process of deciding on indicators is also important. In one case, it was reported that the consultation of a broad range of stakeholders in the selection of socioeconomic and ecosystem indicators was rewarding for the management process in so far it increased different stakeholders understanding of each other's concerns. However, this process also had the drawbacks of being slow and of leading to the inclusion of too many indicators, which reduced effectiveness of the management process (Fraser *et al.* 2006).

2.3.2 Experiences with RBM in the context of Fisheries

As in other contexts, RBM has been conceived of differently with regard to fisheries management. We will here take starting point in EcoFishMan's definition of RBM (presented in section 2), which requires that there is a specification of results to be achieved, and that operators have a flexibility of the means to achieve the results but also an obligation to document their achievement. We will here briefly present and discuss a 5 cases, which will tentatively be arranged with respect to the presence or absence of these RBM features (Table 2). As defined within EcoFishMan, RBM has only been applied in a limited number of cases of fisheries management, and there are very few works published on experiences with such cases. Indeed, we are currently only aware of three such cases. These cases concern management of scallop fisheries in New Zealand (Arbuckle and Drummond 2000; Mincher 2008), management of goose barnacles in Galicia (Molares and Freire 2003) and the case Spencer Gulf Prawns in South Australia (Hollamby *et al.* 2010; Zacharin *et al.* 2008).

It is conceivable that a much greater number of cases comprise some, but not all, of these RBM features. We present and discuss two such cases that are of particular interest to the EcoFishMan project. The first is the case of standard, TAC based, "micro-management" within the CFP. The importance of this case stems form that it represents the management system that the EcoFishMan project intents to reform based on RBM. Noting that we here cannot do justice to the complexity and differences between individual cases of fisheries management within the CFP, we here refer to deliverable D1.2, which offers a review of fisheries management in the CFP. The second of these cases is the Catch Quota Management system, which, based on RBM thinking, has been developed and proposed as a way to improve fisheries management in the CFP.

Note that we here do not seek to evaluate and rank the management performance within the different cases; the purpose is to present and arrange the cases with respect to the features of RBM they do (or do not) comprise. We also note that the scoring of the presence or absence of the RBM features in each case is both crude and tentative: it will be followed up by a more refined analysis and discussion.

Table 2: Tentative arrangement of cases of fisheries management in regard to defining features of Results Based Management as defined in the EcoFishMan project (see text for discussion)

	Outcome Targets defined and documented	Burden of documentation on operators	Operators have flexibility of choosing management means
CFP "micro- management (3.2.1)	yes[9]	no	no
CQM by CCTV (3.2.2)	yes	some	no
NZ Scallops Challenger (3.2.3)	yes	yes	yes
Goose barnacle Cofradías (3.2.4)	yes	yes	yes
Spencer Gulf Prawns (3.2.5)	yes	yes	yes

2.3.2.1 Standard TAC based "micromanagement" in the CFP

As RBM in the EcoFishMan project is proposed as an alternative to how fisheries management is conducted within the CFP, it is important to clarify how these management forms differ. For this purpose, it will here suffice to imagine a standard CFP model of fisheries management: TAC management based on ICES stock assessment and advice, with the fishing operations being subjected to a range of regulations that specify where, how, what, when and with which gear one may fish (i.e. "micromanagement"). In this system, there is little incentive to avoid discards or to cooperate with science and authorities about issues of management and documentation.

This standard CFP model of fisheries management nevertheless comprises an important RBM feature: It specifies Outcome Targets to be reached (stock objectives specified in terms of reference levels of SSB and F) and there is a system for documentation relationships between management measures and the Outcome Targets (i.e. TAC levels linked to the specific stock objectives in ICES catch forecast)[10]. Moreover, ICES stock assessments allow for an evaluation of the extent to which previous Outcome Targets were reached. In practice, the short term objectives are often not met for many CFP stocks, and the assessments are often subjected to high uncertainty, not least for depleted or overfished stocks. But the point here is that this case formally comprises the RBM feature of setting outcome targets and documenting the performance regarding these targets, irrespective of that the management system in many cases may actually perform poorly with respect to these features.

Two other RBM features, however, are not present in this CFP standard model. First, the burden of documenting a need for interventions, in principle as well as in practice, is on the management authority (Lassen *et al.* 2008). This fundamentally remains the case even after the precautionary

[9]For some EU stocks the state of the stock is not known. For these stocks an Outcome Target (TAC) is set without underlying documentation. A list of such stocks can be found here: http://ec.europa.eu/fisheries/documentation/publications/cfp_factsheets/tacs_en.pdf (last visited 15.02.2012)

[10] But see previous footnote.

approach has been implemented in ICES advice and in the CFP though a system of reference points (Hauge *et al.* 2007). Second, there is no flexibility regarding the management means in this standard case, notably including regulations of the conduct of fisheries, such as regulations about what, where, and with which gears one may fish. The absence of these RBM features is the reason why the CFP standard case is not a case of RBM as defined in the EcoFishMan project.

2.3.2.2 Catch Quota Management by CCTV

Catch Quota Management (CQM) involves management and documentation of catches (which include discards) as opposed to management of landings. Proposed by the Danish government , a CQM system was tried in a pilot project which involved electronic monitoring of the catches of six Danish vessels fishing for cod (Kindt-Larsen *et al.* 2011)[11]. The catches of these vessels were continuously filmed by Closed Circuit Television cameras (CCTV), and the images were later used to estimate discard volumes and compositions. The main incentive for fishermen that wished to enter the CQM scheme was that the catch quota they would receive would be higher than the landing quota they would otherwise obtain. From a perspective of sustainability, an advantage of CQM is that it creates and economic incentive to avoid catches below the legal landing size in order to maximize the revenue from the catch quota[12].

The CQM system comprises a range of RBM features. Importantly, it creates an incentive for the fishermen to reduce discards, as these are subtracted from their catch entitlements. In addition, the electronic monitoring produces improved data about catches and discards, which can be utilized to enhance assessments of the stocks. In terms of the RBM features that derive from EcoFishMan's definition of RBM, the CQM system includes outcome targets (catch quotas) and a system for documentation with respect to these (by way of CCTV). Further, the CQM scheme confers the fishermen with a partial burden of documentation, namely insofar the participation in the scheme comes with an obligation of continuous monitoring of catches by CCTV. However, the fishermen in this case are not formally responsible for the documentation process. This responsibility seems to remain with the relevant management authorities. Finally, it appears that the CQM does not provide fishermen with flexibility with respect to management means. The fishermen in the CQM scheme are subjected to the same regulations as they would otherwise be (except that their TAC allowance is replaced by a catch allowance). While a CQM system in which fishermen are formally responsible for catch documentation and are granted extensive flexibility of management means can readily be imagined, such a system has apparently not been tried out in practice so far.

2.3.2.3 RBM in New Zealand: The case of Challenger[13]

Located at the Northern tip of the South Island of New Zealand, the Southern Scallop fishery is to a considerable extent self-managed by an industry led company named Challenger (Arbuckle and Drummond 2000; Harte 2001; Mincher 2008). Challenger was established in 1994 by scallop quota owners to organize and exercise management and stock enhancement activities in this fishery, which is the largest scallop fishery in New Zealand. Later, Challenger also was contracted to provide

[11] Other experiments related to CQM have been performed (Fitzpatrick et al. 2011); see also following footnote.
[12] Reports on experiences with CQM systems in Denmark, Scotland and England are available here: www.fvm.dk/yieldoffish (last visited 10.02.2012).
[13] This section is provisionary. RBM in New Zealand will later be examined and reviewed in more detail by Kåre Nolde Nielsen.

management services (e.g. planning, organization and implementation of management activities) for a number of other fisheries. For the scallop fishery, Challenger is responsible for planning stock enhancement (i.e. harvesting and distribution of oyster spat) as well research, management and compliance activities. Challenger annually presents a plan for these activities, seeking approval by the Ministry of Fisheries. The considerable devolution of management responsibility from the Ministry to Challenger was formalised in a Memorandum of Understanding, which among other things specified the Ministry's requirements regarding the information supporting the management plans proposed by Challenger. The Government consented Challenger considerable legal flexibility, such as allowing for an exemption to the MSY criterion for sustainability (instead Challenger found it preferable to work for sustainability of the scallop fishery by way of a rotational harvesting scheme). It has been argued that such regulatory flexibility has been an important factor in Challenger's relative success with managing the fishery. The costs of management measures and research for Challenger are covered by a levy on harvested scallops (Arbuckle and Drummond 2000; Mincher 2008).

For New Zealand's Ministry of Fisheries, Challenger became an early "proof of concept" of the Ministry's intent to move in the direction of co-management through the development of a fisheries management plan.[14] Such management plans have now been developed for most of New Zealand's fisheries (Anon 2011a). Illustrating the close affinity between New Zealand's fishery policy and the way RBM has been defined in the EcoFishMan project, the Ministry of Fisheries envisaged that the development of harvest strategy standards would be a central element in the fisheries plans:

> It is anticipated that the harvest strategy standard, once approved, will be implemented in fisheries plans. A fisheries plan is an agreement between parties to manage the fishery in a particular way. Fisheries plans will explicitly say what tangata whenua[15], stakeholders, and the Ministry want from a fishery, how to get there, and how to ensure that plan objectives are met (Anon 2006: 5).

In the fisheries plans, the role of the standards will be to represent what the Government "considers to be the minimum level necessary to ensure sustainable fisheries " (Anon 2006: 4)

The case of scallop management and stock enhancement by Challenger's comprises the RBM features RBM outlined in table1: The management plan includes the outcomes to be achieved as well as documentation of why they can be expected to be achieved based on the suggested management means. In practice the burden of documentation (including the responsibility and costs of data gathering of contracting research services for analysis and assessment of the data) rests on the operators. Finally, the authorities have granted the operators flexibility to achieve policy objectives in a ways they consider to be efficient.

[14] Two other early fisheries plans were developed and proposed for the Orange Roughy fisheries and for the "Blue Buff" Oyster fishery Hill, N. A. O., Michael, K. P., Frazer, A., and Leslie, S. (2010). "The utility and risk of local ecological knowledge in developing stakeholder driven fisheries management: The Foveaux Strait dredge oyster fishery, New Zealand." *Ocean & Coastal Management*, 53, 659-668, Yang, Y. W., Frazer, A., and Rees, E. (2010). "Self-governance within a QMS framework — The evolution of self-governance in the New Zealand Bluff oyster fishery." *Marine Policy*, 34, 261–267.

[15] Tangata whenua is a Māori term of the indigenous peoples of New Zealand.

2.3.2.4 Co-management of Goose barnacles in Galicia

The management of Goose barnacles (*Pollicipes pollicipes)* in Galicia, in North Western Spain, has since 1992 been carried out in co-management arrangements between the fisheries authority and local organized guilds of fishermen (i.e. cofradías). The cofradías are permitted to exploit resources in accordance with management plans that have been approved by the fisheries authority. The plans need to fulfil a range of official requirements and are evaluated by fisheries biologists and personnel in the public administration. While the organisational capacities differ between the cofradías, it has been reported that an increasing number of them are acquiring the capacity to develop and implement such plans (Molares and Freire 2003). Successful cofradías manage implementation, control and surveillance of harvest allocations and regulations in a way that is more effective and less costly than if exercised by regional authorities (Frangoudes *et al.* 2008). A project developed a Geographical Information System, which allowed for the collecting and analysing data with a higher space/time resolution than previously. This system in turn allows for the more precise assessment as well as "real time" management" by the cofradías based on information from catch rates (Molares and Freire 2003).

Management plans that are in accordance with formal requirements comprise, in our terms, both outcome targets as well as relevant documentation of the feasibility of achieving the outcome targets through the proposed management measures. While questions relating to in which sense, and to what extent, the burden of proof rests in principle on the operator would invite a more specific analysis of this case, it seems clear that the practical burden of documenting is carried by the cofradías in collaboration with researchers. Finally, we note that cofradías have flexibility of choosing management means, as exemplified by its "real-time" management of permitted harvesting areas.

2.3.2.5 Spencer Gulf Prawns in South Australia

The management of Spencer Gulf Prawns in South Australia has been described as a successful case of a high and increasing degree of self-management in the trawl fishery (Hollamby *et al.* 2010; Zacharin *et al.* 2008). While the formal management responsibility resides with the Minister for South Australian Agriculture, Food and Fisheries, an industry organisation that represents the fishermen and licensees in this fishery (The Spencer Gulf and West Coast Prawn Fishermen's Association) has developed a capacity to propose and implement management measures. The industry association proposes harvests strategies, which are incorporated into a perennial management plan, which is then drafted by the staff members in the ministry for approval by the minister[16]. The plan specifies how the general policy objectives for fisheries in South Australia will be met (Dixon and Sloan 2007). Jointly coordinated by the Association and the South Australian Research and Development Institute, research surveys are performed by fishermen. The surveys support stock assessments, which in turn are used as a basis for proposing harvests strategies. In addition, the Association recruits fishermen to undertake "spot surveys", which are used for making real-time management decisions (i.e. opening and closing fishing grounds based on catch compositions). Fishermen are compensated economically for undertaking surveys, and these costs, together with other research and management expenses are paid for by the industry through licence fees collected by a public authority (the Fisheries Agency) (Zacharin *et al.*

[16] The latest management plan for this fishery: Dixon, C., and Sloan, S. (2007). "Management Plan for the South Australian Spence Gulf Prawn Fishery", Department for Primary Industries and Resources South Australia). City: Adelaide.

2008). A new fisheries management act from 2007 (Anon 2011b) opens up for even more industry self-management in this fishery. However, it has been noted that the industry will not receive the full management responsibility as certain management functions such as compliance, regulations and audit will remain with the public authorities (Hollamby *et al.* 2010; Zacharin *et al.* 2008).

In sum, the management of Spencer Gulf Prawns in South Australia is a highly promising candidate for RBM in the sense defined in the EcoFishMan project. Outcome Targets (related to generic policy objected) are specified, and it is documented how they may be achieved in a harvest strategy. As with the case of cofradías a refined discussion regarding the placement of the burden of documentation would invite a more thorough analysis. However, it seems clear that the practical work of documenting is carried by the Association in collaboration with researchers. Finally, the Association has flexibility of choosing management means, as exemplified by its "real-time" opening and closure of fishing grounds.

2.4 A conceptual model for RFMS – Prototype 1

Drawing on the definition of RBM in the EcoFishMan and on experiences with RBM in fisheries management as well as in other contexts, we now propose a conceptual model of Responsive Fisheries Management System (Fig. 1). The model will at this stage be kept at a rather abstract level; the elaboration and contextualisation of the RBM concept in EcoFishMan will be a collaborative outcome, which will be nourished and shaped though outcomes of the projects different work packages.

2.4.1 Explaining the model of Prototype 1

The RFMS model (Fig. 1) fundamentally conceptualises RBM as a contract between an Authority and an Operator. In the context of resource management, the operator would be a resource user, typically an organized group of fishermen. The contract, i.e. the management plan, specifies the conditions under which the Authority can permit the Operator to use the resource in question. The model includes a third agency: the assessor. The role of the assessor is to evaluate whether the contract between the Authority and the Operator has been fulfilled.

The model is based on EcoFishMan's definition of the RBM:

> Defining an acceptable impact and leaving it to resource users to identify the means to meet the requirements and to document the effectiveness of the means, and ultimately achieve the requirements.

The model's key elements follow from this definition: The specification of acceptable impact (i.e. Outcome Targets); that operators are required to document the effectiveness of management means (so that it can be expected that the Outcome Targets will be reached; and that operators are granted flexibility of choosing management means.

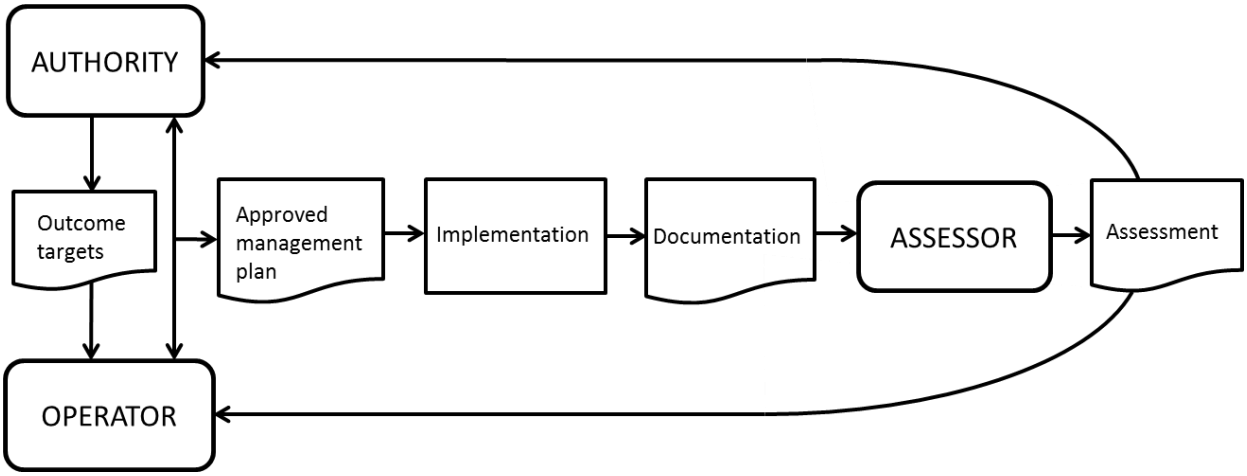

Figure 1. Conceptual model of a Responsive Fisheries Management System (RFMS). The model includes three key agencies. The *Authority* has the final responsibility for resource management. The authority specifies outcome targets to be reached in a specific context. The *Operator* proposes a management plan, which documents that the outcomes targets are achievable through a suggested set of management measures. The Operator may cooperate with the authority about the development of the plan, but the required quality of documentation is decided by the Authority. If a management plan is approved by the Authority, the Operator can proceed with its implementation. Also at this stage the Operator may cooperate with the Authority (the Authority may for instance supply enforcement services). While implementing the plan, the Operator is responsible for collecting information required for assessing whether or not the Outcome Targets were (or will be) achieved. The Operator may contract research services to this end. The documentation provided by the Operator is reviewed by an *Assessor*, which is institutionally independent from the both Authority and the Operator. The Assessor assesses whether or not (or the extent to which) the outcomes targets are achieved. For the Operator, the assessment will provide a basis for drafting modified management plans. For the Authority, the assessment may be a basis for implementing sanctions (if outcome targets were not achieved), for rewarding achievements, or for revising outcome targets. See text for further explanation.

The basic intention of this model of RBM is captured in the Commission's Green paper on the reform of the Common Fisheries Policy, which explicitly links RBM to a shift in the burden of proof:

> The industry can be given more responsibility through self-management. Results-based management could be a move in this direction: instead of establishing rules about how to fish, the rules focus on the outcome and the more detailed implementation decisions would be left to the industry. Public authorities would set the limits within which the industry must operate, such as a maximum catch or maximum by-catch of young fish, and then give industry the authority to develop the best solutions economically and technically.
>
> Results-based management would relieve both the industry and policy-makers of part of the burden of detailed management of technical issues. It would have to be linked to a reversal of the burden of proof: it would be up to the industry to demonstrate that it operates responsibly in return for access to fishing (CEC 2009: 11-12).

How, and in which sense the burden of proof should be placed on the operator is not a straightforward question (Charles 2002; Fitzpatrick *et al.* 2011; Lassen *et al.* 2008), and the refinement of EcoFishMan's model of RBM in this respect will require further work. In the context of fisheries management there

may for instance be legal barriers to shifting the burden of evidence in theory, but not to shifting a certain responsibility for outcomes in practice (Wakefield 2010).

The model depicted in figure 1 describes stages of a RBM process. In the following each of the stages, as well as the agencies responsible for their conduct, will be briefly introduced.

2.4.1.1 The RBM agencies: Authority, Operator and Assessor

The Authority is an organizational entity enacting authority in pursuit of the management objectives decided for a fishery. It represents the interests of the public, and it is ultimately responsible for the management. With regard to fisheries management in an EU context, one task in EcoFishMan will be to specify an appropriate agency of this kind: Is it the Council of Ministers, the Commission, or should the authority be exercised on a member state level? Or should the authority be some combination of these? Such questions represent the kind of specifications of the RBM concept required to develop an operational RFMS.

The Operator is an organizational unit with delegated authority to develop management plans and oversee or conduct fishing operations within the standards decided by a management authority. It is an organization that represents a group of similar resource users. It could be a group of fishermen fishing for the same type of resource and/or could be specified in terms of gear type or areas.

The Assessor is a scientific organization capable of assessing and reviewing the documentation that the operator is responsible for delivering. While the operator may purchase a scientific service to help with preparing the required documentation, the Assessor should be institutionally independent from both the Operator and the Authority in order to facilitate objectivity. In the context of fisheries management in Europe, ICES would have the capacity to perform the role of such an assessor.

2.4.1.2 Outcome Targets

Specified by the authority, the outcome targets reflect overall policy objectives. For instance, the stated objective of the current CFP is to “ensure exploitation of living aquatic resources that provides sustainable economic, environmental and social conditions” (Anon 2002). Presently, the specific Outcome Target used in CFP context seems to be MSY, as it is a declared aim to bring all EU stocks to MSY levels by 2015 (Froese and Proelß 2010). In practice, however, the Precautionary reference points may remain negative Outcome Targets (negative in the sense that they are states one should avoid rather than aim for). One task in the EcoFishMan project is to propose appropriate forms of Outcome Targets. This work will rely on the selection of a set of appropriate indicators (WP 2; Task 2.1 and 2.2).

2.4.1.3 The Management Plan

The management plan is a contract between the authority and the operator: it specifies the conditions under which the latter may operate. The plan will formally be proposed by the operator, although the authority may assist with the development of the plan (as it typically is the case with fisheries management plans in New Zealand and Australia). In practice, the draft plan may circulate between Operator and Authority until it is found acceptable to both parties.

In the proposed plan, the authority will pay attention to how the Outcome Targets are to be met, and to how the Operator will provide information that allows for an assessment of whether or not the targets have been met in practise once the plan has been implemented. As long as they appear to

comprise a realistic way to achieve the Outcome Targets (and are within the laws), the authority will not interfere in the operator's planning of management measures. One important question concerns how other stakeholders than the operator in question may be accommodated into the planning process.

A management plan may be proposed for a number of years. In this case, it may only be slightly revised, reflecting for instance information in (say) annual resource assessments.

2.4.1.4 Implementation of the management plan

Once the management plan has been approved, it may be taken into implementation. Also at this stage, there may be different degrees of cooperation between authority and operator, depending on the organisational capacity of the latter and so forth. Often the authority may provide enforcement service, but the operator may prefer to monitor and ensure compliance itself.

2.4.1.5 The documentation system

During the implementation phase, the operator is responsible for gathering data required for the documentation process. The operator may typically choose to do this in cooperation with a contracted research provider. Under a cost recovery regime (and when carrying the responsibility for documentation as a condition for being allowed to use the resource), the operator has an incentive to find efficient ways to minimise research costs (Arbuckle and Drummond 2000; Harte 2001; Stokes *et al.* 2006). One way to achieve this might be that the resource users themselves participate in data-collection (Bjørkan 2011; Zacharin *et al.* 2008).

2.4.1.6 Assessment and feedback procedures

The main purpose of the assessment is to evaluate whether (or the extent to which) the Outcome Targets in question have been achieved. The quality of the submitted documentation will also be assessed as adequate documentation is part of the requirement for access to the resource. One question to be resolved is how the assessor can be funded without undermining its independence of the authority and the operator. The way ICES is funded may actually be rather ideal in this respect.

The assessment will be submitted to both the operator and the authority. For the operator, the assessment is a useful when preparing a new/updated management plan for the authority. For the authority, the assessment is the background for deciding whether previous Outcome Targets are still adequate (to represent the fisheries policy) or whether they should be revised.

If the assessment shows that the Outcome Targets are achieved, the operator may submit its previous management plan with minor updates, and it may be immediately accepted by the authority. In turn, if the Outcome Targets are not met, the authority will implement sanctions for the operator, and it may also raise its requirements for subsequent management plans. More serious types of sanctions include suspension of privileges granted to an operator, or even access rights to the resource in question.

2.5 How the transition towards a RFMS can be facilitated in practise

Because the RFMS presented here implies a rather radical shift from present fisheries management practises in a European context, it is important to think about how a transition to this model can be made feasible. A meaningful shift of responsibilities for documentation and management functions to

resource users is conditioned on that the resource users develop capacity for executing these functions in a reliable and efficient manner. It is therefore worth noting that reported successful cases in which responsibilities for such management functions have been gradually shifted to resource users appear to have involved long time spans. To implement RFMS as the new general resource management system in one fell swoop may neither be politically feasible nor likely to work well in a transition phase.

One alternative would be to offer RFMS as an alternative to the existing management system. On a voluntary basis, organised operators could then propose management plan for a specific fishery. Since the operators in RFMS systems have more responsibilities than they have within the existing management system, however, it may be difficult to motivate an RFMS alternative. In New Zealand and Australia, much of the motivation for operators to organise management and research activities stems from that fisheries management in these countries is subjected to cost recovery, which makes it interesting for the operators to seek to reduce costs. Without a cost recovery regime it would seem unlikely that RFMS would be implemented widely on a voluntary basis in Europe. In order to motive RFMS as a voluntary alternative, one option would therefore simply be to implement (full or partial) cost recovery, perhaps in combination with other incentive mechanisms (such as the catch quota bonus allocated to those that volunteer for the CQM system).

An alternative strategy would be to implement RFMS on a non-voluntary basis in a step-wise fashion. This could be done by preserving a certain share of the TAC for RFMS proposals. To be eligible for using the RFMS TAC share in a given fishery, resource users would need to get organised, to propose a management plan, and to seek its approval from the authority. The TAC share reserved for RFMS could then be increased with time in pace with operators development of RFMS capacity.

Final Note

This task will be followed up with work dedicated to the specific design and development of an operational RFMS model.

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3. Task 4.2: Design and development of guidelines for making a general management plan

3.1 Introduction

The purpose of this text is to propose guidelines for making a general management plan (MP) within an RFMS context. As suggested in Task 4.1, the MP is a contract between an authority and an operator with regard to the management of a specific fishery for a limited period of time. While the plan formally is proposed by the operator, the authority will be responsible for supplying some of its key elements (i.e. outcome targets and planning guidelines), and may also assist with the development of the plan in different ways. In practice, the draft plan may circulate between an operator and an authority until it is found acceptable to both parties.

The guidelines proposed here are general in scope and are intended to be used:

1. As a basis for the further development of the documented and tested Management Planning Procedures and Framework (D4.5). The guidelines for the general management plan will be formulated on the basis of the conceptual model of the RFMS (Task 4.1) as well as principles and experiences drawn from existing results based management systems (D1.1).
2. As a framework for the development of a RFMS management plan from the individual case fisheries within EcoFishMan. Since the implementation of RFMS procedures for these cases starts in an existing micro-management regime, this framework will not be identical to one developed for a full-fledged RFMS regime.

The guidelines for the general MP developed here are organized as a list of specifications that must be addressed in order for the plan to be approved by the authority. Such specifications include, in addition to requirements with regard to the MP boundaries and the identity and responsibilities of the operator, a description of the fishery and the main management challenges; the outcome targets decided for the fishery; the harvest strategies proposed; the implementation strategy; the documentation system; planning procedures; and monitoring and control system (see section 3.2.4 below).

The format and content of the MP, as well as the procedures for its development, are dependent of the properties of the RFMS system. The general guidelines proposed here (section 3.2.4) have been developed for a transformation scenario, where the starting point is a micro-management regime. This starting point is characterized by a lack of a legal framework to support an ideal RFMS (e.g. general ban on fishing as default, except in terms of approved MPs). If the authority and operators in a fishery agree to introduce the RFMS in one go the MP invitation and the MP should be designed accordingly. In any case the decision on a transformation phase contra immediate implementation has to be agreed upon in a pre-MP-invitation meeting between authority and operators.

In the pre-MP-invitation meeting the suggested invitation should be discussed and agreed upon. There should be an agreement on the identification of the fishery including operators involved, planning period, target species, geographical range, management objectives and conditions for approval of MP. Then outcome targets relevant for the management objectives should be identified and discussed before they are set by the authority in the final invitation for the MP of the fishery in case.

Another highly important constraint at this starting point is that potential operators are unlikely to hold the organizational capacity required to develop and implement a MP for large and complex fisheries. These constraints will be taken into close consideration in the planning of initial RFMS.

Starting with a brief presentation RFMS and as well as of the relevant definitions of key RFMS terms (Complete EcoFishMan Glossary in chapter 4.), section 3.2.3 offers an outline of the RFMS planning procedure. An important part of this procedure is a template for the MP invitation issued by the authority to an operator. The MP invitation, together with the MP guidelines, establishes the framework within which the operator can develop the management plan.

On the basis of the general planning guidelines proposed in Section 3.2.4, a practical procedure for developing an initial management plan for case fisheries is proposed in Section 3.3. Within the EcoFishMan context, WP4 does not have previous access to information needed in order to develop an informed MP invitation to WP5. In advance of the MP invitation it is necessary to establish a "pre-invitation meeting" between the authority and potential operators in order to initiate the management planning process. Here the upcoming invitation is discussed to ensure that it is specific enough and has the acceptance of the operator. Attention is given to the identification of the fishery and the timeframe of the MPs as these issues are particularly relevant in the transition towards RFMS.

Since the purpose of the EcoFishMan project is to develop and test the RFMS model, the procedures and specifications proposed here are provisional and open for revision.

3.2 RFMS system specifications

RFMS is an adaptive management system that is results-based and ecosystem-based. The RFMS attempts to reduce micro-management by involving stakeholders and may include elements of rights-based management and co-management, as appropriate. A key idea in results-based management is that management authorities define acceptable impact and leave it to resource users to identify the means to meet the requirements and to document the effectiveness of the means, and ultimately achieve the requirements. In the RFMS model (see Task 4.1 Fig. 1) the management plan (MP) is a contract between an authority and an operator. The MP specifies the conditions under which the authority can permit the operator to use the resource in question.

3.2.1 RFMS Concepts

The Authority represents the interests of the public, and it is ultimately responsible for the management.

The Operator is an organization that represents a group of similar resource users. It could be a group of fishermen fishing for the same type of resource and/or could be specified in terms of gear type or areas.

The Assessor is an organization capable of assessing and reviewing the documentation that the operator is responsible for delivering in a RFMS. The assessor evaluates whether or not outcome targets have been met. To strengthen the objectivity and legitimacy of the assessments, the assessor should be institutionally independent from both the operator and the authority, and the assessment work should be financed in a way that allows for this.

A Management plan is a formal arrangement between a management authority and operators that specifies the partners in the fishery and their respective roles, the agreed objectives for the fishery, the management rules and regulations that apply, and provides other relevant details about the fishery. The formal responsibility for developing the management plan is delegated to an operator.

Outcome targets are specific and measureable performance objectives defined for a fishery a management authority.

3.2.2 Basic institutional and legal RFMS conditions

An ideal RFMS model presupposes a general legal framework where access to harvest a resource is allowed on the conditions specified in a management plan approved by an authority, and that an operator can be made responsible for developing and implementing this management plan. In the case where such institutional and legal conditions are not fulfilled, the authority must develop an implementation plan that includes a preliminary RFMS model designed to work under micro-management conditions and a procedure by which ideal RFMS conditions can be developed and implemented. In the following, a transitional RFMS planning procedure is proposed, which invites operators to propose a management plan for a limited fishery (e.g. lumpsucker) or a part of a fishery (e.g. 20%).

3.2.3 RFMS planning procedure and the management plan invitation

The planning process starts when the authority issues an invitation for operators to propose a management plan for a specific fishery for a limited period of time. The invitation should be finalized after a pre MP invitation meeting with authority and operator/s. The MP invitation is a formal document containing the elements suggested in the table below (Table 3). The invitation must be read in conjunction with the MP guidelines suggested in section 3.2.4. In the final management plan, key sections will be based directly on the MP invitation, or information within this invitation.

Table 3: The Management Plan Invitation: Transition scenario

The Management Plan Invitation: Transition scenario	
Content	**Comments**
1. IDENTIFICATION Introduction setting out the purpose of the MP invitation, including: a. The identity of the fishery it is valid for (targets species; geography) b. The identity of operators qualified to respond (fleets; organizational requirements) c. The time frame d. The main focus and purpose of the plan requested e. Relevant elements of the transition plan	When RMFS systems are introduced within micro-management regimes, the legal (and political) conditions are not in place to make management planning a condition for access. While the authority may request approved MPs in before granting any access to limited and/or special cases of fisheries (such as the lump sucker case), potential operators will at the outset be unlikely to have the organizational capacity required to develop and implement MPs for larger and more complex fisheries such as Iceland's demersal fisheries. In such cases, the MP invitation must initially be incentive-based and/or only consider a part of the fishery in question. In such cases we propose to set off (e.g.) 20% of the TAC for RFMS. This RFMS TAC can only be harvested on the basis of an approved management

	plan. Note that the MP invitation should foresee and determine distributional issues relating to cases in which only some quota holders have developed an MP that has been approved by the authority. A transition towards RFMS can be achieved gradually though increasing the RFMS TAC in pace with operator's organizational capacity development.
2. OUTCOME TARGETS This section identifies the key management objectives and outcome targets, with indicators, that must be addressed by the MP. The Management objectives must address the following dimensions: a. Biological and ecological b. Economic c. Social & cultural In addition, this section may include a list of allowed management instruments.	In a transition scenario, there will be no general policy process for formulating management objectives and principles as outcome targets. This is a problem, but can also be turned into an advantage. Instead of a complete set of outcome targets, it is possible to accept the management goals in place, and on top of that focus on a select range of outcome targets for the RFMS fishery (the CQM model). For instance, the focus of the MP could be to eliminate discards by developing, selective fishing, flexible quota regimes & documentation systems. Alternatively, the focus of the MP could for instance be on energy efficiency and emissions.

3.2.4 The Management Plan Guidelines

The MP Guidelines will vary according to the implementation scenario as outlined above. If a MP invitation is issued for a transition scenario, as it is the case here, it will be up to the authority to device a transition plan by way of the changing the specifications of the MP invitations through time. The planning task for the operator, in turn, will focus on meeting the issued MP invitations. See Table 4.

Table 4: The Management Plan

The Management Plan	
Content	**Example and comments**
1. INTRODUCTION Explanatory text, setting out the purpose of the MP, the identity of the fishery it is valid for, the parties that are bound by it, the time frame and the main focus and purpose of the plan.	The text can be developed on the basis of section 1 in the MP invitation. In addition, it can explain the practical details of the planning process. Example: Dixon & Sloan 2007: p8
2. FISHERY OVERVIEW A brief description of the fishery in question, including the target species and the condition of the resource, the fleet and technology, etc. This is largely contextual info. Nevertheless, this section can be used to give a general status report, and note recent development trends and specific	This is a section which can be updated and improved in each new version of the MP. It can be supplied by the operator, but must be reviewed by the authority. It may be a good idea for the authority to provide a template and page restrictions. But this must vary according to the complexity & scope of the fishery.

issues and management challenges.	Example: Dixon & Sloan 2007: 9-14 Note that this section can be used to focus attention towards specific management challenges such as by-catch and discards.
3. OUTCOME TARGETS This section identifies the key management objectives and outcome targets, with indicators, that must be addressed by the MP. The management objectives must address the following dimensions: Biological and ecological Economic Social & cultural	The text here is provided by the authority as part of the MP invitation. In case of a transition strategy, the list of relevant outcome targets will be restricted unless they can be derived from the existing management framework (MP0). Examples: • Dixon & Sloan 2007: 21-25 • Management plan for Icelandic Cod (see appendix)
4. HARVEST STRATEGIES This section reports the key decisions, where the operator is taking over responsibility from (old-style) management authorities. This section of the plan reports on the results of the planning exercise & negotiations (among members) undertaken by the operator. Ideally, each outcome target, linked to a performance indicator, is here made operational by linking specific indicator limits to specific management actions, for instance in the form of Harvest Control Rules.	This section should report on the strategies for each of the three dimensions (biological, economic and social), but also must comment on how these interact. See Dixon & Sloan 2007 (p 35-37) for a way to report the key propositions of a management plan in table format. Here, each performance indicator is linked to an outcome target, which is a trigger linked to a management response list. See management plan for Icelandic Cod (appendix) for an example of a harvest strategy.
5. MONITORING, COMPLIANCE SANCTIONS The focus here is on the system that allows the plan to be implemented as intended. a. Monitoring systems and instruments (e.g. stock assessment surveys, electronic logbooks, systems for accounting for by-catch & discards) b. Compliance & sanctions systems: In case of breaches, how will operators ensure that damage is repaired and prevented (exclusion of non-complying vessels/personnel) c. Identification of risk: The work undertaken to identify risk factors & situations and ensure that these get appropriate attention	This concerns the extent to which the operator can carry out operations in accordance with the plan, including how the operator is can make its members comply with the plan. While this concerns the capacity of the documentation system described below, it also concerns how the operator will deal with breaches, when such are detected (penalties; exclusion).
6. DOCUMENTATION The issue here is how reliable information is mobilized so that the authority can be confident that the management plan is appropriately constructed and carried out and the outcome	Regarding the assessment of biological outcome targets, a transition scenario could take a starting point from the division of responsibility between national marine labs and ICES, so that the lab functions are left to the operator

targets achieved. The documentation system must be designed so that it will be possible to measure the performance on relevant indicators, so that appropriate management responses are triggered. That is, if the outcome target is derived from an MSY criteria, and there is a harvest control rule that uses biomass level as trigger for TAC determination, there must be a documentation system (e.g. stock assessment) that allows timely and reliable production of stock biomass estimation. This section can follow the same outline as the previous, with description of the documentation systems for each of the three categories of outcome targets.	(or the operator purchases this service from an independent lab) and this work is reviewed and assessed by ICES (in the role of assessor). The documentation tasks along the other dimensions can be solved in the same way, either by setting up an internal system or hiring external consultancies.
7. PLANNING PROCESS This section reports on the planning process and decisions undertaken under 3 and 4 and 5 above. The main question concerns whether the plan was made with appropriate possibilities for all members to participate and influence the result. In general, the MP plan should reflect good governance ideals.	Also required is some kind of procedure by which the MP gets support by a majority of the members. How external stakeholder groups are consulted in planning may also be an issue.

3.3 A practical procedure for developing an initial management plan for case fisheries (MP0)

In a mature RFMS regime, the authority issues a MP invitation. A prospective operator will respond to this invitation, developing a management plan using the information in the invitation together with the MP guidelines above. In a mature RFMS regime, both the authority and the operator will be well established and have experience with the fishery and the management challenges it faces. Much of the basic information needed for making the plan will be readily available, for instance in the form of previous planning documents. The situation the EcoFishMan project faces is very different from this for two reasons. First, neither WP4 nor WP5 have experience & previous knowledge as managers of the fisheries in question. Even if such knowledge exists in the required form, we do not have access to it. Second, the management knowledge that do exist in the sector, is formatted to accommodate the micro-management regime, and does hence not fit perfectly to EcoFishMan requirements.

In the following, guidelines for collecting the relevant information on case fisheries for EcoFishMan purposes are suggested. The intended uses of this information are twofold (Table 5).

First, it is needed by WP4 in their capacity as “authority” in order to be able to develop the MP invitation outlined above. For this purpose, the following items must be covered: The identification of the fishery and the boundaries of the planning area; information that allows identification of possible operator candidate and evaluation of their capacities; information that allows for identification of existing management goals and how they can be transformed into outcome targets; and information

with regard to the basic management regime characteristics that allows for the development of a reasonable transformation strategy.

Second, the information collected is needed by WP5 in the capacity as "operator" on order to be able to respond adequately to the MP invitation outlined above and interpret the MP guidelines correctly.

Table 5: Guidelines for the initial Management Plan for fisheries (MP0).

Guidelines for MP0	
Content	**Comments**
1. FISHERY IDENTIFICATION Identify the fishery in question by some combination of: a. Target species b. Ecosystem characteristics c. Geographical location d. Gear type e. Vessel types f. Etc	The four EcoFishMan cases have been identified in the DoW. The identification here must build on that, but probably needs to be more precise. Used for: MP invitation, section 1 For the Icelandic case, which target species are included, which are left out? Does the case include the all fleet segments? (Offshore; coastal fleet; tourist fishing; leisure fishing)
2. EXISTING MANAGEMENT STRUCTURES & PROCESSES This section identifies main feature of the existing management regime in a way that facilitates the operationalization of the RMFS model to inform the MP invitation. a. Information regarding the identity of key RFMS agencies: authority, potential operators and assessor. Since these must be built on existing structures, we need information of the existing structure and the division of responsibilities in the established management process b. Information of relevance to a transformation process. This includes info on basic legal requirements: Is the management authority in position to make access to fishing conditional on the existence of a MP? Can industry groups (i.e. "operators") be made responsible for planning? If access to fishing is an established right, what incentives are available for making industry groups take on planning responsibilities voluntary? Can transferability regimes be implemented for transformation purposes?	Used for: MP invitation section 1 and 3
3. MANAGEMENT OBJECTIVES AND INSTRUMENTS This section identifies the existing management objectives and the allowed management instruments. Since these objectives originate in a micro-management regime, they will usually be of	Within the established regime, management objectives will usually be present for all three dimensions, i.e. a. Biological and ecological b. Economic c. Social & cultural Nevertheless, some dimensions will usually be more

another form than outcome targets. Nevertheless, they can usually be translated into outcome targets.	emphasized (e.g. biological) than others (e.g. social), and they will not necessarily be expressed in the same way. For instance, while biological goals may come in the form of Harvest control rules, economic and social coals may be expressed as access conditions (e.g. who can own fishing vessels & quotas) and allowed management instruments (ITQs). Used for: MP invitation section 2

Note: In order to keep the focus on key tasks, we propose that information at this step is kept at a minimum, focusing only on what we need for the purpose of the MP invitation.

3.4 References

Dixon, C. and S. Sloan (2007). Management Plan for the South Australian Spencer Gulf Prawn Fishery. Department for Primary Industries and Resources South Australia. Adelaide.

4. EcoFishMan Glossary

4.1 Introduction

The main objective of the EcoFishMan project is to develop what we have called a Responsive Fisheries Management System (RFMS), which is a type of Results Based Management (RBM) system specifically adapted to fisheries within the CFP framework. In this note, we propose a terminology for EcoFishMan. This is done by developing a Glossary of key terms used for elements and relationships in RBM systems. The Glossary is partly based on OECD's Glossary of Key Terms in Evaluation and Results Based Management (OECD 2011). The glossary will be further developed by WP4.

4.2 Proposed Glossary

Assessor

An organization capable of assessing and reviewing the documentation that the operator is responsible for delivering in a RFMS. The assessor evaluates whether or not outcome targets have been met. To strengthen the objectivity and legitimacy of the assessments, the assessor should be institutionally independent from both the operator and the authority, and the assessment work should be financed in a way that allows for this (EcoFishMan).

Indicator

A variable, pointer, or index related to a criterion. Its fluctuations reveal the variations in those key elements of sustainability in the ecosystem, the fishery resource or the sector and social and economic well-being. The position and trend of an indicator in relation to reference points or values indicate the present state and dynamics of the system. Indicators provide a bridge between objectives and actions. (Source: FAO 1999)

Management authority

Organizational entity enacting authority in pursuit of the management objectives decided for a fishery (Source: EcoFishMan, WP 4). Authority could be a coastal state or the European Commission.

Management goal

The higher-order objective to which a management intervention is intended to contribute (OECD 2011). A management goal is derived from a management principle (constitutional-order) and is specified into a set of more operational management objectives (collective-order).

Management intervention

Strategies or instruments aimed to impact the state of a fishery with reference to authorized objectives. Examples are input and output controls and economic measures[17]. Authority may define sanctions towards the operator if outcome targets are not fulfilled.

[17] This is based on OECDs definition of Development intervention.

Management objective

A purpose to be achieved within the overall principles of sustainable development. Objectives are often hierarchical, referring to specific scales within the system. Objectives encompass all the dimensions and relevant criteria of sustainable development. (FAO 1999)

Management plan

A formal arrangement between a management authority and operators that specifies the partners in the fishery and their respective roles, the agreed objectives for the fishery, the management rules and regulations that apply, and provides other relevant details about the fishery. In RBM, the formal responsibility for developing the management plan is delegated to an operator (Based on FAO 1999 and EcoFishMan, DoW).

Operator

Organizational unit with delegated authority to develop management plans and oversee or conduct fishing operations within the standards decided by a management authority (Source: EcoFishMan, WP 4).

Outcome target

Specific and measureable performance objectives defined for a fishery on the basis of agreed and appropriately authorized general goals, standards and principles, as defined by the authorities based on the policy objectives. In the case of a RBM, the outcome targets are found in policy documents (Table 6). Since the exact formulation of the outcome targets depends on the infrastructure of the RBM system, outcome targets are not found in conventional management settings. (Source: specification of EcoFishMan, DoW)

Reference point

A classification device, defined in relation to the measure of an indicator, for distinguishing different management-relevant states of the system under management. A ***Biological Reference Point*** is a metric of stock status. A ***Target Reference Point*** indicates a state of a system which is considered to be desirable and at which management action should aim. A ***Limit Reference Point*** indicates a state of a system which is considered to be undesirable and which management action should avoid.

Responsive fisheries management system (RFMS)

RFMS is a term generated for use in the EcoFishMan project, and it is used to refer to the new system that we are proposing to develop. The RFMS is an adaptive management system that is results-based and ecosystem-based. The RFMS attempts to reduce micro-management by involving stakeholders and may (or may not) include elements of rights-based management and co-management, as appropriate. (Source: EcoFishMan, DoW)

Results based management (RBM)

Defining an acceptable impact and leaving it to resource users to identify the means to meet the requirements and to document the effectiveness of the means[18], and ultimately achieve the requirements.

RBM is a management strategy focusing on performance and achievement of results. In particular RBM differs from conventional management with regard to the division of responsibility between a management authority and the operator as it delegates defined responsibilities from the former to the latter.. The role of the management authorities is to decide and follow up on a relatively small set of specified and enforceable objectives, outcome targets. How these objectives are going to be pursued and achieved is left to the operator/operators on the condition that the results are acceptable. In contrast to a conventional management system, the management authority will not attempt to regulate the conduct of the industry in detail. Instead, the operator is left considerable discretion with regard to how they conduct the fishing – as long as they achieve the targets specified for the fishery in question (Source: EcoFishMan, WP 4).

Table 6: Examples of outcome targets in a RBM

Management goal	Management objective	Outcome target	Indicator	Target reference point
Sustainable ecosystem	Sustainable fishery	Catch $\leq$ TAC	Annual catch Etc.	F_{msy}= 1.3
Sustainable ecosystem	Sustainable fishery	Maximum by-catch of young fish $\leq$ 5% of total catch	% by-catch received from observers and CCTV Etc.	1% by-catch

4.3 References

EcoFishMan (2010) Ecosystem-based Responsive Fisheries Management in Europe, Description of work, KBBE.2010.1.4-07: Using results-based management to achieve CFP objectives, 120 pp.

Commission of the European Communities (2006). "Green Paper: Towards a future Maritime Policy for the Union: A European vision for the oceans and seas", Brussels, 7.6.2006, COM (2006). 35 p.

OECD (2011). Glossary on Key Terms in Evaluation and Results Based Management. Paris, OECD.

Punt, A. E. (2006). "The FAO Precautionary Approach after almost 10 years: have we progressed towards implementing simulation-tested feedback-control management systems for fisheries management?" Natural Resource Modeling **19**: 441-64.

[18] This formulation revises the RBM definition presented in the EcoFishMan project proposal (which stemmed from the call text that the proposal addressed). The term "resource users" replaces the term "those concerned". "Those concerned" is ambiguous because other types of stakeholders than, for instance, fishermen may be "concerned" in the (non-intended) sense of having concerns. Further, "impact" replaces "negative impact" in order to allow for the possibility of specifying (minimum) positive impacts in RBM. Finally, the term "ultimately achieve" has been added as the resource users are responsible for achieving requirements not, only for documenting the effectiveness of management means.

5. Appendix: Icelandic cod management plan 2009/10.

Source: ICES advice
http://www.ices.dk/committe/acom/comwork/report/2010/Special%20Requests/Icelandic%20cod%20management%20plan.pdf

The Ministry of Fisheries and Agriculture in a letter dated 23 May 2009 requested ICES to evaluate the management plan for Iceland cod cited below:

"Since the mid 1990's the Government of Iceland has attempted through its management scheme for the Icelandic cod fishery to increase the size of the cod stock towards the size that generates maximum sustainable yield. To that end, progress has been made, reflected in lower fishing mortality and increase in spawning stock biomass from historical low of 120 thousand tons in 1993 to 220thousand tons at present.

In accordance with this general aim, the Government has adopted a management plan for the Icelandic cod stock for the next five fishing years, starting by the 2009/2010 fishing season. The main objective of the management plan is to ensure that the spawning stock biomass (SSB) will with high probability (>95%) be above the present size of 220 thousand tons by the year 2015. According to a medium-term simulation conducted by the ICES North West Working Group this spring (Draft NWWG Report 2009), this will be achieved by applying the following harvest control rule (HCR) to calculate the total allowable catch (TAC):

> *TACy+1 == (0.2 B4+,y + TACy)/2, where y refers to the assessment year and B4+ to biomass of 4 year old and older cod.*

This HCR formulation is based on recommendation from national committee of experts that re-evaluated the performance of the initial catch rule adopted in 1995. The Marine Research Institute, Iceland has used this HCR as a basis for advice the last two years. The Government 0f Iceland will determine the TAC for the next five fishing years according to this harvest control (HCR) and informs hereby the General Secretary of this harvest strategy. The Government of Iceland requests the Council to evaluate this management plan at its earliest convenience."