



Ciências  
ULisboa

# SPATIAL DATA INFRASTRUCTURES (SDI)

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THE INSPIRE DIRECTIVE

# Curricular Unit Description

MODULES	TEACHING STAFF	DATES	SW
<b>CURRICULAR UNIT PRESENTATION</b>	Ana Navarro, FCUL	24 sep	
<b>INTRODUCTION TO SDI</b>	Ana Navarro, FCUL	24 sep	GEMA/QGIS
<b>METADATA</b>	Henrique Silva, DGT	1 oct/8 oct	GEMA
<b>SPATIAL DATA SERVICES</b>	Danilo Furtado, DGT	15 oct/22 oct	GeoServer / QGIS
<b>JIIDE2020</b>	Online Conference	29 oct	
<b>SPATIAL DATA HARMONIZATION</b>	André Serronha, DGT	5 nov/12 nov	QGIS / hale STUDIO/GAIA
<b>DATA POLICY</b>	Alexandra Fonseca, DGT	19 nov	
<b>PROJECT DEVELOPMENT</b>	Ana Navarro and DGT researchers	nov/dec	
<b>PROJECT PRESENTATION</b>	Ana Navarro and DGT researchers	To be scheduled	



# SDI Definition

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- According to the [Global Spatial Data Infrastructure \(GSDI\) Association's Cookbook](#) (Nebert, D.D. (editor), 2004) an SDI hosts geographic data and attributes, sufficient documentation (metadata), a means to discover, visualize, and evaluate the data (catalogues and web mapping), and some method to provide access to the geographic data.
- Beyond this are additional services or software to support applications of the data.
- To make an SDI functional, it must also include the organisational agreements needed to coordinate and administer it on a local, regional, national, and or trans-national scale.

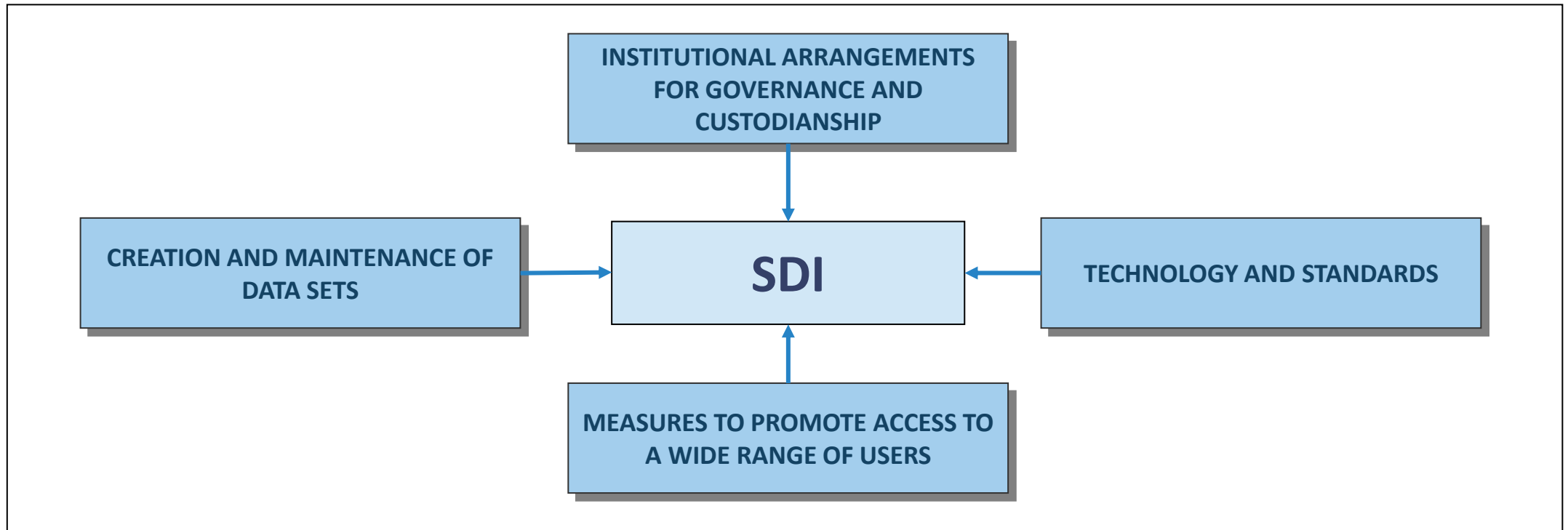
# SDI Definition

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- The description of GSDI classifies SDI components as data, metadata, services (technology), and organisational agreements.
- According to Craglia *et al.* (2003), SDI encapsulate policies, institutional and legal arrangements, technologies, and data that enable sharing and effective usage of geographic information.
- This definition adds an aspect of utmost importance – the effective usage of geographic data, which sets the requirement of [interoperability](#).

# SDI Components

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Masser & Crompvoets (2015)



# INSPIRE Directive

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- The INSPIRE Directive aims to create a **European Union spatial data infrastructure** for the purposes of EU environmental policies and policies or activities which may have an impact on the environment.
- This European Spatial Data Infrastructure will enable the **sharing of environmental spatial information** among public sector organisations, facilitate **public access to spatial information** across Europe and assist in **policy-making** across boundaries.

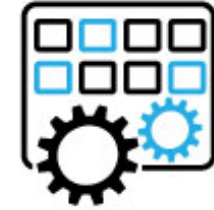


# INSPIRE Directive

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- INSPIRE is based on the infrastructures for spatial information established and operated by the **Member States** of the European Union. The Directive addresses 34 spatial data themes needed for environmental applications.
- The Directive came into force on **15 May 2007** and will be implemented in **various stages**, with full implementation required by 2021.

# INSPIRE Themes



## ANNEX: 1



[Addresses](#)



[Cadastral parcels](#)



[Geographical grid systems](#)



[Hydrography](#)



[Transport networks](#)



[Administrative units](#)



[Coordinate reference systems](#)



[Geographical names](#)



[Protected sites](#)

## ANNEX: 2



[Elevation](#)



[Land cover](#)



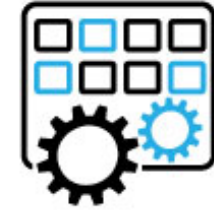
[Geology](#)



[Orthoimagery](#)



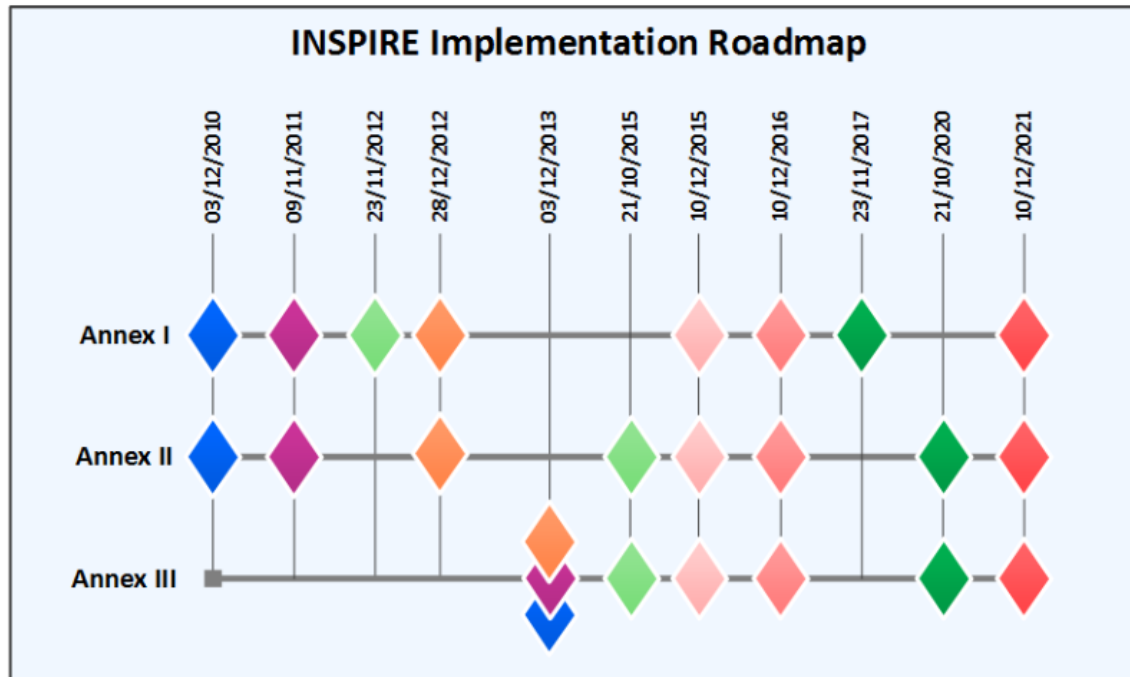
# INSPIRE Themes



## ANNEX: 3

-  [Agricultural and aquaculture facilities](#)
-  [Atmospheric conditions](#)
-  [Buildings](#)
-  [Environmental monitoring Facilities](#)
-  [Human health and safety](#)
-  [Meteorological geographical features](#)
-  [Area management / restriction / regulation zones & reporting units](#)
-  [Bio-geographical regions](#)
-  [Energy Resources](#)
-  [Habitats and biotopes](#)
-  [Land use](#)
-  [Mineral Resources](#)
-  [Natural risk zones](#)
-  [Population distribution and demography](#)
-  [Sea regions](#)
-  [Species distribution](#)
-  [Utility and governmental services](#)
-  [Oceanographic geographical features](#)
-  [Production and industrial facilities](#)
-  [Soil](#)
-  [Statistical units](#)

# INSPIRE Roadmap



<p><b>Discovery metadata</b> shall be available for spatial data sets and services</p>	<p>Spatial data sets shall be available for <b>discovery and view</b> from the INSPIRE geo-portal (data does not yet need to be conformant to IR-ISDSS)</p>	<p>Spatial data sets shall be available for <b>download and transformation</b> (whenever applicable<sup>1</sup>) from the INSPIRE geo-portal (data does not yet need to be conformant to IR-ISDSS<sup>2</sup>)</p>
<p><b>Newly collected and extensively restructured spatial data sets</b> shall be conformant to IR-ISDSS (incl. <b>metadata for interoperability</b>) and available through network services</p>	<p><b>All spatial data sets</b> shall be conformant to IR-ISDSS (incl. <b>metadata for interoperability</b>) and available through network services</p>	
<p><b>All invocable spatial data services</b> shall be conformant to <b>Annex V of IR-ISDSS</b> (incl. <b>metadata</b>)</p>	<p><b>Invocable spatial data services related to newly collected and extensively restructured spatial data sets</b> shall be conformant to <b>Annexes VI and (where practicable) VII of IR-ISDSS</b> (incl. <b>metadata</b>)</p>	<p><b>All invocable spatial data services</b> shall be conformant to <b>Annexes VI and (where practicable) VII of IR-ISDSS</b> (incl. <b>metadata</b>)</p>
<p>IR-ISDSS = Implementing Rules on interoperability of spatial data sets and services (Commission Regulation (EU) No. 1089/2010), including its amendments Regulations (EU) No. 102/2011, 1253/2013 and 1312/2014</p> <p><sup>1</sup> Transformation Services only need to be provided if data sets are not made conformant with the IR-ISDSS by some other means (see Art. 7(3) of the INSPIRE Directive)</p> <p><sup>2</sup> With the exception of newly collected and extensively restructured Annex I data sets, which already have to be compliant with the IR-ISDSS by 23/11/2012</p>		

# INSPIRE Principles

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- Data should be collected only once and kept where it 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.
- Easy to find what geographic information is available, how it can be used to meet a particular need, and under which conditions it can be acquired and used.

# INSPIRE Legislation

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- The INSPIRE Directive was published in the [Official Journal of the European Union](#) on the 25th April 2007 and entered into force on the [15th May 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 \(INSPIRE\)](#)

- To ensure that the spatial data infrastructures of the Member States were compatible and usable in a Community and transboundary context, the INSPIRE Directive required that common [Implementing Rules \(IR\)](#) were adopted in a number of specific areas.

# INSPIRE Legislation

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- These Implementing Rules were adopted as **Commission Decisions or Regulations** and are binding in their entirety.
- The Commission was assisted in the process of adopting such rules by a **regulatory committee** composed by representatives of the Member States and chaired by a representative of the Commission (known as the Comitology procedure).

# INSPIRE Implementing Rules



**METADATA**

**DATA SPECIFICATIONS - INTEROPERABILITY OF SPATIAL DATA SETS AND SERVICES**

**DISCOVERY AND VIEW SERVICES**

**NETWORK SERVICES**

**DOWNLOAD AND TRANSFORMATION SERVICES**

**SPATIAL DATA SERVICES**

**DATA AND SERVICE SHARING**

**MONITORING AND REPORTING**



# INSPIRE Technical Guidance

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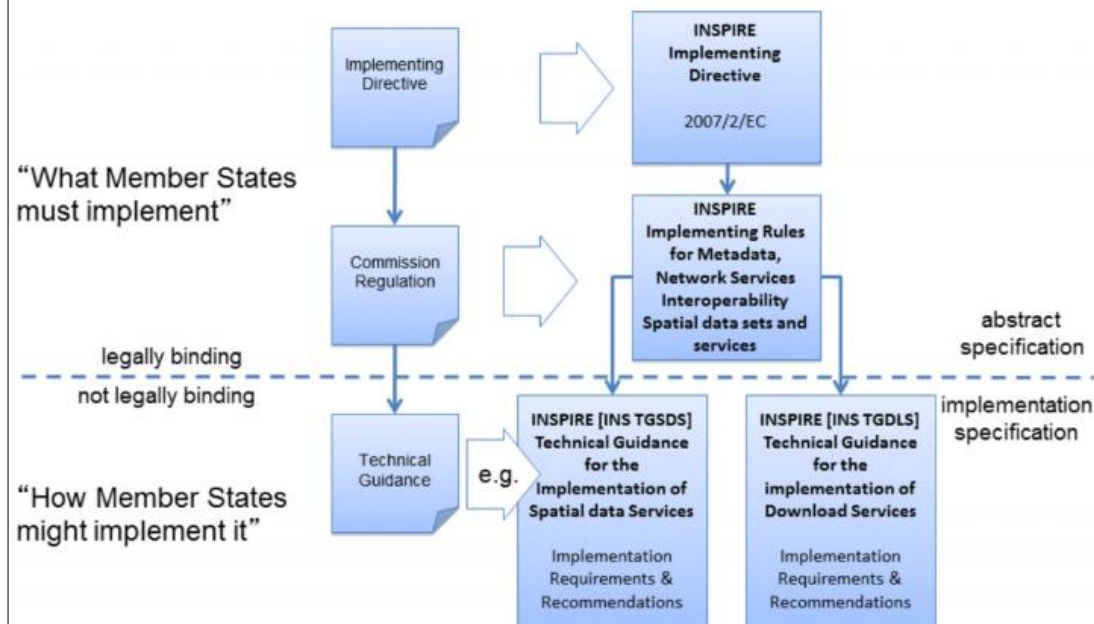
- In addition to the Implementing Rules, non-binding [Technical Guidance documents](#) describe detailed implementation aspects and relations with existing standards, technologies, and practices.
- The figure in the next slide illustrates the relationship between the INSPIRE Regulations containing Implementing Rules and their corresponding [Technical Guidance documents](#).

# INSPIRE Technical Guidance



L 326/12	EN	Official Journal of the European Union	4.12.2008
<b>COMMISSION REGULATION (EC) No 1205/2008</b>			
<b>of 3 December 2008</b>			
<b>implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata</b>			
<b>(Text with EEA relevance)</b>			
THE COMMISSION OF THE EUROPEAN COMMUNITIES,	elements necessary to comply with Directive 2007/2/EC and does not preclude the possibility for organisations to document the information resources more extensively with additional elements derived from international standards or working practices in their community of interest. Nor does it preclude the possibility to adopt guidelines established and kept up to date by the Commission, in particular when it is necessary to ensure the interoperability of metadata.		
Having regard to the Treaty establishing the European Community,			
Having regard to 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) <sup>(1)</sup> , and in particular Article 5(4) thereof,	(3)	Instructions are necessary for the validation of metadata in accordance with Directive 2007/2/EC with regard to the conditions and expected multiplicity of each metadata element, that is to say, whether values for each element are always to be expected in the metadata record, can occur only once, or can occur more than once.	
Whereas:	(4)	The value domain of each metadata element is necessary to ensure interoperability of metadata in a multilingual context and that value domain should be able to take the form of free text, dates, codes derived from international standards, such as language codes, keywords derived from controlled lists or thesauri, or character strings.	
(1) Directive 2007/2/EC lays down general rules for the establishment of the Infrastructure for Spatial Information in the European Community. Since, for the proper functioning of that infrastructure, it is necessary for a user to be able to find spatial data sets and services and to establish whether they may be used and for what purpose, Member States should provide descriptions in the form of metadata for those spatial data sets and services. Since such metadata should be compatible and usable in a Community and trans-boundary context, it is necessary to lay down rules concerning the metadata used to describe the spatial data sets and services corresponding to the themes listed in Annexes I, II and III to Directive 2007/2/EC.	(5)	The measures provided for in this Regulation are in accordance with the opinion of the Committee established by Article 22 of Directive 2007/2/EC.	
	HAS ADOPTED THIS REGULATION:		
	Article 1		
(2) The definition of a set of metadata elements is necessary in order to allow identification of the information	<b>Subject matter</b>		

## Relationship between INSPIRE Implementing Rules and Technical Guidance



**INSPIRE**  
Infrastructure for Spatial Information in Europe

## Technical Guidance for the implementation of INSPIRE dataset and service metadata based on ISO/TS 19139:2007

<b>Title</b>	Technical Guidelines for implementing dataset and service metadata based on ISO/TS 19139:2007
<b>Creator</b>	Temporary MIG subgroup for action MIWP-8
<b>Date of publication</b>	2017-03-02
<b>Subject</b>	Technical Guidance for INSPIRE metadata for datasets and services
<b>Status</b>	Version 2.0.1  This document has been endorsed by the INSPIRE maintenance and implementation group (MIG) in its meeting on 30/11-1/12/2016 (see meeting minutes at <a href="https://ies-avn.jrc.ec.europa.eu/projects/mig-p/wiki/5th_MIG-P_meeting">https://ies-avn.jrc.ec.europa.eu/projects/mig-p/wiki/5th_MIG-P_meeting</a> ).
<b>Publisher</b>	INSPIRE Maintenance and Implementation Group (MIG)
<b>Type</b>	Text
<b>Description</b>	Implementation specification for defining metadata for INSPIRE datasets and services in ISO/TS 19139 based XML format in compliance with the INSPIRE Implementing Rules for metadata.
<b>Format</b>	PDF
<b>Licence</b>	Creative Commons Attribution (cc-by) 4.0 ( <a href="https://creativecommons.org/licenses/by/4.0/">https://creativecommons.org/licenses/by/4.0/</a> )
<b>Identifier</b>	<a href="http://inspire.ec.europa.eu/iddocument/tg/metadata-iso19139/2_0_1">http://inspire.ec.europa.eu/iddocument/tg/metadata-iso19139/2_0_1</a> (latest bugfix version of v2.0)  <a href="http://inspire.ec.europa.eu/iddocument/tg/metadata-iso19139/2_0_1">http://inspire.ec.europa.eu/iddocument/tg/metadata-iso19139/2_0_1</a> (this bugfix version)
<b>Corrigenda</b>	<a href="http://inspire.ec.europa.eu/iddocument/tg/metadata-iso19139/2_0/corrigenda">http://inspire.ec.europa.eu/iddocument/tg/metadata-iso19139/2_0/corrigenda</a>
<b>Language</b>	EN





# INSPIRE Directive Articles

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In the INSPIRE Directive transposition to the Portuguese law (Decree-Law 180/2009, August 7<sup>th</sup>), Portuguese public institutions and local authorities that produce spatial data corresponding to the themes in the 3 annexes of the Directive should focus on:

METADATA CREATION AND MAINTENANCE

INTEROPERABILITY OF SPATIAL DATA SETS AND SERVICES

NETWORK SERVICES

SPATIAL DATA AND SERVICES SHARING



# Article 5

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## METADA

“Member States shall ensure that metadata are created for the spatial data sets and services corresponding to the themes listed in Annexes I, II and III, and that those metadata are kept up to date”.



# Article 7

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## INTEROPERABILITY OF SPATIAL DATA SETS AND SERVICES

“Member States shall ensure that all newly collected and extensively restructured spatial data sets and the corresponding spatial data services are available in conformity with the implementing rules within 2 years of their adoption, and that other spatial data sets and services still in use are available in conformity with the implementing rules within 7 years of their adoption.”

“Spatial data sets shall be made available in conformity with the implementing rules either through the adaptation of existing spatial data sets or through transformation services.”



# Article 11

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## NETWORK SERVICES

“Member States shall establish and operate a network of the following services for the spatial data sets and services for which metadata have been created in accordance with the Directive: (a) discovery services; (b) view services; (c) download services; (d) transformation services; (e) services allowing spatial data services to be invoked.”



# Article 17

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## DATA-SHARING

“Each Member State shall adopt measures for the sharing of spatial data sets and services between its public authorities.”

“Those measures shall enable those public authorities to gain access to spatial data sets and services, and to exchange and use those sets and services, for the purposes of public tasks that may have an impact on the environment.”

# INSPIRE Geoportal



The [INSPIRE Geoportal](#) is the central European access point to the data provided by EU Member States and several EFTA countries under the INSPIRE Directive. The Geoportal allows:

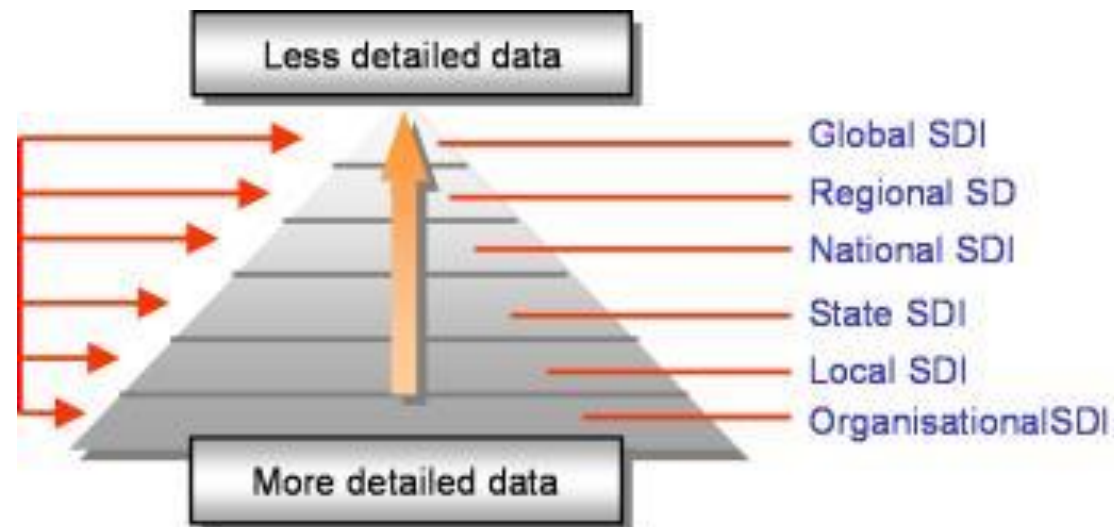
- monitoring the availability of INSPIRE data sets;
- discovering suitable data sets based on their descriptions (metadata);
- accessing the selected data sets through their view or download services.

The metadata used in the Geoportal are regularly harvested from the discovery services of EU Member States and EFTA countries.

# SDI Hierarchy

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An SDI can be established at global, supranational, national, regional, cross-border, or local levels. In an ideal case, these levels are interconnected, accomodating each other's relevant components.



# SNIG Geoportal

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The [Sistema Nacional de Informação Geográfica \(SNIG\)](#) is the National Spatial Data Infrastructure that allows the registration and search of spatial data and data services produced by public and private entities in Portugal.

The [SNIG geoportal](#), coordinated by the Directorate-General for the Territory ([Direção-Geral do Território - DGT](#)), allows the search, exploration and visualization of spatial data through OGC (Open Geospatial Consortium) data services.







SISTEMA NACIONAL  
DE INFORMAÇÃO GEOGRÁFICA

O Sistema Nacional de Informação Geográfica é uma infraestrutura colaborativa que permite partilhar, pesquisar e aceder a informação geográfica através do Registo Nacional de Dados Geográficos



**Aceder**

Registo Nacional de Dados Geográficos



**Partilhar**

Como partilhar informação geográfica



**Saber mais**

Saber mais sobre o SNIG

Direção-Geral do Território © 2019

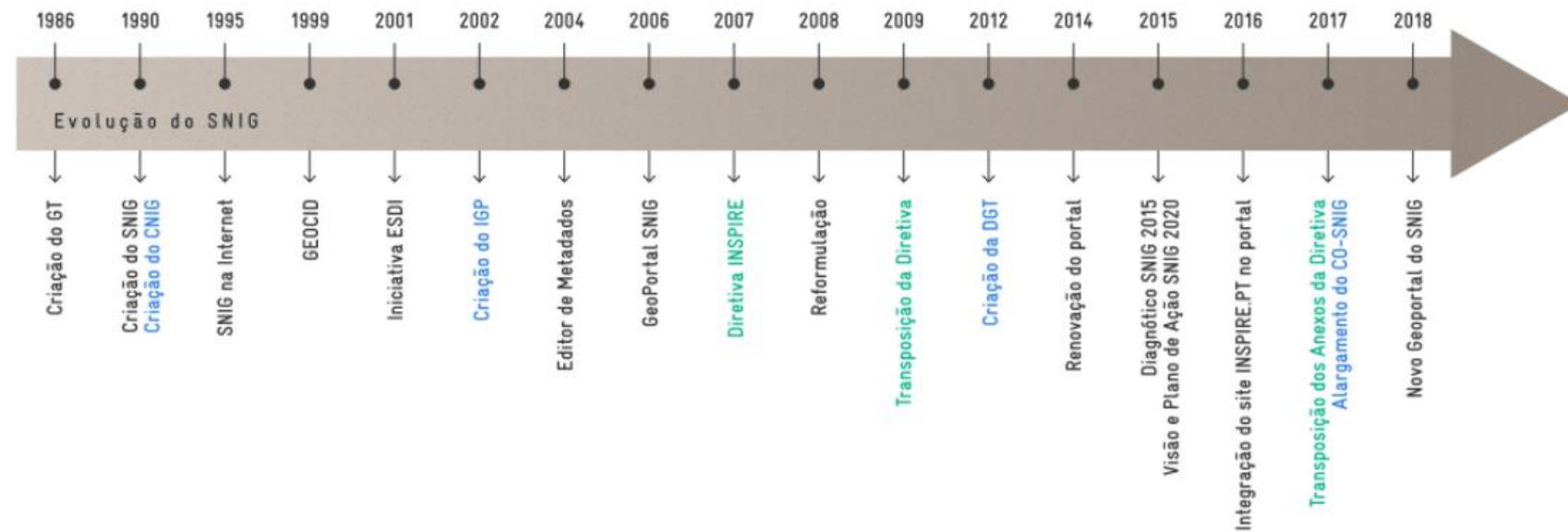
# SNIG Geoportal

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SNIG was created more than 20 years ago by the [Decree-Law 53/90, February 13<sup>th</sup>](#), and was the first SDI developed in Europe and the first to be made available on the Internet in 1995. In 2009, this degree-law was amended by the [Decree-Law 180/2009, August 7<sup>th</sup>](#), reviewing SNIG and transposing the INSPIRE Directive into national law.

Two more amendments were added more recently, [Decree-Law 84/2015, May 21<sup>th</sup>](#) (modifies the composition of the SNIG advisory board (CO-SNIG)) and [Decree-Law 29/2017, March 16<sup>th</sup>](#) (proceeds to the second amendment to Decree-Law 180/2009, August 7<sup>th</sup>).

# SNIG Evolution



# Other SDI in Portugal

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<b>REGIONAL</b>	<p><u><a href="#">SIGAM – Sistema de Informação Geográfica do Ambiente e do Mar dos Açores</a></u></p> <p><u><a href="#">IDEAlg - Infraestrutura de Dados Espaciais do Algarve</a></u></p>
<b>LOCAL</b>	<p>IDEAgueda- Infraestrutura de Dados Espaciais de Águeda</p> <p>IIG de Vale de Cambra</p>
<b>THEMATIC</b>	<p><u><a href="#">Sistema Nacional de Informação do Mar (SNIMar)</a></u></p> <p><u><a href="#">Sistema de Informação de Metadados Ambientais (SNIAmb)</a></u></p> <p><u><a href="#">Sistema Nacional de Informação Territorial (SNIT)</a></u></p> <p><u><a href="#">IPSentinel - Infraestrutura portuguesa para armazenamento e disponibilização de imagens dos satélites Sentinel</a></u></p>

# SNIMar Geoportals

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The [SNIMar geoportals](#) is a central point to gather, search and display spatial data on the Portuguese marine environment. This infrastructure enhances public access to information provided by the partners and entities that participate in the project.

SNIMar, that is the [marine data branch of SNIG](#), includes information that is totally or partially related to marine and coastal areas as well as historical records related to the Portuguese marine environment.

# IP Sentinel Geoportal



The [IP Sentinel geoportal](#) is the Portuguese infrastructure for storing and providing images of the Sentinel satellites that allows free and open access to data from Sentinel-1, Sentinel-2 and future Sentinel-3 satellites obtained for the Portuguese territory including the area of responsibility for search and rescue in the Atlantic.

The Sentinel satellites are the result of the latest Earth Observation missions developed by European Space Agency (ESA) under the [Copernicus program](#) in its Space Component.

# International Standards for SDI

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A **standard** is a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose.



International standards for geographic information have been developed and maintained by the **International Organization for Standardization** Technical Committee 211 (ISO/TC 211) and by the **Open Geospatial Consortium** (OGC) since **1994** when both organizations were created.



# International Standards for SDI

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A co-operative agreement between ISO/TC 211 and OGC formalizes their intention to co-operate and to enable the [development of a series of agreed Industry Implementation Specifications](#) based on ISO 15046 and other related standards.

[OGC](#) produces publicly available Industry Implementation Specifications through an open consensus based process among its members. [ISO/TC 211](#) produces ISO International Standards for Geographical information/Geomatics through a national body balloting process.

This agreement facilitates the Industry Implementation Specifications produced by OGC to formally go through the process of becoming an [ISO International Standard](#).



# International Standards for SDI

	STANDARDS	ORGANIZATION
<b>METADATA</b>	ISO 19115 (Metadata formal description) ISO 19139 (Metadata technical implementation) ISO 19119 (Metadata about services) OGC Catalogue service	International Organization for Standardization (ISO)  Open Geospatial Consortium (OGC)
<b>REFERENCE MODEL</b>	ISO 19101 (reference model) ISO 19107 (Spatial schema) ISO 19108 (Temporal schema) ISO 19109 (Application schema) ISO 19111 (Spatial referencing by coordinates) ISO 19112 (Spatial referencing by geographic identifiers)	International Organization for Standardization (ISO)
<b>SERVICES</b>	OGC Web map service (WMS) OGC Web feature service (WFS) OGC Web coverage service (WCS)	Open Geospatial Consortium (OGC)



# ISO

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ISO is an independent, non-governmental international organization with a membership of 162 [national standards bodies](#).

Through its members, it brings together experts to share knowledge and develop voluntary, consensus-based, market relevant International Standards that support innovation and provide solutions to global challenges.

ISO has published 22342 [International Standards](#) and related documents, covering almost every industry, from technology, to food safety, to agriculture and healthcare.

# OGC

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OGC is an international not for profit organization committed to making quality open standards for the global geospatial community. These standards are made through a consensus process and are freely available for anyone to use to improve sharing of the world's geospatial data.

OGC standards are used in a wide variety of domains and has more than 500 members coming from across government, commercial organizations, NGOs, academic, and research institutes.

# Metadata

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A metadata record is a file of information, usually presented as an XML (Extensible Markup Language) document, which captures the basic characteristics of a data or information resource.

Metadata must be compliant with [ISO 19115:2013](#) (Geographic Information - Metadata) from ISO/TC 211. This standard provides information about the identification, the extent, the quality, the spatial and temporal aspects, the content, the spatial reference, the portrayal, distribution, and other properties of digital geographic data and services.

Q Voltar à pesquisa

## Aquiculturas de Águas Interiores

Instituto da Conservação da Natureza e das Florestas, I.P.

Tema(s)	<input type="checkbox"/> Agricultura, Pesca, Pecuária <input checked="" type="checkbox"/> Águas interiores
Data de Referência (Revisão)	01-06-2019

### Política de Dados

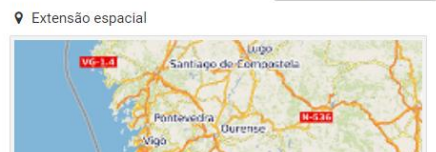
Restrições legais	Sem restrições. A utilização ou divulgação deste conjunto de dados geográficos requer sem restrições
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### Serviços de visualização e descarregamento

<a href="http://si.icnf.pt/wfs/aquicultura_aguas_interiores?service=wfs&amp;version=1.1.0&amp;request=GetCapabilities">http://si.icnf.pt/wfs/aquicultura_aguas_interiores?service=wfs&amp;version=1.1.0&amp;request=GetCapabilities</a>
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<a href="http://si.icnf.pt/kml/aquicultura_aguas_interiores">http://si.icnf.pt/kml/aquicultura_aguas_interiores</a>

Dados geográficos (geometria de pontos) e alfanuméricos (tabela de atributos) sobre os estabelecimentos de aquiculturas de águas interiores, e respetivos processos de licenciamento, constantes nos registos da Divisão de Gestão dos Recursos Cinegéticos e Aquícolas (DGRCA) do ICNF. Legislação principal: Decreto 44623 de 1962-10-10, com a redação do Decreto 312/70 de 1970-07-06, regulamentado pela Portaria 747/86 de 1986-12-16; Lei 7/2008 de 20-02-15, alterada pelo Decreto-Lei 221/2015 de 2015-10-08 e regulamentada pelo Decreto-Lei 222/2015 de 2015-10-08.

Dados abertos



This XML file does not appear to have any style information associated with it. The document tree is shown below.

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              <gco:CharacterString>(351) 213 507 900</gco:CharacterString>
            </gmd:CI_Telephone>
          </gmd:phone>
          <gmd:address>
            <gmd:CI_Address>
              <gmd:deliveryPoint>
                <gco:CharacterString>Avenida da República, nº 16 A e B</gco:CharacterString>
              </gmd:deliveryPoint>
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              </gmd:city>
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              </gmd:postalCode>
              <gmd:country>
                <gco:CharacterString>Portugal</gco:CharacterString>
              </gmd:country>
              <gmd:electronicMailAddress>
                <gco:CharacterString>sig@icnf.pt</gco:CharacterString>
              </gmd:electronicMailAddress>
            </gmd:CI_Address>
          </gmd:contactInfo>
        </gmd:CI_Contact>
      </gmd:contactInfo>
      <gmd:role>
        <gmd:CI_RoleCode codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodeLists.xml#CI_RoleCode" codeListValue="pointOfContact">pointOfContact</gmd:CI_RoleCode>
      </gmd:role>
    </gmd:CI_ResponsibleParty>
  </gmd:contact>
</gmd:MD_Metadata>

```

# Metadata Editor

A metadata editor is a tool that facilitates the documentation of resources, focusing on the description of geographic information resources.

The actual metadata editor adopted by DGT is [GeMA](#) (Gestor de Metadados dos Açores) that creates, edits, converts formats, views and validates metadata, according with INSPIRE rules.

