



Client: European Commission – DG Environment

Subject: Option for coastal information systems

Doc. title: Policy Options – Progress results

Document no.: 21807-REL-T005.0

Distribution list: DG Environment, EU ICZM Expert Group, file 21807

rev.	date	issued for	pages	prepared	checked	approved
0	14.06.11	Information	12	ER	ME	MB
1						
2						
3						

**Thetis S.p.A.**  
Castello 2737/f, 30122 Venice, Italy  
Phone +39 041 240 6111  
Fax +39 041 521 0292  
[www.thetis.it](http://www.thetis.it)





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# 1 Context

The project “Options for coastal information systems” mainly aims to identify a set of policy requirements for coastal information systems (CIS), i.e. requisites that can be concretely implemented in order to improve the use of the same CIS in supporting the diffusion and implementation of the ICZM process at various scales (international, national, sub-national – regional and local). The project is structured in three technical tasks: (i) task 1 deals with the analysis of illustrative cases of existing coastal information systems; (ii) task 2 specifically focuses on the definition of policy requirements and their assessment in terms of expected policy impacts; (iii) task 3 deals with stakeholder involvement and participation in supporting the CIS analysis and the definition and assessment of policy requirements.

Stakeholder involvement and participation in particular included the realisation of a 1-day stakeholder workshop, held in Marseille on the 6<sup>th</sup> of May. The workshop enabled to discuss preliminary project results and gather related stakeholder feedbacks, in particular in relation to the identification of policy requirements and the definition of related policy options, i.e. integrated set of relevant policy requirements. Results of the workshop are reported in the “Workshop Report. Stakeholder Workshop – 6<sup>th</sup> May 2011, Marseille” (ref. cod. 21807-REL-T004.0); another relevant document is the Discussion Paper prepared for and distributed before the workshop (ref. cod. 21807-REL-T003.0).

Workshop feedbacks have been in particular used to underpin the still on-going process related to policy options definition; progress results are briefly presented in this document.



## 2 Policy requirements definition

Within the context of the “Options for coastal information system” study, a policy requirement is intended as a requisite that can be concretely implemented in a coastal information system in order to improve the use of the same CIS in supporting the diffusion and implementation of the ICZM process at various scales (international, national, sub-national – regional and local). The following key structuring policy requirements have been identified and validated by the stakeholders participating in the 6<sup>th</sup> of May workshop. These requirements are related to four categories: scope, contents, functions and mechanisms of CIS:

### Scope

#### **a1. Include end-user in the system design**

Consultation of the user community throughout the CIS design phase is essential to ensure development to meet users’ needs and implement a useful and really used system. This firstly requires the identification of the user community and their active participation in the definition of the specific system requirements, as actually done by some of the analysed CIS illustrative cases.

#### **a2. Address different user expectations and needs**

A CIS may aim to provide data and functionalities to different users, such as policy and decision makers, coastal planners and managers, researchers, representative of the economic sectors, citizens, students, CIS experts etc. These can have different expertise and skills, and different requirements and expectation. Multiple CIS versions are required to deal with diverse user typologies, providing them with different knowledge levels, data and functionalities.

#### **a3. Adopt an ecosystem-based approach in the definition of the CIS’ context and geographic area of application** (or more generally: take in consideration and support ecosystem-based management approach).

This would imply the inclusion in the CIS's geographical context of the drainage basin, the land component of the coastal area, and the marine area, thus promoting integration across the land-sea boundary.

The adoption of an ecosystem-based approach could also require the definition of the CIS’ area of application beyond administrative (sub-national and national) boundaries, thus implying a cross-border cooperative effort in creating common CIS platforms, also at the international level (some examples have been analysed in this project, such as: Integrated Atlas of the state of the coast in the South-Eastern Baltic, Three later Wadden Sea cooperation web-site, Schelde Monitor, Oder Estuary coastal information system, MEGASIG).

#### **a4. Continue and strengthen the effort in matching the INSPIRE Directive**

Continue and strengthen the effort in matching the INSPIRE Directive, specifically in relation to metadata standards, geo-spatial data availability and interoperability in general. It is in particular important to ensure the high-quality and standards-compatible metadata are continued to be provided; this can be rather challenging in particular for historical geo-spatial data. Use of various-levels structure to organise and describe metadata (e.g. abstract, discovery, full metadata) can be very useful in approaching different target users.



## Contents

### **b1. Improve economic and in particular social and governance information within CISs**

The great majority of coastal information system widely covers territory and environmental information. Economic dimension is considered by a good number of CISs, however only for limited data typologies (such as for examples location of main economic activities). Social and governance dimensions are rarely properly addressed. Indeed, there is a need to improve economic and in particular social and governance geospatial data within CIS. In relation to the governance dimension, it would be very important to include in the CIS the progress results of the ICZM process, i.e. information (data, layers, documents, etc.) on ICZM related plans and policies. These should be made available to all users thus improving awareness and participation of all possibly involved stakeholders on the on-going ICZM process.

This aspect is strictly related to the holistic nature of ICZM and the related ecosystem-based management approach, aiming to determine progress towards good environmental status of coastal ecosystems that is directly relevant to socio-economic benefits and human well-being.

### **b2. Improve availability of information resulting from the integrated analysis of data related to different topics** (and possibly to different ICZM information dimensions: territory, environment, society, economy and governance).

Integrated information (i.e. information directly related to integrated management, such as in particular integrated maps, indicators and indexes) can result really useful in supporting ICZM decision making and communication, in particular in relation to cross-sector analysis and assessment, for example related to: coastal sensitivity, vulnerability, risk, overall pressure, evolution, adaptation, etc. These added value products are also particularly important in dealing with multi-uses zoning (of both land and marine components of the coastal systems) and related conflicts.

A specific CIS section on integrated data and geo-spatial data related to ICZM could be developed to properly structure this kind of information.

### **b3. Improve availability of multi-time data**

Historical series of data and geospatial information are essential for the assessment of coastal process trends and the evaluation of their future evolution. Currently availability of multi-time data is limited to some specific issues, such as in particular: shoreline position, satellite images and orthophotos, population and population density, land uses, some environmental monitoring data. Multi-time should be expanded to other spatial information, also addressing the economic, social, and governance dimensions.

### **b4. Develop and implement a common ontology for coastal and marine information**

Terminology used to describe same or similar information sectors and data typologies is not uniform, there are differences among various information systems (e.g. shoreline vs coastline). These differences can obstacle data search, sharing and integration. The adoption of a common ontology could reduce this limitation.



## Functions

### **c1. Improve functionalities directly supporting ICZM decision making in a short and long term perspective**

Coastal Information Systems only partly provide functionalities specifically supporting the ICZM decision making process, in particular for the public administrations. These kinds of functionalities are particularly required and useful for: vision building and scenario development, assessment of planning and management alternatives, monitoring and evaluation of the ICZM process. Their complexity and completeness can widely vary, including data driven functions (such as integrated maps, scenario maps or ICZM indicator) and more ambitious Decision Support Tools (DST). DST should be in case designed and developed on the basis of real end-users expectation, thus avoiding too general and no-useful tools.

### **c2. Improve diffusion and innovation of e-participation tools**

There is a clear need to evolve from information/communication to real participation in the generation and use of coastal information and more in general in the ICZM process. However few CISs provide proper e-participation tools and functionalities; such tools therefore need to be further developed and innovated. Some examples are: blog, e-forum, social networks, platform for participated GIS (for example to analyse conflicts among coastal uses), wiki-like tools focusing on ICZM or specific related topics, functionality enabling users to provide georeferenced naturalistic or environmental observations (geo-tagging functions), etc.. Database of coastal stakeholders can be very useful in supporting mutual cooperation and full participation within the ICZM process.

Effort shall also be dedicated to develop specific *interactive education tools* aiming to increase civil society awareness. Analysed CIS cases showed very few tools or sections specifically dedicated to education, that is a fundamental basis for awareness rising.

### **c3. Integrate 3D data and develop 3D tools**

3D data and tools are essential in the analysis some relevant coastal management issues (such as flooding vulnerability and risk, coastal erosion and related interventions, topographic and bathymetry evolution, habitat conservation, etc.). A further more ambitious requirement deals with the development and implementation of *4D tools*, also integrating time dimension in the analysis.

### **c4. Ensure data and metadata availability**

CISs should provide the possibility to download the majority of data and geospatial data, thus supporting the use of coastal information for a wide spectrum of ICZM related initiatives. Downloadable data must be accompanied by a detailed metadata description, also including clear and transparent link to the original data producers.

### **c5. Improve availability of geospatial data and CIS functions related to climate change**

Climate change and sea level rise will likely improve significantly coastal vulnerability. However, these issues appear to be rarely considered in the analysed coastal information systems. There is an evident need to improve the availability of geo-spatial data and functionalities (such as for example coastal vulnerability maps to sea level rise, coastal evolution scenarios, visualisation tools, etc.) related to climate change impacts, vulnerability and adaptation. This would actually support mainstreaming of climate change vulnerability and adaptation in coastal and marine plans and policies.



## Mechanism

- d1. Establish strict link and cooperation between the structure** (department, office, division, etc.) **responsible for the CIS management and operation and the structure** (often a different one) **responsible for the implementation of the ICZM process.**

Modalities to develop or reinforce this cooperation can be different and depend on the specific ICZM case and in particular on the involved subjects. One example could be the creation of a working group (or a coordination board) for the definition of guidelines for the implementation, management and use of the CIS. The working group should primarily facilitate the embedding of the CIS in the policy making and planning/management process, therefore leading to a concrete use of the CIS for ICZM implementation.

The working group should involve representatives (with different roles: policy makers, coastal planners, coastal managers, CIS experts, etc.) of all the public (at all relevant governance levels) and private bodies/structures involved in the concrete implementation of the ICZM process, including those operating the CIS.

- d2. Improve the use of protocols facilitating geo-spatial data sharing**

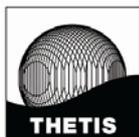
Open Geospatial Consortium standards (such as Web Map Service – WMS, Web Feature Services – WFS, and Web Coverage Services – WCS, etc.) offers a high potential for data and metadata sharing, implying the following advantages: data are updated by data producers, responsibility of data and metadata quality check is shared among different subjects (again the data producers), reduction of management costs, reduction of limitation to data accessibility related to restrictive data policies and Intellectual Property Rights (IPS).

- d3. Develop on-line tools to measure the real use of CIS**

These tools should aim to assess the real use of CISs within an ICZM process and therefore by the ICZM community. Web statistic tools can provide part of the needed information, however innovative tools are required.

- d4. Participate to CIS and/or ICZM networks**

Participation to CIS and/or ICZM networks (such as ICAN – International Coastal Atlas Network) can be particularly useful for exchanging best practices on CIS management and use within an ICZM process. These networks can also be very important to share knowledge related to more technical aspects, including data contents, interoperability, metadata, functions and tools, etc., as well as to connect initiatives at different level (sub-national, national and international).



### 3 Policy options definition

Policy options are intended as integrated and homogenous sets of the key structuring policy requirements. The study foresees the identification of three policy options plus a “baseline scenario”. Policy options will be evaluated in terms of direct and indirect impacts; the “baseline scenario” is used to relatively assess the proposed policy options in terms of above impacts.

The **baseline scenario** is defined as a scenario not including the implementation of new policy requirements for coastal information systems and implying the fulfilment of already set legislative requirements, in particular related to implementation of the INSPIRE Directive. As agreed with participants to the stakeholder workshop, the baseline scenario includes the two identified policy requirements:

- Continue and strengthen the effort in matching the INSPIRE Directive (a4);
- Ensure data and metadata availability (c4), policy requirement strictly related to the previous one.

The three policy options have been developed on the basis of the main Workshop feedbacks:

- Use all the identified policy requirements for the formulation of the policy options;
- Clearly differentiate the three policy options;
- Base the policy options development on the categorization used or proposed to group the identified policy requirements (see in particular categories included in chapter 2).

In these preliminary results, three policy requirements are considered as common to all the three policy options:

- Include end-user in the system design (a1);
- Address different user expectation and needs (a2);
- Participate to CIS and/or ICZM networks (d4).

Ready involvement of final users in the system design and a multi-users oriented systems can significantly improve the real use and usefulness of CISs with relatively limited costs. Indeed, users can help to rightly orientate the CIS design and development (in terms of objectives, contents and functions) since its real beginning, thus contributing to rationalize the use of, and likely save, human and economic resources. These two requirements are therefore considered as common for all the three policy options.

Similarly, participation to CIS and/or ICZM networks can require limited economic and human resources and result in being particularly advantageous for the ICZM implementation, enabling to share worldwide experiences, best practices and knowledge related to more technical aspects. Participation to these networks can also contribute in saving money and time by learning from others' experience and sharing/integrating efforts and expertise.

The following three policy options have been identified:

**Contents driven policy option (P1)**, including most of the policy requirements related to the “Contents” category. This policy option mainly aims to improve the data and information base of CISs in particular in order to increase the role of scientifically-based approach, multi-sector and integrated (holistic) knowledge and long-term evaluation in supporting the ICZM process.



The policy option includes the following 6 policy requirements (3 common and 3 specific ones):

- Improve economic and in particular social and governance information within CISs (b1);
- Improve availability of information resulting from the integrated analysis of data related to different topics (b2);
- Improve availability of multi-time data (b3);
- Include end-user in the system design (a1) – common to all policy options;
- Address different user expectation and needs (a2) – common to all policy options;
- Participate to CIS and/or ICZM networks (d4) – common to all policy options.

**Functions driven policy option (P2)**, including most of the policy requirements related to the “Functions” category. This policy option mainly aims to improve the availability of functionalities and tools directly supporting ICZM decision makers and coastal planners and managers, as well as to increase stakeholders’ involvement and participation in the ICZM process. The policy option includes the following 7 policy requirements (3 common and 4 specific ones):

- Improve functionalities directly supporting ICZM decision making in a short and long term perspective (c1);
- Improve diffusion and innovation of e-participation tools (c2);
- Integrate 3D data and develop 3D tools (c3);
- Improve availability of geospatial data and CIS functions related to climate change (c5);
- Include end-user in the system design (a1) – common to all policy options;
- Address different user expectation and needs (a2) – common to all policy options;
- Participate to CIS and/or ICZM networks (d4) – common to all policy options.

C1 and c2 are the core policy requirements of this policy option; indeed c3 and c5 are related to some specific aspects that are particularly important for the previous c1 and c2 policy requirements.

**Mechanism driven policy option (P3)**, including most of the policy requirements related to the “Mechanism” category and some policy requirements related to the other categories. This policy option mainly aims to enhance cooperation among different subjects involved in the CISs implementation and management and more in general in ICZM process, thus improving the CISs support to this latter. Specifically, increased horizontal and vertical cooperation is desirable among: structures of the same authority involved in ICZM and/or the CIS’ management and operation, different public authorities involved in the ICZM process, different coastal data providers and managers, managers of different CISs related to the same area of interest. The policy option includes the following 8 policy requirements (3 common and 5 specific ones):

- Adopt an ecosystem-based approach in the definition of the CIS’s context and geographic area of application (a3);



- Establish strict link and cooperation between the structure responsible for the CIS management and operation and the structure responsible for the implementation of the ICZM process (d1);
- Improve the use of protocols facilitating geo-spatial data sharing (d2);
- Develop and implement a common ontology for coastal and marine information (b4);
- Develop on line-tools to measure the real use of CIS (d3) in particular in concreting support ICZM;
- Include end-user in the system design (a1) – common to all policy options;
- Address different user expectation and needs (a2) – common to all policy options;
- Participate to CIS and/or ICZM networks (d4) – common to all policy options.

Figure 3-1 illustrates the main conceptual links among the different identified policy options. P1, P2 and P3 can be considered progressive scenarios in terms of likely required resources, effort and expected benefits in concrete support to the ICZM process. In this perspective P1 depicts a relatively low ambitious policy option, P2 a medium ambitious policy option and P3 a high ambitious policy options. However, it is important to stress that the “level of ambition” strictly depends on specific objectives and modalities considered in the implementation of the three different policy options and related policy requirements.

After their identification, the three policy options will be assessed in term of direct and indirect impacts (including both expected benefits and negative impacts/costs). **Direct impacts** are conceptually organised as follows.

Aspects related to ICZM principles (as identified by the Recommendation 2002/413/EC):

- Integrated knowledge on the coastal system;
- Bridged gap between scientific information and policy/decision making in the ICZM process;
- Involvement of stakeholders in the ICZM process, also aiming to improve awareness on sustainable coastal planning and management;
- Support and facilitation in climate change adaptation of coastal zones within the wider context of ICZM;
- Periodical evaluation process of ICZM planning and management; support an ICZM adaptive process;
- Cooperation among different institutions and institutional levels;
- Adoption of a long-term perspective for ICZM.

Links with a broader policy context:

- Implementation of ICZM in a regional sea context;
- Support to the integration of ICZM with other closely related policies and directives (e.g. WFD, MSFD, IMP-MSP).

Use of the system:

- Simplification of the use of the coastal information system.



#### Costs and use of resources:

- Development costs;
- Costs related to maintenance and updating of the CIS;
- Learning costs;
- Difficulties related to factors external to the specific CIS context.

Furthermore, the following **indirect impacts** have been indentified:

#### Economic

- Functioning of internal market;
- Competitiveness, trade and investment flows;
- Costs and benefits for public administrations;
- Innovation and research.

#### Social

- Better living conditions in terms of effects on social protection, public health and safety, educational system;
- Individual sustainable behaviour (e.g. sustainable consumption);
- Employment and labour market.

#### Environmental

- Awareness of coastal risk and vulnerability;
- Adaptation to climate change and sea level rise;
- Biodiversity and habitat protection.

Direct and indirect impacts could be fin-tuned during the on-going evaluation process in order to better understand potential effects on defined policy options.

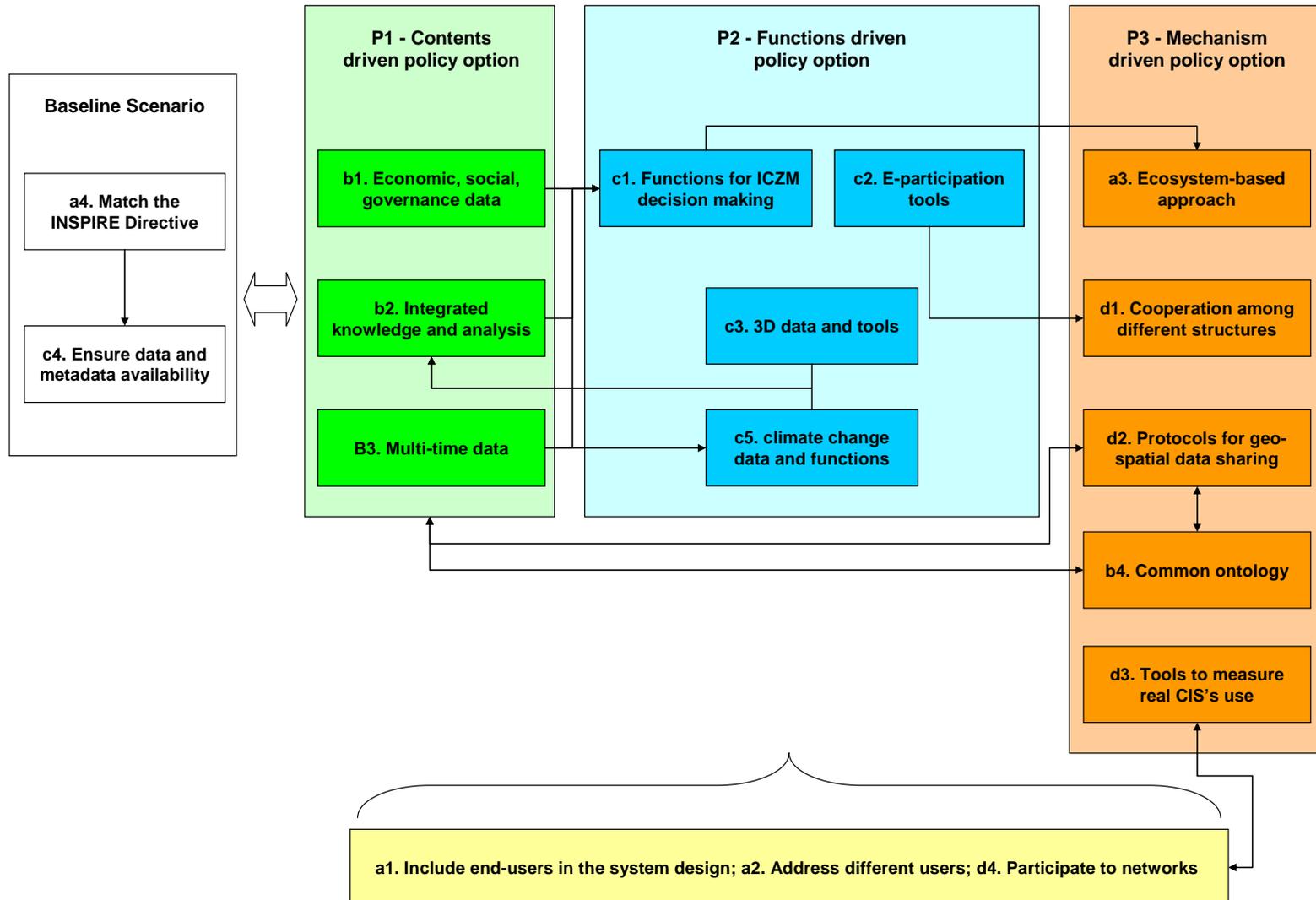


Figure 3-1 Main conceptual links among different policy options.