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Promoting Effective Governance of the Channel Ecosystem  
Promouvoir une gouvernance efficace de l'écosystème de la Manche



## Management and use of data supporting effective marine governance.

### ABSTRACT

Information is the cornerstone of decision-making and governance, providing managers and decision-makers with knowledge and evidence to make choices and monitor the marine ecosystem. The different Interreg IVA Channel area projects gathered within PEGASEAS have produced a range of information tools aiming to support effective marine governance: datasheets and maps, databases and modelling systems. Whilst identifying the advantages of these various tools, this report also highlights some issues and challenges which should be addressed in the future so as to ensure compliance with the INSPIRE Directive principles (European Directive 2007/2/EC)<sup>1</sup>.

### KEY WORDS

ACCESSIBILITY  
DATA  
INFORMATION  
EMODNET  
INSPIRE DIRECTIVE  
INTEROPERABILITY  
MARINE KNOWLEDGE 2020  
METADATA  
SUSTAINABILITY  
VISIBILITY

### DESCRIPTION OF KEY FINDINGS

This report discusses the management and use of information/processed data produced by different projects, rather than the collection of raw data.

The academic community has spent years discussing and clarifying what constitutes data, information and knowledge. The diagram on the right, known as the "DIKW Pyramid", shows the relationship (and the hierarchy) between data, information, knowledge and wisdom<sup>2</sup>.

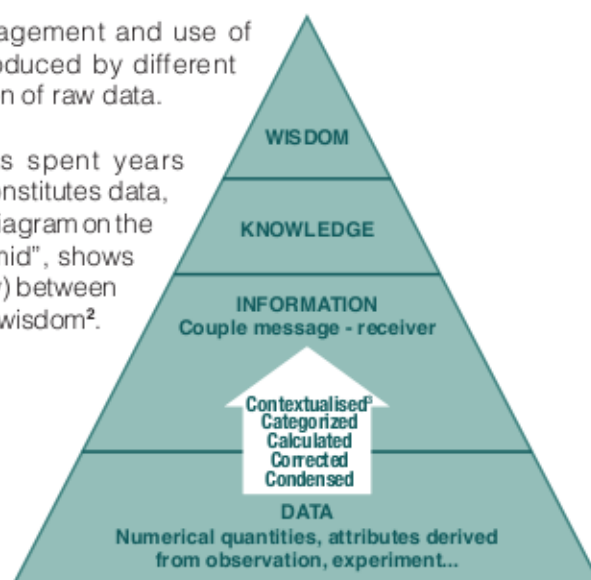


Figure 1: DIKW Pyramid (Source: adapted from [www.trainor-knowmore.eu](http://www.trainor-knowmore.eu) and from Leibowitz, J., "The Knowledge Management Handbook", CRC Press LLC, 2003)

<sup>1</sup> European Commission (2007). Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) <http://eur-lex.europa.eu/legal-content/EN/ALL/?qid=0KWVTrPGMwF08JLGrvW1R4J7pNshGjNyLpPnZPZ5QFGsDQNzI-21454677223ri-CELEX-32007L0002>. More information available at: <http://inspire.eceuropa.eu/>

<sup>2</sup> European Commission – Education and Culture (2005-2008). *Trainor website – 1.3.2 Basic Knowledge Concepts – Data, Information, Knowledge and W's dom*. Available at: <http://www.trainor-knowmore.eu/FRC5DDB3.en.aspx>

<sup>3</sup> Davenport, T.H. and L. Prusak, *Working Knowledge: How Organizations Manage What They Know*. Harvard Business School Press, Boston, 1998.

“Data” are a set of discrete objective facts about an event or a process which have little use by themselves unless converted into information. Data are numerical quantities or other attributes derived from observation, experiment, or calculation. “Information” can be defined as items of data which have been condensed, contextualized, categorized, calculated or corrected<sup>3</sup>. Thus, information paints a bigger picture; it is data with relevance and purpose.

Information is the cornerstone of decision-making and governance, providing the public with knowledge and evidence to make choices and monitor the ecosystem. The management and use of information and data is such an important issue that a coordinated action across the European Union was required.

The **INSPIRE Directive**, which came into force on 15 May 2007, aims to create an EU Spatial Data Infrastructure (SDI). This will enable the sharing of environmental spatial information among public sector organisations in order to facilitate public access to spatial information across Europe. INSPIRE is based on the following principles:

- Data should be collected only once and kept where they can be maintained most effectively;
- It should be possible to combine seamless spatial information from different sources across Europe and share it with many users and applications;
- It should be possible for information collected at one level/scale to be shared with all levels/scales; detailed for thorough investigations, general for strategic purposes;
- Geographic information needed for good governance at all levels should be readily and transparently available;
- The information should be accompanied by complete metadata on the conditions under which targeted spatial information can be accessed and used, the quality and validity of such information, limitations on public access and the public authorities in charge of that information

Launched in September 2010, the EU’s “**Marine Knowledge 2020**” initiative<sup>4</sup> provides a unifying framework for all ongoing activities on marine observation within the EU. It embraces the full data lifecycle, from initial observation through to interpretation, processing and dissemination. It is based on basic principles including “collect data once and use them for many purposes” and “data should be interoperable, accessible and free of restrictions on use”. The initiative also created the “European Marine Observation and Data Network” (**EMODnet**), whose aim is to unlock fragmented and hidden marine data resources and to make these available to individuals and organisations, and to facilitate investment in sustainable coastal and offshore activities through improved access to quality-assured, standardised and harmonised marine data<sup>5</sup>.

In this context, this report first identifies how data were converted into information within the various Interreg projects dealing with various aspects of the Channel Ecosystem and its management. Then, it highlights some issues and challenges which should be addressed in the future so as to comply with the above-mentioned INSPIRE principles and fully contribute to “Marine Knowledge 2020”.

### **Typology of information tools developed to support effective marine governance**

The different tools developed can be classified into three categories, according to the way data were converted into information: datasheets and maps (data were condensed and contextualized), databases (data were categorized) and modelling systems (data were calculated).

<sup>3</sup> Davenport, T.H. and L. Prusak, *Working Knowledge: How Organizations Manage What They Know*. Harvard Business School Press, Boston, 1998.

<sup>4</sup> European Commission (2010). *Communication from the Commission to the European Parliament and the Council “Marine Knowledge 2020: marine data and observation for smart and sustainable growth*. COM(2010)0461 final. Available at: <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52010DC0461>

<sup>5</sup> European Marine Observation and Data Network website. Available at: [www.emodnet.eu](http://www.emodnet.eu)

### Datasheets and maps

Two mapping tools were developed within CAMIS: the “Cross-Channel Atlas” and a printed document entitled «Focusing on the Channel».

- (1) The “Cross-Channel Atlas”<sup>6</sup> was initiated by the Caen University in 1994 and continues to be regularly updated through Espace Manche Development Initiative (EMDI) and CAMIS projects. The maps, data and analyses provide information and gives insight into the whole Channel area. Topics covered include geographical information, population, transport, environment, economy, energies, culture and training and research. The aim is to further develop the knowledge of the Channel area and contribute to the development and planning of initiatives as well as to co-operation schemes between both countries whilst retaining a Channel scale approach. The Atlas is supporting decision-making and the dissemination of knowledge about the Channel region. It enables different scales of analysis to be conducted, from local to global scale, and investigation of current and future issues.
- (2) “Focusing on the Channel” is an A3 document including 11 datasheets on the following topics: seabed morphology and fishing resources, organisation of space, shipping, fishing industry, pleasure-boating, marine renewable energy, land/sea interface, vulnerability, maritime accidents. For each topic, diagrams, maps, graphs and short analysis are provided.

Two mapping tools were also developed within CHARM 3.

- (1) In September 2012, a **distribution map of large marine vertebrates biodiversity** was finalized. This tool is based on the marine data structure of Sextant (run by Ifremer) and provides a starting point for future spatial planning<sup>7</sup>.
- (2) A **Fisheries Atlas** was also produced<sup>8</sup>. Covering the period 2000-2010, this tool provides an integrated overview of fisheries in the English Channel through a series of indicators, charts and maps on the production and fishing effort in the Channel. It includes several factsheets on the fishing fleet in the Channel, each country, key species and key gear types. Each factsheet includes illustrative maps and charts.

CRESH worked on **mapping potential spawning sites of cuttlefish** at the scale of the English Channel by an analysis of the distribution of suitable habitats.

The marine birds data collected within the PANACHE project were added to the Sextant webGIS.

We can also mention the work carried out within ARCOPOL, part-financed by the Atlantic Area Transnational Programme. ARCOPOL produced **several datasheets** including key information to improve prevention, response and mitigation capabilities against oil, HNS and inert spills<sup>9</sup>.

### Databases

The “Cross-Channel Resource Centre”, developed within CAMIS, is made of three databases<sup>10</sup>:

- (1) A «Stakeholders» database that identifies key organisations in maritime and coastal areas, as well as in the fields of research and innovation. In particular, it aims to help French and British stakeholders find partners on the other side of the Channel in order to carry out potential future cooperation projects;
- (2) A «Projects» database, which identifies projects that are now complete or still under way. These include projects supported by Interreg or other funding programmes which focus on at least one of the five major themes of the CAMIS project, in particular in the field of integrated marine and coastal area management, marine and coastal risks, knowledge and preservation of marine environment. The database aims to raise awareness of a range of projects in the Channel area which highlight best practice and complementarities, as well as identifying new areas for cooperation;

<sup>6</sup> University of Caen Basse-Normandie. Cross Channel Atlas. Available at: <http://atlas-transmanche.cetic.unicaen.fr>

<sup>7</sup> CHARM (undated). Sextant Tool webpage. Available at: [www.charm-project.org/fr/outils/sextant/sextant-outils](http://www.charm-project.org/fr/outils/sextant/sextant-outils)

<sup>8</sup> CHARM (undated). Channel Fisheries Atlas. Available at: [www.charm-project.org/fr/outils/atlas-des-pecheries/atlas-des-pecheries-outils](http://www.charm-project.org/fr/outils/atlas-des-pecheries/atlas-des-pecheries-outils)

<sup>9</sup> ARCOPOL (undated). Activity 6. Available at: [www.arcopol.eu/arcopol/buscaDocu.aspx?act=A6](http://www.arcopol.eu/arcopol/buscaDocu.aspx?act=A6)

<sup>10</sup> CAMIS (undated). The Cross Channel Resource Centre. Available at: <https://camis.arcmanche.eu/resources/>

(3) An «Atlas-Observatories» database lists various atlases and observatories that provide information, analysis, maps or data on the Channel area. These are either data specific to the Channel area, or at broader scale such as at French and British domestic or European level. These atlases and observatories deal with the sea, the coastline and more general maritime issues.

The "Cross-Channel Resource Centre" is both a tool for the dissemination of knowledge and a collaboration platform.

Within CHARM 3, a multidisciplinary database with metadata (called "Gazetteer") was created<sup>11</sup>. It constitutes a valuable tool for managers across the study area as it will avoid unnecessary duplication of effort.

ChanneLIS is currently developing an online **bibliographic database of marine scientific literature** pertaining to the Channel held in the libraries of relevant institutions (with a focus on historical and grey literature). The database will organize bibliographic records through normal categories (author, date, country, keywords), but also in terms of defined geographic zones and scientific themes. The organization of the records will enable targeted and accurate searches.

OFELIA has set up an online **database of available information on wind farm developments** in the Channel region. This available information includes everything found or provided by the external partners: data sites, reports and author contacts, papers, events, etc.

Also, within the ARCOPLUS project (part-financed by the Atlantic Area Transnational Programme), a "**Hazardous & Noxious Substances spill incidents Data Base**"<sup>12</sup>, was developed providing information on previous HNS spills as well as datasheets (with weathering and fate information).

PORTONOVO, also part-financed by the Atlantic Area Transnational Programme, has developed a tool called "**Decision Support System**" (DSS), that allows the processing, storage and interchange of all information related with water quality under a decision making perspective in harbour areas. The system has been designed to centralize all the information under a cloud computing environment, maximising use and performance for users and provide maximum security and reliability.

A geoportal has been created to answer the need of the managers, national and international bodies, linked to the database "North-East Atlantic" created during the MAIA and PANACHE projects, together with the OSPAR secretariat. It should allow to share official and updated information concerning MPAs.

### Modelling systems

CRESH has developed a **two stage biomass model** to assess the English Channel cuttlefish stock, as well as a presence-only maximum entropy (MaxEnt) modelling approach to predict the distribution of benthic cuttlefish egg clusters.

ARCOPLUS has developed **HNS modelling software** able to simulate transport and chemical fate of a few number of typical chemical substances<sup>13</sup>.

PORTONOVO has developed and applied **five modelling methodologies** for the study and the management of harbours: a numerical modelling procedure to evaluate water flushing time in port areas, a GIS method for harbour areas zoning regarding socioeconomic activities, a numerical modelling procedure for the evaluation of areas affected by different kinds of contaminants, a procedure for the estimation of the recovery potential time of effected waters and a methodology to integrate modelling results into a Geographical Information System.

<sup>11</sup> CHARM (undated). Gazetteer. Available at: [www.charm-project.org/fr/ouille/index-geographique/gazetteer-ouille](http://www.charm-project.org/fr/ouille/index-geographique/gazetteer-ouille)

<sup>12</sup> ciimar (undated). Hazardous and Noxious Substances Spill Incidents. Searchable database. Available at: [www.ciimar.up.pt/hns/](http://www.ciimar.up.pt/hns/)

<sup>13</sup> Fernandez, R. (2013). *Technical Report on HNS model implementation. Selection of HNS for modeling applications*. Pub: 28/12/2012. Available at: [www.arcopol.eu/fichaDocumento.aspx?id=6](http://www.arcopol.eu/fichaDocumento.aspx?id=6)

## Issues and challenges to be addressed in the future

### Data collection

Data collection can prove to be a really difficult task. Indeed, there is often a **lack of homogeneity** between data provided by different contributors, resulting in geographic gaps and unrepresentativeness of data. **Some methodological difficulties** are also often raised due to the different geographical information systems that are used and the language barriers (it can be difficult to find an adequate translation of technical terms)<sup>14</sup>.

Thus, there is a need to develop and share best practice for data collection. A good example is the “VALMER spatial data management advice note” (in progress), which will describe the current issues and best practice for the collation, storage and management of social and economic data.

In addition, it is also important to develop a bilingual thesauri and shared electronic platforms to store and collect data (or metadata). For instance, within ChannelIS, the National Marine Biological Library at the Marine Biological Association of the UK in Plymouth and the library of the Station Biologique de Roscoff in France will create a shared database of their holdings of material relevant to the scientific study of the Channel<sup>15</sup>. Also, for building up the CHARM 3 Fisheries Atlas, a common database of data from England (CEFAS) and France (Ifremer) was created<sup>16</sup>.

“**Crowd-sourcing**” could be a good way to overcome this problem of lack of data. “Crowd-sourcing is a type of participative activity (usually online) in which an individual, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task”<sup>17</sup>. For instance, this method was developed by the Marinexus project through several “Bioblitz” events. A “Bioblitz” is a 24 hour event involving scientists, the public, outreach experts and various stakeholders with a view to recording all the living species within a designated area. Three events were organized in Cornwall from 2011 to 2013. All the data collected was processed and passed to the National Biodiversity Network and DASSH (Data Archive for Seabed Species and Habitats)<sup>18</sup>. In the PANACHE project, citizen science actions have been organised on each side of the Channel. A tool to collect data has, for example, been developed through a partnership with the Planète Mer NGO.

However, it should be pointed out that the volume of responses does not necessarily create a high quality result. Thus, crowd-sourcing should always be combined with a quality monitoring process.

### Accessibility

The INSPIRE Directive requires public authorities to make sure data is accessible, that it can be shared and used by everyone. It covers spatial data sets that are in electronic format, held by a public authority and relate to one or more of the 34 themes listed in its three annexes<sup>19</sup>.

However, spatial datasets, series or services covered by the INSPIRE directive do not have to be made available to the public if any of the following conditions apply:

- It is not in electronic format;
- The Intellectual Property Rights or copyright of the data, or part thereof, belongs to a third party that has not given permission for its re-use;
- The protection of the environment to which such information relates, such as the location of rare species;
- It affects the confidentiality of personal data and/or files relating to a natural person where that person has not consented to the disclosure of that information to the public;

<sup>14</sup> A number of projects, including CAMIS and CHARM3, had to deal with these difficulties.

<sup>15</sup> See CHANNELIS website: [www.charmidis.eu](http://www.charmidis.eu)

<sup>16</sup> This database, called “Harmonie”, is hosted by Ifremer (<http://sih.ifremer.fr/>)

<sup>17</sup> Estellés-Arolas, E. and F.G. Ladrón-de-Guevara (2013). *An African American Paternal Lineage Adds an Extremely Ancient Root to the Human Y Chromosome Phylogenetic Tree*. In: *The American Society of Human Genetics*, 92(3): pp. 454-459.

<sup>18</sup> Further information available at: [www.mba.ac.uk/education/Bioblitz](http://www.mba.ac.uk/education/Bioblitz)

<sup>19</sup> These themes are listed at: <http://inspire.ec.europa.eu/index.cfm?pageid/2/list/7>

- The interests or protection of any person who supplied the information on a voluntary basis without a legal obligation to do so, and who also has not given permission to disclose this information;
- It is sensitive to international relations, public security or national defence;
- The confidentiality of commercial or industrial information, where such confidentiality is provided for by national or Community law to protect a legitimate economic interest, including the public interest in maintaining statistical confidentiality and tax secrecy;
- The confidentiality of the proceedings of public authorities, where such confidentiality is provided for by law;
- The course of justice, the ability of any person to receive a fair trial or the ability of a public authority to conduct an enquiry of a criminal nature.

INSPIRE is made of five components:

- Metadata - descriptions of the spatial i.e. 'data about data';
- Interoperability of Spatial Data Sets and Services;
- Network Services - to make it possible to discover, transform, view and download spatial data and to invoke spatial data and e-commerce services;
- Data Sharing - to allow an 'as easy as possible' data exchange between public bodies and to allow third parties, especially citizens to have an as much as possible free and easy access to spatial information covered by INSPIRE;
- Coordination and Monitoring Measures – to monitor the organizational and management aspects of the INSPIRE implementation.

Thus, the INSPIRE directive is addressing the key issues of data accessibility and interoperability. However, the specific case of the European territorial cooperation projects is not considered. Indeed, which body/organization should be responsible for making data available? Is it the lead partner, the partner which has collected or processed data, the Interreg programme Managing Authority or the European Commission? This question should be further explored, so as to avoid any legal void.

### Sustainability

At the end of the projects, the various websites are not updated further or even disappear. As a consequence, the databases which were accessible through these websites disappear as well. This may be due to a lack of resources or a "deadweight" effect.

Thus, it is essential that project partners identify as soon as possible a leading organisation, a partnership and funding beyond the Interreg programme funding or any other way to keep the tools up-to-date and develop them further. For instance, the CRESH biomass model was implemented into a software application in order to facilitate routine assessment by an ICES<sup>20</sup> working group.

To ensure sustainability, it is suggested that **additional Interreg rules are introduced** for how databases should be stored and managed, to increase sustainability requirements. This could be done by asking further details in the application form or by making sustainability measures a compulsory deliverable (with some dedicated budget).

### Visibility

One cannot but notice that there is a plethora of databases, with various thematic focuses and different scales. However, this diversity, combined with a lack of communication on these tools, affects their visibility. Thus, there is a need to increase communication on the various tools which has been developed within the projects, by organizing specific conferences, using social networks or listing all of them on a website (a "database of databases").

Besides, the consolidation of existing information and data should be further encouraged. Any unnecessary duplication should be avoided and it should be

<sup>20</sup> International Council for the Exploration of the Sea (CIEM: Conseil International pour l'Exploration de la Mer). Website available at: [www.ices.dk](http://www.ices.dk)

investigated whether the various existing databases match real needs and are useful for decision-makers and the general public or not. It should be examined as well how Interreg projects can feed the existing databases and observatories, such as ICES database at the International level<sup>21</sup>, EMODnet and the European Environment Agency data centres<sup>22</sup> at the European level and national databases (such as "Système d'Information Nature et Paysages"<sup>23</sup>, Sextant 's marine and coastal geographic data structure in France or the Marine Environmental Data and Information Network (MEDIN) portal in UK<sup>24</sup>).

On that point, the following good practices are worth mentioning: the Cross-Channel Resource Centre and the Channel programme. By listing all the atlases and observatories providing information, analysis, maps or data on maritime issues in the Channel area, the above-mentioned "Cross-Channel Resource Centre", contributes to improving their visibility and avoiding any further duplication. However, this could be done on a larger scale (and not only on maritime issues) by the Interreg IVA France (Channel) – England programme or the INTERACT programme<sup>25</sup>.

The "Channel Programme", developed and led by Ifremer Boulogne-sur-Mer, is a multi-disciplinary informal initiative gathering scientists, managers and decision-makers with a view to implementing an ecosystem-based approach to marine resources management. In particular, the Channel programme aims to communicate information and exchange knowledge gained from the research, so that it can be efficiently integrated into public policies. The aim is also to collectively develop research capacities in the Channel area. The Channel programme is built upon four major areas of research (habitats, trophic networks, sustainable management and socio-economy) and two transversal activities (communication and tools). It is developed through research projects, gathered together under the "Channel programme" label, and public conferences that are organized on an annual basis<sup>26</sup>.

## CONCLUSIONS/WORK LEADS

### The main conclusions coming out from this report are the following:

- The different Interreg IVA Channel area projects gathered within PEGASEAS have produced a range of information aiming to support effective marine governance: datasheets and maps, databases and modelling systems;
- So as to overcome the various challenges related to data collection (geographic gaps and unrepresentativeness of data, discrepancies between the methodology and technical terms used, language barriers), there is a need to develop and share best practice on a cross-channel scale as well as bilingual thesauri and shared electronic platforms to store and collect data. Also, crowd-sourcing practices should be further encouraged;
- The INSPIRE directive is addressing the key issues of data accessibility and interoperability. However, the specific case of the European territorial cooperation projects is not considered and should be further explored;
- In order to ensure sustainability, it is suggested that additional Interreg rules are introduced regarding how databases should be stored and managed;
- There is a need to increase communication on the various tools which have been developed within the projects and further encourage the consolidation of existing knowledge and data.

<sup>21</sup> ICES (undated). ICES Data Portal. Available at: <http://ecosystemdata.ices.dk/>

<sup>22</sup> European Environment Agency (undated). European Data Centres. Available at: [www.eea.europa.eu/data-and-maps/european-data-centres](http://www.eea.europa.eu/data-and-maps/european-data-centres)

<sup>23</sup> Nature France website. Available at: [www.naturefrance.fr/](http://www.naturefrance.fr/)

<sup>24</sup> Marine Environmental Data and Information Network website. Available at: [www.oceansnet.org](http://www.oceansnet.org)

<sup>25</sup> Funded by the ERDF and national contributions, the INTERACT programme aims to exchange information and best practices among cooperation programmes and make projects results more visible. More information at: [www.interact-eu.net](http://www.interact-eu.net).

<sup>26</sup> Ifremer website (undated). Channel Programme. Available at: [http://www.ifremer.fr/del/manche\\_eng](http://www.ifremer.fr/del/manche_eng)

**In order to move forward on these issues, two avenues of work could be explored:**

- To develop and implement a territorial cooperation project gathering national agencies, universities and local authorities with the aim to exchange best practice and methodology on marine data collection, storage and management. This project could be co-funded by the Interreg VA France (Channel) – England or, on a broader scale, by the future Interreg Europe programme;
- Discuss the potential, for the INTERACT programme, for example, to lead a specific working group aiming to examine how the information and data produced by the Interreg projects could be more accessible, visible and sustainable. It should be investigated as well to which extent they can feed EMODnet and other European and national data portals.