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Integrated, Ecosystem-based Marine Spatial Planning: First Results from International Simulation-Game Experiment

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Abstract. *Marine ecosystems around the globe are increasingly affected by human activities such as fisheries, shipping, offshore petroleum developments, wind farms, recreation, tourism and more. Whereas the necessity and urgency to regulate and plan competing marine spatial claims is growing, the planning and regulation of these claims is even more difficult than on land, among others because of insufficient data and knowledge on how ecosystems are affected, the international dimension of marine ecosystems and, as yet, poorly validated Marine Spatial Planning practices. The main question in this paper is: what exactly defines the high level of complexity of Marine Spatial Planning (MSP), and, given the strong transnational dimension of MSP, what can be done to integrate and harmonize the various planning practices of the EU member states? In this paper, the authors present the use of an international simulation-game (with 68 international MSP professionals in Lisbon, 3 November 2011) to conduct an expert panel study on MSP, both in the real and gamed countries. In order to analyze the panel and in-game data, several scales on MSP-outcome and process were defined and validated. In this paper the authors present the main insights of the pre-game panel study. They conclude that the differences in approaches to the MSP process and outcomes among the real countries are significant.*

Keywords. *Marine Spatial Planning, Marine Ecosystems, Integrated Planning, Simulation-game, Serious Game, Modeling, Science-policy Interface, Evaluation*

1. Introduction

Marine ecosystems around the globe are increasingly affected by human activities such as fisheries, shipping, offshore petroleum developments, wind farms, recreation,

tourism and more. Whereas the necessity and urgency to regulate and plan competing marine spatial claims is growing (Douvere 2008; Douvere and Ehler 2009) the planning and regulation of these claims is even more difficult than on land, among others because of insufficient data and knowledge on how ecosystems are affected (Halpern et al. 2007, 2008), the international dimension of marine ecosystems (e.g. HELCOM 2010) and, as yet, poorly validated Marine Spatial Planning practices.

Under the EU Marine Strategy Framework Directive (MSFD), member states, in respect of each marine region or sub-region, are required to make an initial ecological assessment of their marine waters; furthermore, EU Integrated Maritime Policies are actively promoting integrated MSP-frameworks, science-based and stakeholder involved planning processes and harmonization of marine data (collection) (CEC 2008, 2010a, 2010b).

Today, a number of MSP activities exist in different stages from early beginnings and pilot projects to already established statutory systems. Germany for example has spatial plans in place for both, its North Sea and Baltic Sea EEZ (www.bsh.de/en/Marine_uses/Spatial_Planning_in_the_German_EEZ/index.jsp). The Netherlands have developed a '2009-2015 Policy Document on the North Sea', which analyses spatial developments in the sea and formulates policy related targets (Ministerie van Verkeer en Waterstaat 2009). Norway has an integrated management plan for the Barents Sea in place (Olsen et al. 2010). The EU roadmap lists MSP activities in several Member States (CEC 2008). HELCOM uses Plan Bothnia as a pilot for MSP (Backer 2011, http://planbothnia.org/). In the EU funded INTERREG project BaltSeaPlan for several demonstration areas in the Baltic Sea (Pomeranian Bight, Western Gulf of Gdańsk, Middle Bank, Danish Straits, Hiiumaa and Saaremaa, Pärnu Bay and the Western Coast of Latvia) detailed maritime spatial plans are under development taking into account the analyses on national maritime strategies and scenarios (www.baltseaplan.eu). Furthermore several EU or nationally funded projects have looked into MSP processes and accompany from an analytical and/or scientific point of view existing MSP activities, for example MESMA (www.mesma.org), MASPNOSE (www.surfgroepen.nl/sites/CMP/maspnose), BALANCE (www.balance-eu.org), BaltSeaPlan (www.baltseaplan.eu), PlanCoast (www.plancoast.eu), KnowSeas (www.knowseas.com) and Coastal Futures (Lange et al. 2010). Similar initiatives are pending in other regions of the world, s.a. North America (Halpern et al. 2011) and China. An international professional community, collecting and sharing best-practices on MSP is emerging in ICES, HELCOM, VASAP, OSPAR and other international regimes.

The question arises what – from a policy sciences perspective - constitutes the high-level of complexity of Marine Spatial Planning (MSP) and subsequently, what the requirements are for effective marine spatial planning processes and MSP institutions. Qualifications such as 'integrated', 'participatory', 'eco-system-based', 'adaptive' planning are rhetorically powerful, but often poorly defined, at least in practical terms (Farmer et al. 2012). It may prove difficult to find common ground on such matters when networks of stakeholders in different countries, who share one sea – the North Sea, the Baltic, the Mediterranean – have different, often conflicting values, interests, cultures and institutions. Given the strong transnational dimension of MSP particularly in Europe (see Gee et al. for the Baltic Sea case), what can be done to

integrate and harmonize the various planning practices of the EU member states? And what is the role of science (data, models) and scientists in the integrated, participative etc. planning process?

In this article we analyze the complexity of MSP and explore some strategies to deal with it. We used a game-based, quasi-experimental study to collect expert opinions on Marine Spatial Planning.[1] The simulation-game or serious game, shortened below as SG, was played in the Marine Aquarium in Lisbon on 3 November 2011 by 68 international experts, mainly scientists, policy-advisors and marine spatial planners, coming from 16 countries (14 EU countries, plus Russia and Canada). In this paper we do not go into detail on the game itself, but present the results of a pre-questionnaire filled out by the participants in the game and later used to analyze the insights from the game in its policy context.

2. MSP – a complex, multi-actor socio-technical system

Unclear system boundaries

In most simple terms, MSP is 'spatial planning at sea', in particular including planning in the Exclusive Economic Zones (EEZ) - sea areas over which a national state – according to the UN Law of the Sea - has special rights concerning the exploration and use of marine resources, including production of energy from water and wind. The EEZ stretches out from the seaward edge of the state's territorial sea– the coastal baseline - to 200 nautical miles (370 kilometer) unless the EEZ's of two or more countries overlap because their coastal baselines are closer together than 400 miles.[2] In casual usage, the term EEZ may include the territorial sea and even the continental shelf beyond the 200-mile limit (see Wikipedia, 2012, http://en.wikipedia.org/wiki/Exclusive_economic_zone).

The spatial planning inside the territorial or 12-mile zone is rather evident because an increasing number of planning decisions on land, stretch out into the immediate coastal zone and vice versa. For the EEZ however the need for planning the many different spatial functions, may not be so evident at first, not even for the EEZ of one country. But external pressures and conflicts increasingly make it necessary. In Germany, for instance, the trigger for developing a marine spatial plan came from offshore wind farming – a new type of spatial claim at the time – which requested coordination with existing uses such as shipping, protected areas and fishing (Kannen and Burkhard 2009). In such cases, difficult questions can arise: What are the boundaries of the planning system: the regional territorial sea, the eco-system, the

1 The data gathered through the game-based experiment and policy intervention are extensive and part of further academic PhD research and publications. In this paper we focus on the analysis of how to profile and assess the level of integration and effectiveness of MSP in a comparative and explanatory fashion.

2 Part V, Article 55 of the UN convention of the sea states: "The exclusive economic zone is an area beyond and adjacent to the territorial sea, subject to the specific legal regime established in this Part, under which the rights and jurisdiction of the coastal State and the rights and freedoms of other States are governed by the relevant provisions of this Convention."

EEZ or the 12-mile zone or all of them at the same time? What kind of human activities and effects should be taken into consideration? What are the transnational dimensions? What should be the planning horizon? and many more questions.

In light of the above, the EU-DG Maritime Affairs defines Maritime (sic!) Spatial Planning rather arbitrarily as:

> "…planning and regulating all human uses of the sea, while protecting marine ecosystems. It focuses on marine waters under national jurisdiction and is concerned only with planning activities at sea. It does not cover management of coastal zones or spatial planning of sea-land interface." (www.ec.europa.eu/maritimeaffairs/policy/maritime_spatial_planning/index_en.htm).

Four dimensional planning

Even more than terrestrial planning, MSP involves planning in at least three spatial dimensions – maybe even five when deep-earth geological layers and a long-term horizon are taken into consideration[3]; dimensions that in different ways are not easily accessible for human observation:

- (Sub) sea floor – for instance clam fishing or drilling for gas.
- Sub sea level – for instance fishing or the construction of wind farms.
- Sea level – for instance commercial and recreational shipping.
- Above sea level – for instance military activities or wind farms.

International-transnational

To make it more complicated, the EEZ's of two or more countries will commonly share the same (sub) regional sea, a gulf or ocean, e.g. the Oresund strait, Kattegat and Skagerrak, the Gulf of Finland, the Baltic Sea, the Atlantic Ocean. The cumulative effect of all human maritime activities and all sectoral planning decisions in all countries in the region, will impact the regional sea as an eco- and economic system. In other words, marine ecosystems are not bounded by administrative borders like EEZs. Therefore there is a need for transnational cooperation in MSP (as in environmental planning and regulations such as the MSFD). For the Baltic Sea the BaltSeaPlan vision 2030 has - on the base of a transnational policy analysis – identified four key topics for transnational cooperation, a) healthy marine environment, b) a coherent pan-Baltic energy policy, c) safe, clean and efficient maritime transport and d) sustainable fisheries and aquaculture. Furthermore the vision recommends three key principles to harmonize MSP in different countries, namely a) Pan-Baltic Thinking, which requests to put long-term objectives first, recognize differences between regions and aim for fair distribution of advantages and disadvantages, b) Spatial Efficiency, which implies to encourage co-use of multiple activities within sea areas, and c) Connectivity Thinking, meaning to focus on the connections that functionally exist between areas, e.g. shipping lanes and ports or connections between breeding grounds and feeding grounds (Gee et al., 2011).

[3] In the Netherlands for instance there is a controversy on whether gas extraction in the Waddenzee will cause land subsidence.

In sum, MSP in many cases should be transnational planning - the sum of two or more national planning regimes for their respective EEZs within a larger regional sea-area.

Contested EEZs
A further complication is that there can be territorial disputes; the boundaries of EEZs are not uncontested, not even in Europe.

Ambiguity
It is not surprising therefore, that definitions of MSP vary markedly among experts and countries:

> "MSP is pro-active and future oriented. It delivers the desired outcome of sustainable socio-economic development within a healthy marine environment by balancing all relevant interests in a fair and unbiased manner." (Gee et al., 2011: pp)
>
> "Marine spatial planning (MSP) is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process." (Ehler and Douvere, 2009: pp)
>
> "MSP is a tool for improved decision-making. It provides a framework for arbitrating between competing human activities and managing their impact on the marine environment. Its objective is to balance sectoral interests and achieve sustainable use of marine resources in line with the EU Sustainable Development Strategy." (CEC, 2008: pp)
>
> "Marine spatial planning (MSP) is an approach to assist integrated planning of human activities and the protection of the marine environment. Marine spatial planning works through the allocation of space, utilizing the ecosystem approach and integrating all available relevant datasets, and forms the basis for decision-making. (…) the MSP process usually results in a comprehensive plan or vision for a marine region. MSP is an element of sea use management." (TemaNord, 2009: pp)

It is illustrative that there is even no consensus whether the acronym MSP should stand for:

- (Ecosystem-based) Marine Spatial Planning: i.e. emphasis on the marine eco-system.
- (Integrated) Maritime Spatial Planning: i.e. focus on the economic functions.

A clash of frames
Underlying this ambiguity, there are different values – economy and social versus ecology - as well as different perceptions on things like the role of (science in) planning. Stable and coherent combinations of values, beliefs and opinions are commonly referred to as frames or belief systems who tend to have a large impact on policy-making (Sabatier, 1998). Changing policy-making usually implies changing

the dominant frames of the influential stakeholders, for instance through informed stakeholder discourse.

Actors concerned with the rapid deterioration of marine ecosystems around the world, are likely to frame MSP as a way forward towards 'sustainable development', protection of 'marine ecosystems', and 'nature conservation'. It is generally accepted that marine ecosystems all over the world are strongly affected by pollution, fishing and other human activities. Seen from this perspective no country or region in the world as yet, has an adequate marine spatial planning system.

> "Integrated Sea Use Management is an approach that provides a strategic, integrated and forward looking framework to help achieve both sustainable development and nature conservation." (NGO's, Andersson, WWF: pp).

Others apply a more moderate or pragmatic view by accepting that trade-offs between ecology and the many different economic functions need to be made. A main concern is that these trade-offs are made well-informed, with an eye on the future. MSP can be framed as part of a larger movement towards Ecosystem-Based Management (EBM) (Douvere, 2008).

> "If MSP is intended to incorporate all human activities and see their impact in relation to each other and the ecosystem, MSP manages the space-use of human activities in the ocean so that existing and emerging uses can be maintained, use conflicts reduced, and ecosystem health and services protected and sustained for future generations (Foley et al., 2010: pp).
>
> "…it must be based on ecological principles that articulate the scientifically recognized attributes of healthy, functioning ecosystems. These principles should be incorporated into a decision-making framework with clearly defined targets for these ecological attributes." (Foley et al., 2010: pp)

Still others are more concerned with balancing all social-economic-ecological functions of the marine system; ecology being one of the values and concerns, but not necessarily the dominant value. This is primarily the perspective of Integrated Management (IM).

> "Integrated management (IM) embodies many of the principles of EBM such as acknowledging the linkages between land, coastal areas and the sea, recognizing the need to protect ecosystems, accounting for the cumulative effects of human activities on ecosystems, aiming for sustainable development, use of the precautionary principle, identifying ecosystem objectives and indicators, integrating knowledge and research with traditional knowledge of marine resources, and ensuring the participation of all stakeholders. The difference lies in IM having a balance between environmental, economic and social goals while with EBM there is more of a priority given to the environmental aspect." (Murawski et al., 2008: pp).

In short, depending on one's position, MSP is part of a sustainability strategy, part of ecosystem-based management (EBM), or part of integrated management (IM). There are similarities among the three, but they are not identical. The discourse among

planning professionals, policy advisors, issue and stakeholder advocates can get confusing – the same words can have different meanings.

Competing claims

Essentially, MSP is about making choices between competing spatial claims of various kinds (Kannen and Burkhard 2009). The claims can be mutually exclusive – fishing and wind farms, military and recreation; Or they can be combined but one claim should be given priority over others – shipping and recreation; nature and recreation. Other claims can be qualified as sustainable – wind farms – but the construction or exploitation requirements might conflict with other claim of sustainability; construction noise for instance is known to disturb marine mammals that use sonic communication.

> "Some activities are simply incompatible, as with military zones and fishing and shipping (for security and safety reasons), while many others lead to high cumulative impact when they co-occur (Halpern et al., 2009: pp).

Spatially separating such activities is one tool for minimizing negative interactions among activities while still allowing them to occur to the greatest extent possible.

Zero-sum game

Competing claims and the stakeholder's interests that are associated with them, have the character of a 'strategic game'. Sometimes when competing claims cannot be combined it is a zero-sum game: one stakeholder will win, at the expense of other(s). Sometimes, when two or more claims can be combined it is a sum-sum game – two or more competing stakeholders win; or it can be a zero-zero game – no stakeholder - or maybe, only the ecosystem –wins. The outcomes of the strategic games that are played by the various stakeholders in the political arena can be unpredictable and can make decision-making highly erratic.

Controversies

Given the fact that MSP is about competing spatial claims, the assessment of the potential impact of human activities – is bound to lead to controversy. Societal or stakeholder discussions about the potentially negative impact of, for instance, the construction of wind farms or off shore drilling for gas on sea birds and sea mammals are likely to flare up. Or, like in the Brent Spar controversy, scientific claims can be used to win a strategic game.

Scientific uncertainty

In case of confusion and controversies, planning professionals and stakeholders commonly turn to science for answers – for facts and prove - and arbitration. Although we know a lot about marine ecosystems, there is even more that we do not know. A major uncertainty for instance concerns the amount of stress that specific human activities will put on the marine ecosystem, in the short, medium or long term. This becomes even more problematic when we take the cumulative effects of so-called stressors into account. MSP allows for overlaying differing impact maps and

easily determining the sum of impacts, but the effects may be more complicated and subtle than simply summing up the impacts. Cumulative impacts may also involve indirect effects and impacts that act in synergy or antagonistically creating situations where one impact will severely increase the impact of another. Also, cumulative impacts may act indirectly through the interlinked pathways of the ecosystem creating effects that were not expected. Assessing total human impacts is therefore a very challenging task, and no methods currently exist that allow this to be done in a comprehensive manner (Halpern, 2009)

A new planning territory?
It is clear that dedicated marine research centers are highly institutionalized around the world. But they tend to approach marine policy research and advice from a natural – geophysical, or life science perspective. Insights, methods and tools from the social sciences - like policy analysis – need to be integrated into the marine research (centers) to cope with the aforementioned social-technical complexity of MSP. Marine Spatial Planning however is relatively undiscovered territory for the science and practice of planning.

3. Integrated MSP: principles, procedures and tools

Fragmentation
MSP has many traits of what we call a complex, multi-actor, socio-technical problem. It involves complexity in its natural, physical aspects as well as in its social-political aspects (see Mayer, 2009). Planning of complex, socio-technical systems tends to be of a highly fragmented nature.

- Many sectors involved: fishing, shipping, nature etc.
- Many authorities involved: regulatory and planning bodies for all various functions;
- Various legislative frameworks: national, EU, international in all sectors
- Many stakeholders: Non-governmental organizations, multinationals, etc.
- Many forms of political will, interests and understanding: ecologists, entrepreneurs, activists, etc. safety, security, economy, ecology.
- Many, shifting goals
- Different countries (in) different regions
- Different planning cultures and institutions among countries: elitists, hierarchical, participatory, consensual, etc.
- Many other stakes on the international agenda – package deals

Hence, the planning process requires a tight coupling between political, stakeholder interaction and input from science and analysis. One of the big challenges is that alignment of planning practices – a certain level of understanding, sharing of frames, shared practices, knowledge and data – is required to approach MSP integrally. It can be difficult to find common ground when networks of stakeholders from different countries have different, often conflicting values, interests, cultures and institutions.

Planning approaches that are qualified as 'participatory', 'integrated', and 'eco-system-based' are rhetorically powerful, but often poorly defined, at least in practical terms Here we touch upon the procedural and instrumental aspects of MSP: how to do it? A number of MSP procedures – MSP in six or more steps - have been developed in order to support planning institutions in EU countries to implement MSP (e.g. Schultz-Zehden et al. 2007, Ehler and Douvere 2009). For reasons of scope and space we will not go into these procedures, but in general they combine the following elements:

- Interactive, participatory: involving stakeholders at the national and international level.
- Integrated: horizontally among countries, sectors, ministries, agencies and vertically integrated among different governance levels.
- Procedural, iterative, step by step: going through a limited number of steps such as from goal setting, data gathering and analysis of conflicts to developing shared solutions, implementation and monitoring;
- Adaptive, strategic, learning: emphasizing learning in the process.
- Evidence-based, science-based, well-informed, rational: using best-available knowledge in the planning process.
- Institutional, organizational: creating rules, organizations and platforms to coordinate, monitor, check and implement.
- Instrumental: emphasis on digital tools, models: using support tools, databases.

4. Research questions

Ecosystem-based Marine or Maritime Spatial Planning has characteristics of a complex, social-technical, multi-actor system. This causes certain emergent – i.e. unpredictable and/or counter intuitive - properties of marine ecological systems due to:

- Uncertain, cumulative impact of human activities on the marine ecosystem.
- Uncertain outcomes of strategic stakeholder behavior in the social-political arena.

The importance and significance of MSP is growing and thereby the need to facilitate the learning process among the important public, private, scientific and non-governmental actors in the various marine sub-regions. This learning process is an important step towards the development and implementation of best practices of MSP in a coordinated fashion.

The above analysis indicates that MSP has many traits of a 'strategic game' with interdependent players, stakes and objectives, resources and strategic behavior. For reasons of understanding and change, such a strategic game in reality can be recreated – modeled - in a simulation-game or serious game.

The objective of the simulation-game MSP Challenge 2011 therefore was to contribute to the aforementioned international learning process on eco-based, integrated and participatory MSP in regard to following aspects:

- The underlying socio-technical complexities of MSP
- The underlying regulatory principles and institutional frameworks of MSP in the various countries
- The joint development of (best) practices of MSP among stakeholders and countries
- The use of science, knowledge, data, methods and tools in MSP.

Underlying the analysis of the game results in the remaining part of this chapter are the following question:

> How does an international group of MSP professionals assess the state of MSP in their country of origin on the basis of a number of criteria for good practice?

5. Game-based, quasi-experimental design

Design context of the experiment

The experiment comprised the joint development and facilitation of a simulation game (SG) on Marine/Maritime Spatial Planning (MSP) to be played at the joint HELCOM-VASAB, OSPAR, and ICES[4] workshop, Lisbon Portugal 2-4 Nov., 2011. The objective of the 2,5 day workshop was defined as:

> "contribute to the further development of (…) marine spatial planning (by) reinforcing and extending existing networks and sharing knowledge and experience between scientists, managers and planners (…) test how (ICES, HELCOM, OSPAR, planning and scientific) data can be used in the development of an MSP plan (…)"

The workshop was prepared by a planning group consisting of three representatives from ICES, one from HELCOM and two from OSPAR. The three-day program of the Lisbon workshop included presentations, group discussions and reflections on the basis of a case (1st day), a simulation-game including debriefing on the 2nd day, and an after action review on the 3rd day.

4The International Council for the Exploration of the Sea (ICES) coordinates and promotes marine research on oceanography, the marine environment, the marine ecosystem, and on living marine resources in the North Atlantic including the Baltic Sea (see: www.ices.dk). HELCOM is the governing body of the "Convention on the Protection of the Marine Environment of the Baltic Sea Area" - more usually known as the Helsinki Convention (see: www.helcom.fi).The OSPAR Convention is the current legal instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic. Work under the Convention is managed by the OSPAR Commission, made up of representatives of the Governments of 15 Contracting Parties and the European Commission, representing the European Union (see: www.ospar.org). VASAB is an Intergovernmental multilateral co-operation of 11 countries of the Baltic Sea Region in spatial planning and development (see; www.vasab.org).

The Netherlands' Ministry of Infrastructures and Environment (I&E), commissioned and financed the design and facilitation of the simulation-game on behalf of the international organizing committee. The serious gaming research group of Delft University (Delft, the Netherlands) was requested to contribute to the development and running of the aforementioned simulation-exercise at the Lisbon, MSP workshop.

The actual design of the game took place between August and November 2011. This involved the detailed analysis of the MSP system and practices, the analysis and adaptation of data on the Baltic sea, consultations with the client and organizing committee, the design and production of the game material, the planning of logistics (as the game needed to be played in Lisbon with an uncertain number of international participants) and most of all, the design and programming of the digital map software that would play a significant role in the game.

Gaming as methodology

Simulation-gaming - in its digital variants, more and more referred to as serious gaming - is a multi-faceted, very flexible method that is certainly not easy to design and use, but can be quite rewarding. Much has been written about the design and use SG for learning and policy making. For reasons of brevity we refer to other publications (Mayer, 2010). By and large, the method can be characterized as:

- Experiential – relying on actions, trial and error, feedback.
- Experimental – possibilities to redo and retry under different circumstances, limited control.
- Participatory – demanding active involvement from stakeholders and experts
- Safe: no consequences for the external world.
- Interactive – interacting with other players, with computers, game paraphernalia and facilitators.
- Engaging – using human emotions such as joy and pleasure to enhance motivation.
- Immersive – using various techniques such as stories, visuals, 3D world, leveling, to create a feeling of flow.
- Challenging – adapting to player levels, but challenging to do better, compete with others, oneself or some system.
- Reflective – collective sense-making of what happened, why and what this means for the real world.

The game as policy-oriented learning

A first and important use of the game MSP Challenge 2011 is policy oriented learning among the players about the complexity of MSP, to try out strategies and get experience with planning processes and tools.

The game as policy research

A second way of looking at the experiment is as a research effort, to use the participation of around 70 international experts on MSP to collect data on their backgrounds, their frames of thinking, the state of MSP in their countries of origin or profession. And second to listen to their analysis of problems and solutions when it comes to integrated, participatory and eco-system based MSP. In this fashion, the game was not only a learning tool, but also a well-designed research effort. It is this use of simulation-gaming – i.e. using the players as experts in a panel – that is emphasized in the remainder of the paper.

6. Research design

Data were gathered through pre-game, in-game and post-game observations, both quantitative by means of online and paper questionnaires and logging of computer data, as well as qualitative observations in the form of video registrations and in-game participant interviews. In this paper we focus on the pre-questionnaire.

Table 1 Overview of data-gathering

When?	Pre-game	In-game				Post-game
Observation number	O1	O2	O3	O4	O5	O6
How?	Online survey	Paper quest.	Paper quest.	Paper quest.	End of game debriefing	Online survey
What?	Soc. Dem. Involvement in MSP Knowledge in MSP Influence in MSP MSP in country	MSP process Game play Emotions	MSP process	Influence	After action review	Analysis of maps
Response	63	50	40	41	41	38
Additional data gathering		Video registration – Observation – Data logging				

About one week before the conference and on behalf of the organizing committee of ICES, HELCOM and OPSPAR, we distributed an online questionnaire to all 77 persons who registered for the three day conference in Lisbon. Around 73 persons started up the online system, but not all of them inserted information or completed the questionnaire. Around 45 filled out the questionnaire before turning up at the conference registration desk the first day. Those who had not filled out yet, were

urgently requested to do so before the next morning when the game would start, increasing the total number of valid respondents to 63 including people involved in the organization of the conference. The second day – the actual game day held in the impressive Marine Aquarium in Lisbon - 68 people turned up and nearly all had completed the questionnaire. Some participants turned up a little later, and/or without registration, and a few left early, explaining differences in numbers and a slight non-response.

Of all players, 50 filled out the first in-game measurement (O2) – a sheet of paper distributed among the players around 11.00h, with some questions on . This was repeated at 15.00h (O3) and 19.00h (O4) with responses around 40 participants. The drop in response can partly be explained by the fact that some eight MSP experts were involved in co-facilitating the game – e.g. as a journalist, country facilitator, etc. and did not fill out in-game questionnaires.

Immediately after the game, we send out another online questionnaire (O6) through e-mail, promising everybody that after filling it out, they would receive some PR documentation about the game, and Internet links to a video and photo impression of the game-day. After two weeks, 38 participants had filled out the last questionnaire.

Furthermore, an extensive after action review (O5) was held between 18.00 and 20.00 on the actual game day, followed by a more in-depth concluding session facilitated by the conference organization and experts, during the morning of the third day. Much of the qualitative conclusions about MSP were formulated on the basis of, and in terms of the game-experience.

The quantitative data acquired from the participant survey (O1-O6) as well as the data from the four digital maps of the game-countries (see below) were put into SPSS for statistical analysis. The descriptive results of the analysis were subsequently given to the conference organizers and clients, and more detailed analysis is used for scientific and policy purposes. The participant coming from Canada did not fill out country specific information (and therefore discarded in detailed analysis), one respondent filled out information for the EU as a whole and one for the Baltic.

Limitations of the research method

The chosen method combines many different objectives and interests at the same time. Setting up the game and making sure it is engaging, while at the same time using it to gather a lot of reliable data, is not an easy task. However, we noticed a very high commitment to Marine Spatial Planning, the workshop and the game, among the majority of the player-participants. People were looking forward to it and were definitely curious.

One of the important pitfalls is the ‘dropping response’ in the series of six questionnaires given to the player-participant-experts before, during and after the game. We tried to make the measurements as unobtrusive and light as possible, but the expected drop in response rate did occur. When we designed the game, the organization expected around 70 participants to play, but in the end 68 started, around 50 were really active the whole day and around 40 completed nearly the whole set of

questionnaires. Some of the respondents did not answer all questionnaires in the pre- or post-test or for some other reasons, thereby generating missing values. Finally, 32 respondents together form an expert panel with a complete set of data for all measurements (O1-O6).

We also noticed that although all player-participants had professional affiliation to MSP, not all participants considered themselves to be very knowledgeable about what was happening, even in their own countries Nor did many of them think they were very influential (see Table 1). Some commented that MSP in their country was really at the start, and that they were just delving into the issue. The presented data therefore give an indication of the perceptions – best judgments – on the state of MSP given by around 50 professionals from different countries, rather than a well-represented, validated judgment. In other words, one could very well disagree with the judgment of say 3 experts on the state of MSP in country X.

A further shortcoming in the approach of course is that the experts were asked to assess the countries for which they have the most expertise, often their own country, and that they have not been asked to score MSP in (comparison to) other countries. Moreover, cultural, psychological and cognitive factors are likely to have influenced the overall scoring process. Nevertheless, we believe the results are interesting and we conducted reliability tests, when possible and relevant. Most scales for profiling MSP had high reliability scores (.9 Cronbach alpha).

It does however, generate food for thought and discussion. Expert judgment on complex policy making is not an uncommon approach and for instance used in the Delphi method. What is more, our generated method of profiling the countries through expert judgment can be repeated among a greater set of respondents and/or countries. And more sessions with MSP Challenge are foreseen in the near future and we will continue to gather data in the same fashion, thereby expanding the original data set.

We do feel that the triangulation of methods – survey and experiment, self-reported and observed, stated and revealed, quantitative and qualitative – makes a game-based experiment particularly interesting and valuable in a policy context.

7. The expert panel

Experts - Respondents- Players

The number of expert-respondents-players in the game was 68, coming from 15 European Countries with emphasis on the north European countries (Scandinavian, Baltic, Germany, Poland, Russia, the Low countries, UK, etc.) and one participant from Canada. The average work experience in MSP was 3.35 years (SD = 4.15) the average age was 43.71 years (SD = 10.99) and the gender distribution was 57% male and 43% female. 16 percent of the participants had participated in the MSP workshop held the previous year.

Table 1 At which global-local scale are you mainly practicing your profession?

International (e.g. multinationals, UN, international NGO)	5,4
Continental (e.g. Europe, Asia, America)	32,1
National (e.g. country)	55,4
Regional (e.g. province, department, states)	7,1
Total	100

Table 2 In which societal sector do you (mainly) practice your profession?

Public sector (e.g. government, public administration, public policy advice etc.)	76,8
Private sector (e.g. fishing, shipping, tourism, energy, consulting, etc.)	1,8
Non-profit sector (e.g. science, NGOs, academia, etc.)	21,4
Total	100

Participants shared professional interests and involvement in MSP, either from maritime policy-making and/or maritime science/research perspective. Table 3 presents information about the extent to which participants considered themselves knowledgeable in MSP and marine ecosystems, were involved and influential in MSP, listed per country of professional occupation in MSP.[5] From this, we calculated two 'impact factors', used further on to statistically check a potential bias in the results:

- Individual impact factor: This indicates the total 'weight' of input into the game by players who work in the same country. It is calculated as: the number of participants from the same country x individual scores of each respondent of that country on each of the 4 items. (min = 4, no max)
- Country impact factor: This indicates the relative 'weight' of input into the game by one country. It is calculated as: the average score for all participants that work in a country for each of the 4 items divided by 4. (min 1 – max 5).

Table 3 ranks the results from high to low on the calculated individual impact factor. It shows that respondents from Norway, Canada and Ireland can be considered the most knowledgeable, involved and influential among all respondents.

[5] Note: not listed per country of their nationality as many people have their professional occupation elsewhere.

Table 2 Knowledge, involvement and influence on MSP of the players by country

Country	*N*	*Knowledge about MSP*		*Knowledge about marine ecosystems*		*Professionally involved*		*Personal and professional influence*		*Country Impact factor*	*Indiv. Impact factor*
		M	SD	M	SD	M	SD	M	SD		
Norw.	1	5.00	-	5.00	-	5.00	-	4.00	-	19	4.75
Can.	1	4.00	-	4.00	-	5.00	-	5.00	-	18	4.5
Irel.	1	4.00	-	4.00	-	5.00	-	5.00	-	18	4.5
Finl.	2	3.50	.71	2.50	.71	3.00	-	3.50	2.12	25	3.13
UK	8	2.88	.99	2.63	1.30	3.38	1.41	3.38	1.60	98	3.06
Germ.	4	3.50	1.73	2.50	.58	2.75	1.71	2.75	.96	46	2.88
Pol.	2	1.69	.87	2.37	.96	2.31	1.08	2.13	.72	23	2.88
Denm.	3	3.00	1.00	3.33	2.08	2.33	.58	2.33	.58	33	2.75
Belg.	2	3.5	.71	1.5	.71	2.5	2.12	3.00	1.41	21	2.63
EU	2	3.00	1.41	3.00	1.41	2.50	2.12	1.50	.71	20	2.5
Spain	1	2.00	-	3.00	-	3.00	-	2.00	-	10	2.5
The Neth.	5	2.80	.84	2.40	1.52	2.40	1.52	2.00	.71	48	2.4
Russ.	1	1.00	-	1.00	-	3.00	-	4.00	-	9	2.25
Baltic	1	2.00	-	4.00	-	1.00	-	2.00	-	9	2.25
Port.	16	1.44	.53	2.67	1.12	2.00	.71	2.11	.33	136	2.13
Swed.	2	1.50	.71	2.00	-	2.00	1.41	1.50	.71	14	1.75
Missing	11	-	-	-	-	-	-	-	-	-	-
Total	63	-	-	-	-	-	-	-	-	-	-

Profiling MSP for cross-national comparison

In order to measure the quality of the MSP in the game and relate them to the real world, we developed a set of indicators for profiling the process and outcome of MSP and measuring the progression of MSP. The set of principles is loosely based upon 'ten key principles for MSP' promoted by the European Commission (COM, 2008).

How well-established is MSP in your country? (7 point scale, 1 = not established at all; 7 = very well established, measured for real country and gamed country)

1. Coordination with other states
2. Stakeholder participation
3. Vision and ambition
4. Clear objectives
5. Implementation guidelines
6. Science and evidence based
7. Knowledge and data infrastructure
8. Profiling MSP in the real countries

Furthermore, we developed 2 scales to measure the level of integration of outcome and process:

Level of integration MSP outcome (7 point scale, measured for real country and gamed country)

1. National oriented – international oriented
2. Economy based – ecology based
3. Short term thinking – long term thinking
4. Interest based – evidence based
5. Conservative – innovative
6. Uninformed – well informed
7. Disjointed – integral consideration

Level of integration MSP process (7 point scale, measured for real country and gamed country)

1. Centralized - networked
2. Top down – bottom up
3. Out of control – well managed
4. Viscous – decisive
5. Every man for himself – good cooperation
6. Contentious – harmonious
7. Closed process – open process

9. MSP in the participating countries

Based upon the three MSP scales mentioned above, we can now discuss the experts' opinion on the level of integration in MSP outcome (the final plan) and the MSP process (the participation of stakeholders, the management of decision-making, etc.). Furthermore we can assess the expert panels' opinions on the 'establishment of MSP' in the various countries.

Profiling MSP outcome and process

Table 3 presents the results for each country on the scale that measures the level of integration in MSP outcome, whereas table 4 does the same for the MSP process (min = 1; max 7). Note that a lower score on outcome and/or process does not say much about the quality of MSP in that country, mainly a different orientation: more short term, more national, more economy-based, more hierarchical, etc.

Figures 1 and 2 present the results in a visual way: the larger the area in the spider webs, the more 'integrated' the MSP outcome and process are – according to the experts from that country.

Statistical testing of the reliability of the three scales gave Cronbach alpha values between .9 and .94. We therefore calculated a factor 'integrated MSP outcome' and a factor 'integrated MSP process' (see the last columns in tables 5 and 6). Again we list the countries from high to low factor scores.

On the basis of this procedure we first observe significant statistical variance among the 13 countries and the Baltic (we discard Canada and the EU). In other words, the

expert panel rates the level of integration in the 14 countries quite differently, most likely indicating differences in policy approaches. The Baltic, Ireland, Spain, UK scoring quite high (above 5) and Denmark and Russia scoring rather low.

Table 3 Profiling MSP outcome per countries

Country	*Valid N*	*International orientation*	*Ecology based*	*Long term thinking*	*Evidence based*	*Innovative*	*Well - informed*	*Integral consideration*	*Factor Integ.r.outcome*
		M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	
Baltic	1	7.00	7.00	7.00	6.00	7.00	7.00	7.00	6.9
Irel.	1	6.00	4.00	5.00	6.00	5.00	6.00	4.00	5.1
Spain	1	5.00	4.00	3.00	5.00	6.00	6.00	6.00	5.0
Norw.	1	2.00	3.00	5.00	6.00	4.00	6.00	6.00	4.6
UK	8	2.00 (.76)	3.5 (.76)	5.88 (1.25)	4.50 (2.07)	4.38 (1.85)	5.88 (.99)	5.50 (1.31)	4.5
Belg.	2	3.00 (1.41)	4.00 (.00)	5.00 (1.41)	5.00 (1.41)	5.00 (1.41)	5.00 (1.41)	4.00 (.00)	4.4
Swed.	2	2.50 (2.12)	5.00 (1.41)	5.00 (1.41)	5.00 (1.41)	4.00 (0.00)	5.00 (1.41)	4.50 (0.71)	4.4
Pol.	2	2.50 (.71)	4.00 (1.41)	5.00 (1.41)	4.50 (.71)	4.00 (2.83)	4.00 (1.41)	4.50 3.54)	4.1
The Neth.	5	3.40 (1.52)	3.20 (1.30)	4.00 (1.87)	4.00 (.71)	3.80 (1.10)	5.00 (.71)	5.40 (1.14)	4.1
Finl.	2	4.50 (0.71)	4.00 (1.41)	4.00 (1.41)	3.50 (0.71)	3.00 (1.41)	4.50 (0.71)	3.50 (2.12)	3.9
Germ.	4	3.25 (0.96)	3.50 (1.29)	4.50 (0.58)	3.00 (0.82)	3.50 (0.58)	4.75 (0.50)	4.75 0.50)	3.9
Port.	16	2.19 (1.17)	3.94 (1.44)	4.13 (1.63)	3.69 (1.45)	3.56 (1.36)	3.94 (1.65)	4.38 1.54)	3.7
Russia	1	2.00	2.00	3.00	2.00	2.00	1.00	1.00	1.9
Denm.	3	2.33 (1.53)	2.33 (1.53)	1.00 (.00)	2.33 (1.53)	1.00 (.00)	1.67 (.58)	1.67 (.58)	1.8
Missing	11	-	-	-	-	-	-	-	-
Total	63	-	-	-	-	-	-	-	-

On the basis of this procedure we first observe significant statistical variance among the 13 countries and the Baltic (we discard Canada and the EU). In other words, the expert panel rates the level of integration in the 14 countries quite differently, most likely indicating differences in policy approaches. The Baltic, Ireland, Spain, UK scoring quite high (above 5) and Denmark and Russia scoring rather low.

Table 4 Profiling MSP process per countries

Country	*N*	*Networked*	*Bottom up*	*Well managed*	*Decisive*	*Good cooperation*	*Harmonious*	*Open process*	*Factor integr. process*
		M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	
Baltic	1	7.00	4.00	7.00	7.00	7.00	4.00	7.00	6.1
Spain	1	6.00	5.00	5.00	6.00	6.00	6.00	6.00	5.7
UK	8	5.13 (1.36)	4.25 (1.67)	5.50 (.93)	5.00 (1.69)	5.38 (1.60)	4.50 (1.60)	6.13 (.64)	5.1
Swed.	2	4.00 (1.41)	3.50 (2.12)	5.00 (1.41)	4.50 (0.71)	5.00 (1.41)	5.00 (1.41)	6.00 (0.00)	4.7
Germ.	4	3.00 (1.15)	2.50 (0.58)	5.75 (0.50)	5.50 (0.58)	4.75 (0.50)	4.50 (0.58)	3.75 (0.96)	4.3
Port.	16	4.00 (1.79)	3.25 (1.48)	4.50 (1.41)	4.06 (1.48)	4.69 (1.08)	4.06 (1.06)	5.06 (1.12)	4.2
Belg.	2	4.00 (.00)	3.50 (.71)	4.50 (.71)	4.50 (.71)	4.00 (.00)	4.00 (.00)	4.00 (.00)	4.1
Finl.	2	3.00 (2.83)	3.00 (1.41)	4.50 (0.71)	4.00 (0.00)	4.50 (0.71)	4.00 (1.41)	5.00 (0.00)	4.0
Norw.	1	2.00	2.00	7.00	5.00	5.00	5.00	2.00	4.0
The Neth.	5	3.20 (1.30)	2.80 (1.30)	4.40 (1.14)	4.00 (.00)	4.80 (.84)	4.60 (.55)	4.20 (1.48)	4.0
Pol.	2	1.50 (.71)	2.50 (2.12)	5.00 (.00)	4.50 (.71)	4.50 (2.12)	5.00 (1.41)	4.50 (2.12)	3.9
Irel.	1	1.00	1.00	4.00	5.00	5.00	4.00	2.00	3.1
Denm.	3	2.33 (1.53)	2.00 (1.00)	2.00 (1.00)	1.67 (.58)	1.67 (.58)	1.67 (.58)	2.00 (1.00)	1.9
Russia	1	1.00	1.00	1.00	1.00	2.00	3.00	2.00	1.6
Miss	11	-	-	-	-	-	-	-	-
Total	63	-	-	-	-	-	-	-	-

Figures 1 and 2 and table 3 and 4 visualizes this data for a small sample of countries in Northern, Southern, Eastern and Western Europe. The differences in level of integration is indicated by the surfaces for each country in the spider webs.

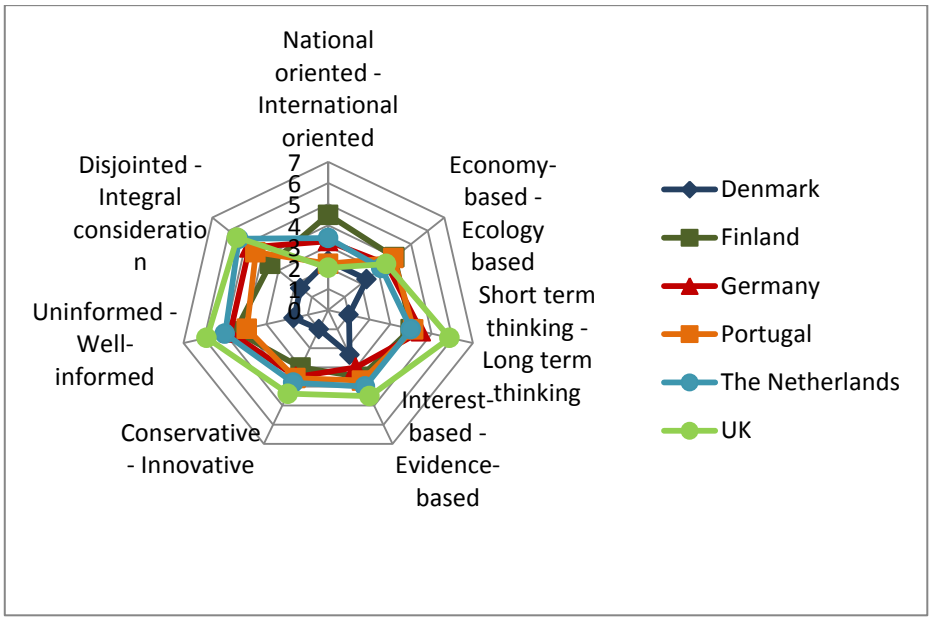

Fig. 1 Profiling MSP outcome per country

Profiling established MSP

Table 5 in the annex presents the results of the scoring of the participants on how well-established MSP is in their country.

In contrast to the previous scales, this scale is based upon 14 indicators derived from a set of EU principles of good practice in MSP. Again, we found a high reliability factor among the principles and we calculated a factor of establishment for each of the countries (last column in Table 5). We listed the countries in descending order, with the Baltic, the Netherlands, Norway, Germany, Spain and the UK at the high end.

Combing the profiles on MSP process and established MSP, figure 3 shows a high correlation between the two. More interesting however are the marked differences in positions among the countries. The Baltic countries scoring high in process and established. Countries like Denmark and Russia scoring low on both. The Netherlands however scoring relatively higher on established than on process and Sweden for instance more on process than on established.

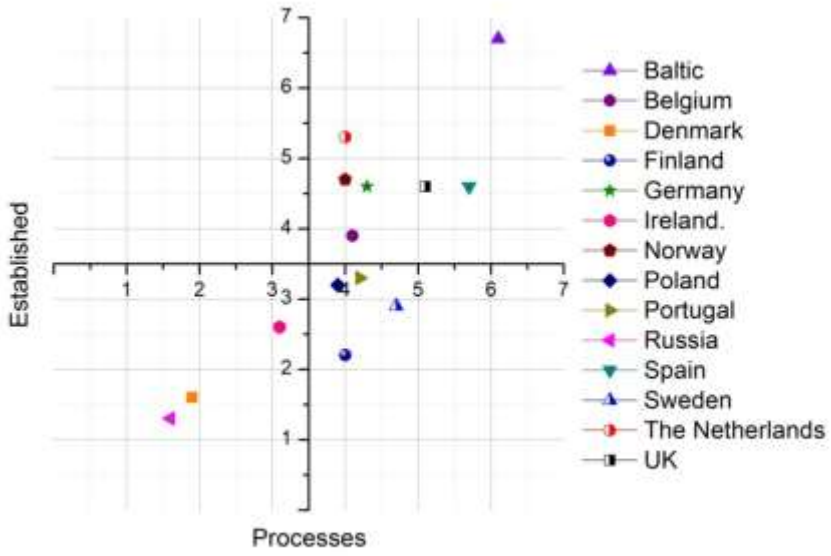

Fig. 2 profile established MSP per country

What – according to the participants in the countries - determines the establishment of MSP in their respective countries?

Regression analysis shows 5 items that have a significant influence:

1. a more harmonious (rather than contentious) process.

2. A more decisive (rather than viscous) process.

3. An open (rather than closed) process.

4. a well-informed MSP-plan.

5. with a long term perspective.

In other words experts value MSP in a country higher when the MSP process is open to stakeholder involvement but at the same time decisions are taken. The process should balance conflicts with information, and the MSP plan should take a long term perspective. The individual impact factor (table 3) does not influence the perceptions of the respondents on MSP outcome or process; but the level of involvement of the respondent does influence this perception.

10. Conclusion

In this paper we have used the participants in an international simulation-game as experts in a panel to profile and compare the outcome, process and establishment of MSP in their countries. The results show marked differences among the countries. The profiles can be used for further analysis with in-game and post-game data, as well as in other policy games.

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Marine loket (I&M/IDONz):

http://www.noordzeeloket.nl/ems/Home/

Appendix

Table 5 Profile established MSP per country

Country	*Valid N*	*Coord. with EU member states*	*Coordation with neighboring countries*	*Coordination between government*	*MSP governance structure*	*Legal framework*	*Stakeholder participation*	*Vision and ambitions*	*Clear objectives*	*Performance indicators*	*Implementation guidelines*	*Financing available*	*Monitoring and evaluation*	*Science and evidence base*	*Knowledge and data infrastructure*	*Factor quality MSP*
		M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	
Baltic	0	7.0	7.0	n.a.	n.a.	n.a.	7.0	7.0	7.0	n.a.	7.0	n.a.	n.a.	n.a.	5.0	6.7*
The Neth.	3	5.0 (.7)	5.4 (.6)	5.8 (.5)	4.3 (2.1)	5.5 (.6)	5.0 (1.2)	5.4 (.6)	5.2 (1.3)	3.8 (1.7)	5.0 (1.4)	5.0 (1.7)	4.0 (1.4)	5.0 (1.0)	4.8 (1.3)	5.3
Norw.	1	2.0	3.0	6.0	5.0	2.0	4.0	4.0	7.0	2.0	6.0	4.0	7.0	7.0	7.0	4.7
Germ.	2	5.5 (0.7)	5.25 (1.0)	5.25 (0.5)	5.50 (0.6)	6.8 (0.5)	5.0 (0.8)	4.8 (0.5)	5.50 (1.00)	3.3 (1.0)	3.7 (0.6)	4.75 (2.1)	3.25 (1.3)	3.8 (1,0)	4.5 (0.6)	4.6
Spain	1	4.0	4.0	4.0	4.0	7.0	5.0	5.0	5.0	5.0	1.0	4.0	5.0	5.0	7.0	4.6
UK	7	3.6 (1.4)	4.3 (1.17)	4.6 (1.9)	5.1 (1.6)	5.7 (1.7)	5.6 (1.8)	4.6 (1.9)	4.3 (2.1)	3.0 (1.8)	3.9 (2.0)	5.0 (2.0)	3.4 (1.9)	5.1 (1.25)	5.4 (1.41)	4.6
Belg.	2	4.0 (.0)	3.5 (.7)	3.5 (.7)	3.5 (.7)	3.5 (.7)	3.5 (.7)	4.5 (.7)	4.5 (.7)	3.0 (1.4)	3.0 (1.4)	4.0 (.0)	3.0 (1.4)	5.50 (2.1)	5.50 (2.1)	3.9
Port.	8	2.9 (1.5)	2.73 (1.49)	3.7 (1.6)	3.33 (1.50)	4.0 (1.7)	3.7 (1.8)	3.8 (1.7)	3.6 (1.7)	3.2 (1.4)	3.50 (1.6)	2.30 (1.5)	3.5 (1.5)	3.93 (1.14)	2.8 (1.1)	3.3
Pol.	2	3.0 (1.4)	3.0 (1.41)	4.50 (2.1)	5.0 (2.83)	3.0 (2.8)	2.5 (2.1)	5.0 (1.4)	3.0 (1.4)	1.0	3.50 (2.1)	3.0 (.0)	1.5 (.7)	3.00	3.5 (.7)	3.2
Swed.	1	4.0	4.00	4.00	3.00	2.00	2.0	4.5 (2.1)	2.0	1.0	1.00	4.0	1.0	3.00	6.0	2.9
Irel.	0	5.0	5.0	4.00	3.00	1.00	4.0	2.0	2.00	1.0	2.00	1.0	1.0	n.a.	n.a.	2.6*

Finl.	1	2.0	5.5 (0.7)	4.0 (2.8)	2.00	3.50 (0.71)	4.0 (1.4)	3.0 (1.4)	3.0 (1.41)	2.5 (2.1)	2.00	2.0	1.0	3.0 (2.8)	3.5 (0.7)	2.2
Denm.	3	1.3 (.6)	1.7 (.6)	2.7 (.6)	1.0 (.0)	1.0 (.0)	2.0 (1.0)	1.7 (.6)	1.3 (.6)	1.3 (.6)	1.0 (.0)	1.3 (.6)	1.3 (.6)	2.3 (1.2)	2.3 (.6)	1.6
Russia	1	1.0	2.0	3.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.3
Miss.	28															
Total	63															

* Corrected for missing values