MareFrame

Proposal Summary FP7-KBBE-2013
Start date: 1st January 2014
Duration: 48 months
EC contribution: € 6.000.000

Co-creating Ecosystem-based Fisheries Management Solutions

What is new about this approach?

There have been developments within the field of modelling tools and data collection is now greater than ever before. Different models are now widely used with extensive ecosystems data. A fundamental question is; how well and consistently these models work for real ecosystems. This has created a need for comparing the models on the same datasets, to ultimately test the prediction of the models. It is a process that requires a sufficient historical data set. For the first time, the performance of such a broad spectrum of ecosystem based models will be developed, tested and compared systematically on the same ecosystem, and evaluated using the same underlying dataset. The new predictive monitoring system will be based on responsiveness, flexibility, stakeholders´ responsibility and communication and developed and demonstrated through training actions, role-play and workshops with stakeholders.

Why now?

As pointed out by DG MARE, the European fisheries policy is in urgent need of reform. Vessels are catching more fish than can be considered safe, thus exhausting individual stocks and threatening the marine ecosystem. Today, three out of four stocks are overfished: 80% of Mediterranean stocks and 47% of Atlantic stocks. The fishing industry is experiencing smaller catches and facing an uncertain future. Considerable changes are needed to make fishing environmentally, economically, and socially sustainable.

The CFP is reviewed every 10 years, which gives an opportunity to implement new knowledge and tools into the marine management systems in Europe. The importance of this ecosystem approach to fisheries management has been highlighted by DG MARE, FAO, ICES, IWC and NAMMCO. FAO has recently provided guidelines on the Ecosystem-based approach to fisheries management and stakeholders show increased interest in sustainable management, e.g. through the requests for certification of sustainable fishing. These requests arise due to pressure from consumers, advocacy groups, general societal awareness of limited resources and environmental concerns.

MareFrame Abstract

MareFrame seeks to remove barriers preventing a more widespread use of an Ecosystem-based Approach to Fisheries Management (EAFM). It will develop assessment methods and a Decision Support Framework (DSF) for management of marine resources and thereby enhance the capacity to provide integrated assessment, advice and decision support for an EAFM. Enabling comparisons between relevant "what-if" scenarios and their likely consequences, DSF will support the implementation of the new Common Fisheries Policy (CFP) and the Marine Strategy Framework Directive (MSFD). The project SMEs, together with RTD institutions and stakeholders, will develop and demonstrate the use of innovative decision support tools through training actions, role-play and workshops. Indicators of Good Environmental Status (GES) will be developed along with models for ecosystem-based management. The models will take multi-species approaches into account and be developed and compared through seven datasets of six European regional seas. The models will draw on historical data sets and data from new analytical methods. Model performance will be compared and evaluated using a simulated ecosystem as an operating model. Learning from the experience of previous and on-going research, MareFrame integrates stakeholders at its core using a co-creation approach that combines analytical and participatory processes to provide knowledge that can be applied to policy-making, improving management plans and implementation of EAFM. The project dissemination will use innovative ways to ensure effective usage of project outcomes. The work packages and the allocation of roles have been designed to ensure effective collaboration through the project's lifetime. MareFrame liaises with other national and international research projects and is of high relevance to the futuremanagement of living marine resources in Europe in a changing environment, taking a holistic view incorporating socio-economic and legislative issues.

1. Overview of Research Activities

The MareFrame project will develop new assessment methods and a decision support framework for the management of marine resources. Enhancing the capacity to provide integrated assessment, advice and decision support for an ecosystem based approach to fisheries (EAF), it will support the implementation of the Marine Strategy Framework Directive (MSFD). The project partner SMEs, together with RTD institutions and stakeholders, will develop and demonstrate the use of innovative monitoring systems and decision support tools for fisheries advice through training actions, role-play and workshops. Indicators of Good Environmental Status (GES) will be developed along with models for ecosystem-based management. The models will be evaluated taking multispecies approaches into account in accordance with FAO guidelines to the ecosystem approach to fisheries. Ecosystem models will be developed and compared on seven datasets of six European regional seas and then evaluated using a simulated ecosystem as an operating model. The project is of high relevance to the future management of living marine resources in the European countries in a changing environment, taking a holistic view incorporating socio-economic and legislative issues.

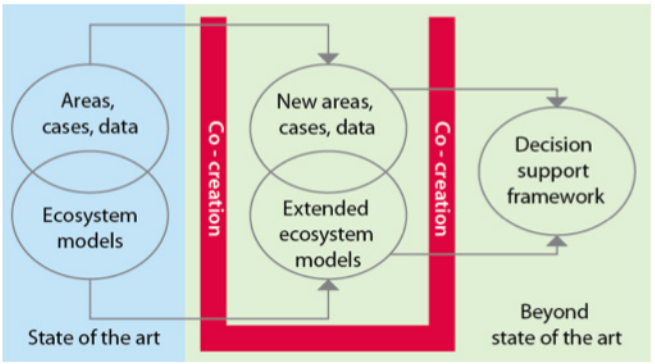
Learning from the experience in previous research projects, MareFrame integrates stakeholders at its core using a co-creation approach. Co-creation combines analytical and participatory processes to provide knowledge that can be usefully applied to policy-making and management. It provides an arena to optimize stakeholders' knowledge and capabilities, allowing for a collective improvement in the knowledge on the paths for implementing the EAF, elaborating and refining ideas on the basis of the results generated in the project. The design of work packages and the allocation of roles is focused on ensuring an effective dialogue and collaboration through the lifetime of the project.

MareFrame is of high relevance to the future management of living marine resources in the European countries in a changing environment.

Concept

The vision of MareFrame is to significantly increase the use of ecosystem-based approach to fisheries management (EAFM) when providing advice relating to European fish stocks.

The overall objective of MareFrame is to remove the barriers preventing more widespread use of EAFM through development of new tools and technologies, development and extension of ecosystem models and assessment methods, and development of a decision support framework that can highlight alternatives and consequences; all in close collaboration with the stakeholders in the co-creation processes.



2. Background to the Research

It has long been recognized by most national and international, scientific and political bodies concerned with the management of marine resources that the incorporation of a multi-species and ecosystem approach, is of utmost importance for future improvement of the management of fisheries and other living natural resources. Despite this general agreement on the importance of the subject, relatively little progress has been made in this field in recent years. Current models tend to be based on single species, not taking multi-species interactions into account. This typically results in an overestimate of the production capability of the system and quotas which are too high. Although the models being used today have been evaluated using simulations, real data sets etc., it is established (e.g. in the Baltic Sea) that multi-species issues are very important for management.

The project will address important issues within the Common Fisheries Policy (CFP), the Marine Strategy Framework Directive (MSFD) and Habitat Directive (HD), which call for the development of ecosystem-based management tools to improve fisheries and environmental management, to ensure preservation of the marine biodiversity and assess the environmental status of marine waters to proclaim Good Environmental Status (GES).

The circumstances, conditions and dynamics of the ecosystems have a clear impact on fisheries and fish stock dynamics. It is therefore important to have a thorough understanding of mechanisms controlling life history traits and plasticity within species, since time scale adaptations have broad reaching implications.

It is critical to be able to predict how any given species or food-web structure will respond to changes within the ecosystem, since it can have significant implications for conservation strategies in an ecosystem-based management framework.

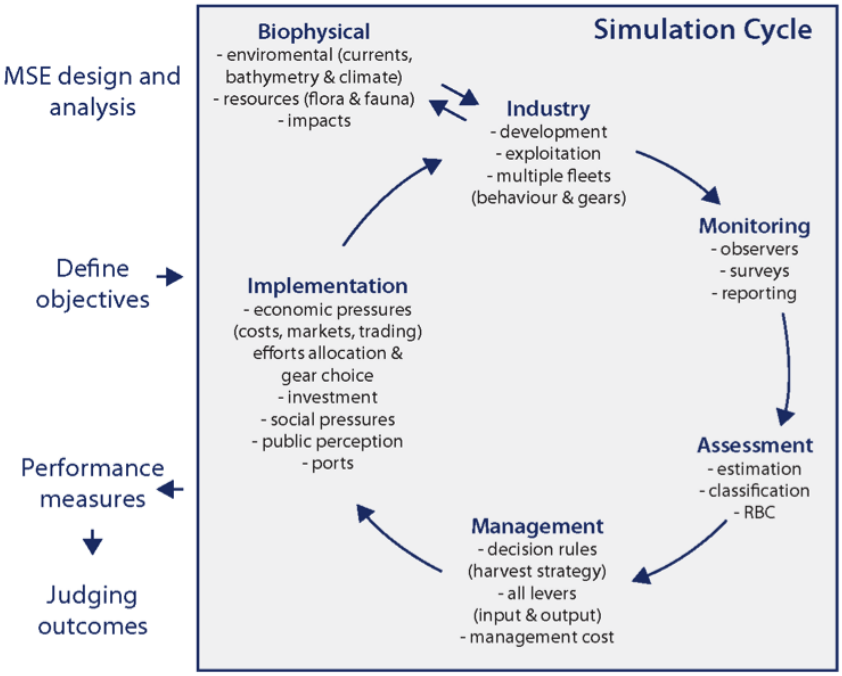
Models are key tools for integrating a wide range of system information in a common framework. Attempts to model exploited marine ecosystems can increase understanding of system dynamics; identify major processes, drivers and responses; highlight major gaps in knowledge; and provide a mechanism to virtually test management strategies before implementing them in reality.

How

The approach used will involve an iterative management plan co-created with stakeholders, taking environmental, economic, social and legal issues into account using methods indicated in the figure[1], although the primary aim will not be a formal management strategy evaluation.

The outcome of this project will include development of innovative tools to simulate the impact on the ecosystem under different management scenarios in collaboration with stakeholders of marine resources. The aim is to contribute to the implementation of the CFP, MSFD and HD by improving ecosystem-based management in the European regions taking a multispecies approach into account.

The models and analyses will be used to address specific important issues in each case study. Although the modelling approach is well-defined from the outset, these specific applications will be defined during the co-creation phase of the project.



[1]From http://atlantis.cmar.csiro.au/www/en/atlantis/mainColumnParagraphs/00/content_fi les/fi le/atlantis_mse_cycle.gif where this describes methods for Management Strategy Evaluation. Here Atlantis will be used as an operating model to compare theperformance of EwE and GADGET.

The project will address the following:

1. *New Tools and Technologies* will be used for developing new knowledge on population distribution, spatial patterns of spawning components, stock structure and definition, habitat preferences, species interactions (including food-web and predator-preys interactions), migration patterns, and biological parameters.

2. *Multispecies Assessment Methods* include fitting models to multiple datasets. Two main models (the statistical multispecies toolbox GADGET and Ecopath with Ecosim (EwE)) will be fitted to seven Case Study datasets representing six regional seas (Baltic Sea, North Sea, Northern Waters, Western Waters, Mediterranean Sea and Black Sea). In addition, one case study from the International participant, NIWA NZ. The enclosed Table summarises the eight case studies in MareFrame and the six Ecosystem models tested. Model results will be compared by area and both models and ecosystem indicators will be evaluated using the Atlantis-based simulated ecosystem.

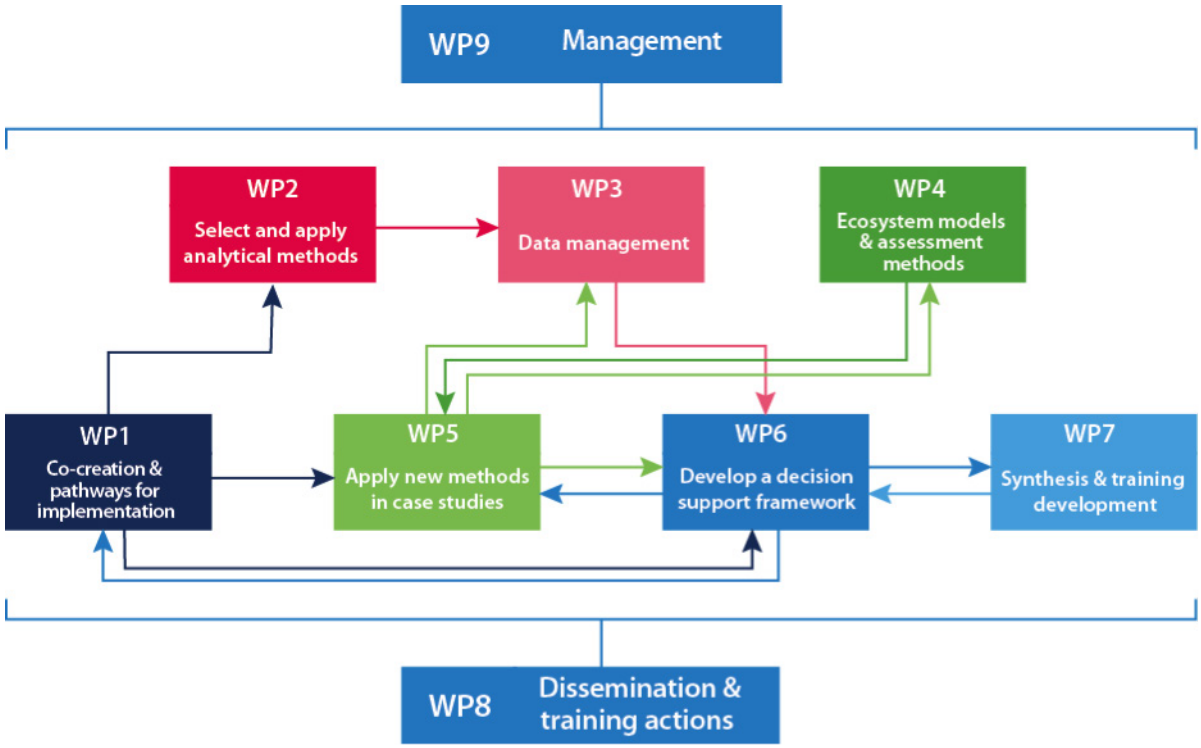
Of these models, EwE models tend to be holistic ecosystem models whereas GADGET models are formal statistical models, being consistent with FAO guidelines on Best Practise models for the ecosystem approach to fishery management.

3. *Decision Support Framework*. Set of policy options of the Case Studies for Managers involving iterative management plan developed with stakeholder and considering the socio-economic responses.

4. *Training Actions and Cooperation of Stakeholders*.

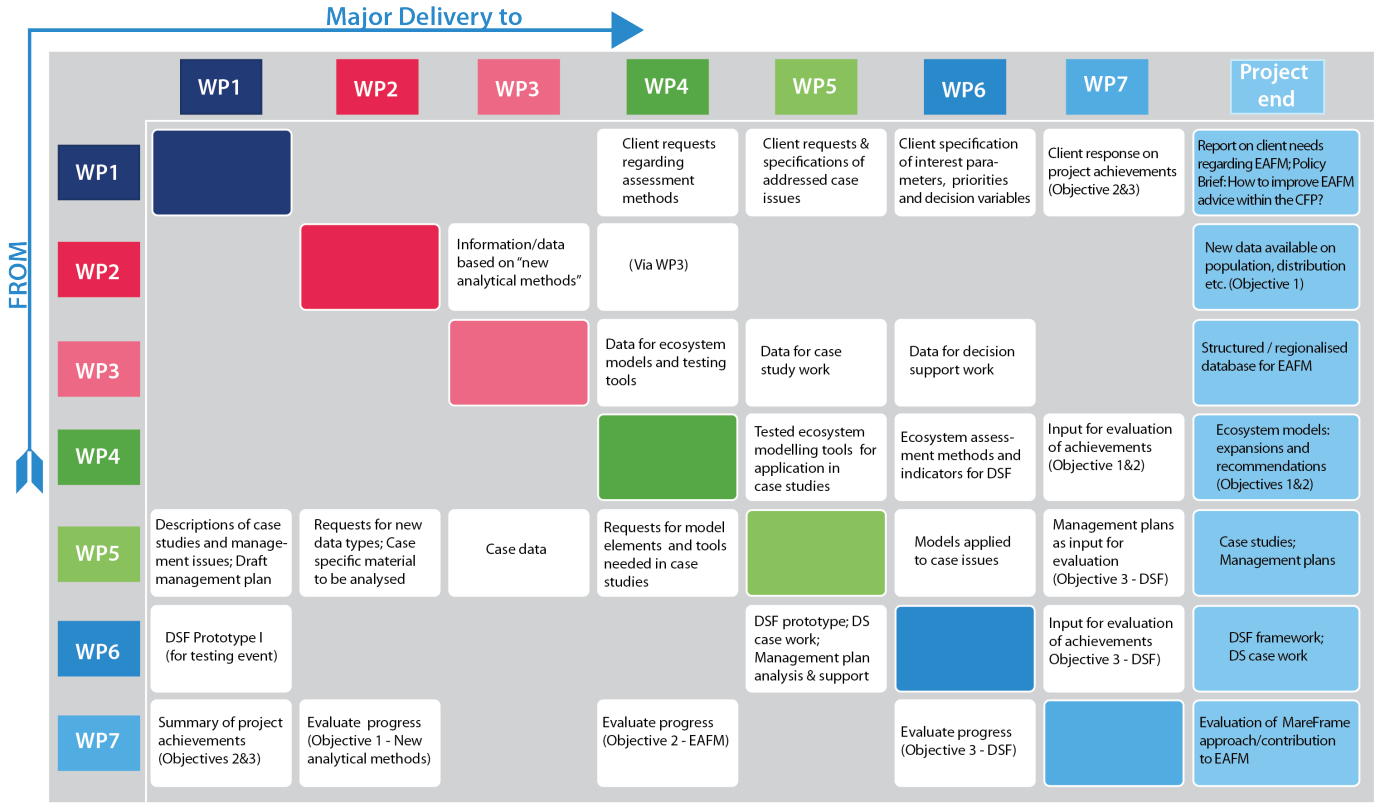
The project is organized in 9 work packages (6 RTD: WPs 2-7 and 3 OTH: WP1,8,9). Through a logical sequence of steps, the WPs are structured to contribute to the implementation of an EAFM DSF based on increased stakeholder involvement. To this end the consortium has implemented a separate WP on stakeholder interaction (WP1). The interaction of the WPs is illustrated in the Figure and indicates the iterative nature of the overall work plan. Throughout the project, the close cooperation between stakeholder and scientist in the co-creation activities, dissemination and training actions are all designed to contribute to the implementation of an EAFM.

The Work Package (WP) diagram



Overview of MareFrame Case Studies (CS) and Ecosystem models:

Case Studies (CS)	Partner	Name	Gadget	EWE	Atlantis	Multi-species prod. models	FishSums	Size spectra
Baltic Sea	SLU	Valerio Bartolino	X	X		X		
North Sea	NRC	John Pope	X	X		X		X
Northern & Western Waters - Iceland	MRI	Gudmundur Thordarsson	X	X	X			
Northern Waters - West of Scotland	UNIABDN	Paul G Fernandes		X			X	
South-Western W. - Iberian Waters	CSIC	Javier Ruiz	X					
Mediterranean	CNR	Francesco Colloca	X		X			
Black Sea	INCDM	Gheorghe Radu	X	X				
New Zealand - Chatham Rise	NIWA	Ian Tuck			X			



The specific objectives in MareFrame:

SO	Description	Means of verification
1	To identify the paths for implementing EAFM through co-creation with stakeholders	A comprehensive overview of barriers to EAFM adaptation produced, including identification of how these can be removed or reduced
2	Apply novel analytical methods and integrate state-of-the-art data into EAFM	Can provide case studies with previously unavailable data relating to population structure, spawning components and trophic levels
3	Design integrated and harmonized database containing collated ecosystem data suitable for supporting EAFM development	Integrated database exists Database contains and provides data as specified
4	Extend existing ecosystem models	Extended ecosystem models with additional indicators, socio-economic data, report templates exist, etc.
5	Develop innovative ecosystem based assessment methods/ tools and conduct performance evaluation	Innovative ecosystem based assessment methods that address multi-species concerns developed and evaluated
6	Apply and configure the extended ecosystem models and the assessment tools in the respective case studies	Ecosystem models generated and configured for each case, assessment tools tested and verified for each case
7	Develop, test and adapt a decision support framework (DSF)	Tools and guidelines for decision support exist, used and evaluated as suitable by stakeholders
8	Compare and evaluate the developed ecosystem based models and the decision support system, including socio-economic impact	Overall evaluation exists, co-created in close collaboration with stakeholders in line with their opinion of the suitability and relevance of the main project outcomes
9	Develop interactive learning tools to facilitate the implementation of EAFM	Learning tools exist, used and evaluated as suitable by stakeholders

3. Main Results of the Research

Major MareFrame outcome	Can or will be used by (most important users)	How to ensure use, what steps are needed	How will the impact be of use
Co-creation process with stakeholders where knowledge is generated.	"Experts" (the scientific community) and "users" (policy makers, fishermen, NGO).	Arrange co-creation sessions throughout the project in the case study regions. Produce user-friendly guides and "hands-on" involvement of users, applying new tools and prototypes.	Co-creation allows combining experiential knowledge (fishermen and traditional) with "hard science" to improve our understanding of marine ecosystems.
Apply novel analytical methods to develop new ecological knowledge.	Fisheries Commission, Regional Body, industry, NGOs and scientists.	Explore the results of previous projects and existing databases The approach will be tailored to the requirements of each of the case studies.	A database that can store results from case-studies and ecosystem modelling and provide data back to case studies from other projects where required.
A scientific modelling tool, which can be used in a broad spectrum within ecosystem-based management.	Stakeholders, policy makers, ecosystem managers, recreationists, scientists, public officials, conservation groups, IGO's and NGO´s.	Step-change in understanding of how marine ecosystems interact with the human societies that exploit them. Combine state-of-the-art models of marine populations, the ecosystem, and the human economic and social system. Conduct virtual experiments on ecosystems.	Expand GADGET and EwE to include processes and data sets currently not used in single stock fisheries assessments. This will result in a toolbox capable of predicting and comparing various management decisions in the EAF framework
Identify data requirements and create broad consistency of GES indicators.	Ecosystem managers, scientists, stakeholders, NGO´s and IGO's.	Together with stakeholders document the goals that different groups have for the ecosystem. and the range of strategies that might be considered as candidates for achieving these goals.	Ensure that all of our models can simulate the marine ecosystem to provide indicators of GES; adapt existing economic models to include the essential elements of EAFM; develop DCM to deal with sociological aspects; and ultimately combine these three elements into each Ecosystem Model to simulate the marine socio-ecosystem.
Decision Support Framework (DSF). Identification of the need for change in the practises of the management advice to achieve the principles of ecosystem-based management.	Ecosystem managers, policymakers stakeholders, scientists, IGO's and NGO´s.	DSF clients will have a key role in specifying inputs for the decision analysis and provide important feedback on the general DSF approach and the specific decision tools that will be developed. Enhance the utility of the DSF for clients through the development of a user-friendly interface that renders relevant and likely outcomes of different "what if scenarios" visible.	In practice, the specific DSF tools developed for the specific issue in focus in each case study will be used to support the development of iterative management plans and ill allow for adaptation of the DSF in order to improve its practical utility.
Innovative solution that ensure synergy between scientists and the managers.	Stakeholders, ecosystem managers, recreationists, scientists, public officials, conservation groups, policy makers, IGO's and NGO´s.	A simulations based training tool will be l developed in parallel with the DSF using the same interfaces and based on input from the co-creation process with stakeholders.	A novel training tool for none-scientists for ecosystem approach to fishery management. A story-centred collaborative learning simulation that easily can be used to teach how to use the MareFrame DSF.
Socio-economic cost-benefit analysis.	Stakeholders, ecosystem managers, recreationists, scientists, public officials, conservation groups, IGO's and NGO´s.	Developing and agreeing on a set of ecosystem model evaluation criteria of the different ecosystem models in used the different case studies. Evaluated DSF in the different case studies of the project through co-creation and evaluation with stakeholders. Use Multi Criteria Analysis (MCA) to combine a range of positive and negative impacts into a single framework to allow easier comparison of scenarios resulting from EAFM in case studies.	The MCA often requires subjective judgment in the decision process. However, in MareFrame we will validate the results of the MCA through direct interaction with relevant stakeholders in the case study regions.

The MareFrame consortium includes 28 RTD, SME and ORG participants from 14 countries:

The proposal group (MATIS IS, UI IS, NMFRI PL, UH FI, MRI IS, UNIABDN UK, CSIC ES, IEO ES, CNR IT, INCDM RO - FOMLRM RAC, SLU SE, SU SE, CETMAR ES - MED RAC, - BS RAC - SWW RAC, UiT NO, Nofima NO, IFM-AAU DK, UCT ZA, CSIRO AU, NIWA NZ, NRC UK, SYN DK, SIM UK, MAPIX UK, STL UK, NS RAC, NWWRAC, PELAGIC RAC & ICES) have been active both in fisheries research, modelling and its management in close cooperation with the industry. The partners have experience as consultants within strategic management, marketing and processing. The group is experienced both in co-ordinating and participating in FP6 and FP7 projects.

The MareFrame consortium represent the biggest fisheries nations (total catches) of the EU 27 (DK, ES and UK). Two associated members, Norway and Iceland, have one of the biggest fisheries in Europe. (http://ec.europa.eu/eurostat). The MareFrame partners represent different fishery management policies and broad range of European fishing grounds of commercial importance. The following lists the ocean representation of the consortium:

- EU Member States (Denmark, Sweden, Finland, Polland, UK, Spain, Italy, Romania): Baltic Sea (ICES IIIb, c & d), North Sea (ICES IIIa & IV), West Scotland (ICES Vb, VI & VII), Iberian Peninsula (ICES VIIIc and IXa), the Mediterranean and Black Sea
- EU Associated Country (Norway): North Sea (ICES IIIa & IV)
- EU Accession Negotiations State (Iceland): Northeast Atlantic Ocean (ICES Va)

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The Call and topic text

Call Identifier: FP7-KBBE-2013-7-single-stage
Publication Date: 10 July 2012
Budget: € 341 350 000
Deadline: 05 February 2013 at 17:00:00 (Brussels local time)
OJ Reference: OJ C202 of 10 July 2012
Specific Programme(s): COOPERATION

KBBE.2013.1.2-08: Innovative insights and tools to integrate the ecosystem-based approach into fisheries advice
Call: FP7-KBBE-2013-7 – single stage (Note that bold and headings were added to the original text)
The challenge of implementing the ecosystem-based approach to fisheries management requires development and best use of innovative scientific methods, new tools and technologies as well as new statistical, modelling tools and assessment methods that go beyond the single-species approaches which used to be, to a large extent, the main sources of scientific advice. It will also require adaptation of current management objectives and practises.

Tools and Technologies
The first objective of the project is to make the best use of new tools and technologies such as genetics, microchemistry, and isotope analyses to develop new knowledge on population distribution, spatial patterns of spawning components, stocks structure and definition, habitat preferences, species interactions (including food-web and predator-preys interactions), migration patterns, and some biological parameters such as growth and fecundity, for species targeted in fisheries carried out **in EU waters as well as for other species caught incidentally or are affected by fisheries because of related impacts on their habitats or food sources.**

Multispecies Assessment Methods
The second objective is to develop innovative assessment methods that address multispecies concerns resulting from biological interactions between species. This includes consideration of biodiversity, food-web structures and habitat impacts including indicators of these. A new range of approaches supporting the development of new assessment tools, **including ecosystems models** such as size-based models and **indicators of ecosystem function** (e.g. size based metrics, stable isotopes, etc), among other options, should be considered and developed. These approaches and the ecosystem models should be tested on data rich marine ecosystems with a long history of fisheries exploitation, as well as on data poor systems using simulations. The performance of these ecosystems models should be compared and evaluated with respect to their suitability for fisheries and environmental management purposes, and to their ability to predict responses of a multispecies community of fish to changes in fishing mortality. Future data requirements for correct implementation of these models should be also investigated.

Decision Support Framework
The third objective is to develop an innovative decision support framework that serves to provide an evidence basis for policy makers about the trade-off between various management options on a multispecies basis. The project shall utilise the assessment methods developed under the second objective as a basis **to develop interactive and integrated tools for decision support** and include a series of case studies of possible approaches, **involving iterative management plan** development with stakeholder involvement and considering the socioeconomic effects. Modelling development and management aspects should be based on close cooperation with the **fishing industry** in order to integrate fishers' knowledge.

Training Action
In addition, **training actions** will have to be planned between scientists and stakeholders (including fishing sector, international scientific organisations providing scientific advice on fisheries management and competent authorities for decision-making).

CASE STUDIES & DATASETS
The project should use available information (including historical data sets) from the EU Data Collection Framework. It should also liaise with other relevant national and international research initiatives (e.g. on-going FP7 research activities such as FP7 **ECOKNOWS, MYFISH and BENTHIS** projects).

The project should address the regional dimension of the Common Fisheries Policy (CFP) and at least one case study should be developed in each of the following regional seas: Baltic Sea, North Sea, Northern and Western Waters, and Mediterranean and Black Seas.

International Collaboration
Participation of relevant partners from **Australia, Canada and New Zealand** will add to the scientific and/or technological excellence of the project and ensure effective uptake of ongoing international efforts for the implementation of the ecosystem-based approach to fisheries management.

Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).
One project may be funded.
Additional eligibility criteria:
- The requested European Union contribution shall not exceed **EUR 6 000 000** per proposal.
- The estimated EU contribution going to S**MEs shall be at least 15%** total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.
- The duration of the proposed project shall be maximum 4 years.

Expected impact: The project will provide new knowledge, methods, models and tools to support the integration of an ecosystem-based approach in fisheries advice and to support decision-making for ecosystem based fisheries and environmental management. It will be of high relevance to the future management of marine living resources and will support proper implementation of the new CFP, the Marine Strategy Framework Directive (MSFD) and the Habitat Directive.