



# INSPIRE

## Infrastructure for Spatial Information in Europe

# Monitoring and Reporting Drafting Team

## Monitoring Indicators – Justification Document

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These are Dublin Core metadata elements. See for more details and examples <http://www.dublincore.org/>.

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## Foreword

The INSPIRE Drafting Team Monitoring and Reporting has been created by the Commission in October 2005 in order to draft Implementing Rules for monitoring and reporting. The activity of the team has been defined through two documents:

- 1-INSPIRE Work Programme Preparatory Phase 2005-2006
- 2-INSPIRE Work Programme Transposition Phase 2007-2009

The first programme defined the objective, the scope and the process to be followed by the team. The second programme built upon the results of the activities of the team in 2005 and 2006, proposed to continue the development, to test the feasibility of the proposed monitoring mechanism and to elaborate an implementing rule for monitoring and reporting.

During the development of the Implementing Rules for Monitoring and Reporting the Drafting Team has taken into account all the comments received from the CT, from all the Drafting Teams, from the SDICs and LMOs during the reviews and from the stakeholders and the Members States who accepted to test the approach.

This Justification document is an accompanying document used to clarify the reading of the Implementing Rules for monitoring and reporting in order to have a clear overview of the approach. Another accompanying document called "Guidelines" will give further explanation and guidelines to help the Member States (MSs) to use the Implementing Rules.

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## Purpose of the document

This document intends to explain and justify the general approach for monitoring and reporting the implementation of INSPIRE and the use of the INSPIRE infrastructure for spatial information. It also explains and justifies the choice of the indicators. This document describes the reasons behind the choice of the indicators with the help of examples.

Moreover, the document explains why no indicator to measure data sharing has been chosen, although it is one of the key aspects for the successful implementation of INSPIRE.

This document mainly focuses on monitoring because even if monitoring it is a requirement of INSPIRE directive(see Article 21(1) of INSPIRE), the Directive doesn't explicitly define neither what has to be monitored nor how to proceed. On the other side this document will not provide any detailed explanation on the reporting, as INSPIRE Directive sets out more detailed requirements for this activity already (see Article 21(2) of INSPIRE).

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# 1. Justification for the general approach

The starting point for the approach is the general requirement of the Directive to monitor and report the implementation and use of the INSPIRE infrastructure for spatial information.

*Preparatory work for decisions concerning the implementation of this Directive and for the future evolution of Inspire requires continuous monitoring of the implementation of the Directive and regular reporting (recital 34).*

And,

## *Article 21*

*1. Member States shall monitor the implementation and use of their infrastructures for spatial information. They shall make the results of this monitoring accessible to the Commission and to the public on a permanent basis.*

*2. No later than 15 May 2010 Member States shall send to the Commission a report including the summary description of:*

- a) how public sector providers and users of spatial data sets and services and intermediary bodies are coordinated, and of the relationship with the third parties and of the organisation of quality assurance;
- b) the contribution made by public authorities or third parties to the functioning and coordination of the infrastructure for spatial information;
- c) information on the use of the infrastructure for spatial information;
- d) data-sharing agreements between public authorities;
- e) the costs and benefits of implementing this Directive.

The work programme defined the direction in which to develop the Implementing Rules for Monitoring and Reporting, asking for:

- a continuous monitoring of the implementation progress with respect to the targets set out by INSPIRE and;
- a description of the approach applied by the MSs to translate the requirements set out by INSPIRE into concrete measures and a description of the developments of its INSPIRE spatial data infrastructure.

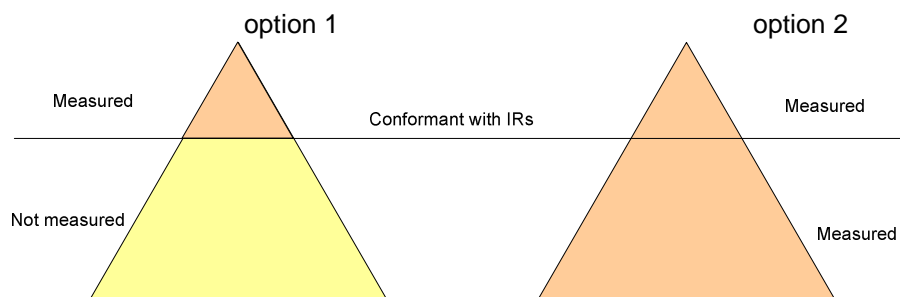
The basic idea of the approach followed for monitoring and reporting has been to define a set of indicators that measure the status and progress of the implementation of the Directive and, as a consequence, the progress of the INSPIRE infrastructure for spatial information developed by each MS. While indicators 'measure' where a MS stands, the reports will give more qualitative information on how the MS implements the Directive.

INSPIRE will build on what already exists in the MSs, and therefore it is necessary that the monitoring and reporting mechanism takes the existing situation as the starting point. So it is important to know which data sets, which metadata and which services exist.

Even if the technical Implementing Rules for metadata, spatial data sets and services and network services are not yet fully applied within the INSPIRE infrastructure for spatial information, it is important to know the existing situation and monitor the progress. There are two options:

- to restrict the monitoring to those parts of the infrastructure which are already INSPIRE compliant, or;
- to monitor what exists and to which degree it is compliant with the requirements of the Directive (and its IRs).

These two options are illustrated in figure 1 below.



**Figure 1**

The second option was chosen, which reflects the fact that an infrastructure for spatial information already exists and that the part of this infrastructure that will contribute to the implementation of INSPIRE should be acknowledged as such.

In this approach a key element is a list of all the spatial data sets and the services that are (or will be) part of the INSPIRE infrastructure for spatial information. Only the MS is able to decide which spatial data sets and which services belong to the INSPIRE infrastructure and therefore which spatial data sets and which services have to be put on the list.

In this approach it becomes possible not only to have an overview on the status of the different components of the INSPIRE infrastructure at a certain point in time, but also to monitor its development through time. Questions that can be answered are (amongst others):

- How many spatial data sets are part of the INSPIRE infrastructure?
- How many of them have metadata?
- How many of them have compliant metadata?
- How many of them are discoverable?
- How many of them are in conformity with INSPIRE?
- How many of them can be viewed and downloaded?

The final aim is not to compare the MSs nor is it to use the monitoring mechanism to 'judge' the MSs - whether they did a good job or not. The aim is to have a good overview of the status of the INSPIRE infrastructure at the European and national level and the degree of conformity of the different components. The target for all MSs is to have an INSPIRE national infrastructure for spatial information, which is, as much as possible accessible (applying the principles of sharing) and as much as possible in conformity with the Implementing Rules.

### **What will be monitored or reported?**

The Drafting Team Monitoring and Reporting has classified the items for monitoring and reporting in terms of:

- technical aspects of the implementation of the Directive (chapters II, III and IV of INSPIRE);
- non technical aspects of the implementation of the Directive (chapters V and VI of INSPIRE).

The monitoring indicators set up in the Implementing Rules will only address the technical aspects of the implementation of the Directive targeting the metadata, the spatial data sets and the services and their conformity to INSPIRE. It is interesting to follow the progress through indicators because they will evolve over the years to come (the roadmap for implementing INSPIRE is fixed until 2019).

Additional technical elements will be described with qualitative information through the reporting activities. Referring to the article 10(2), for example, it will be possible to give examples of cross-border usage and efforts made to improve cross-border consistency. Referring to Article 7(3), it will be possible to give a description on how transformation services are used to achieve interoperability of the spatial data sets. Referring to Article 15 (2), it will be possible to give a description of the access to the network services through the INSPIRE geo-portal.

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The non technical aspect of the Directive (chapters V and VI) on data sharing and cooperation between stakeholders will not be monitored as such. Indeed, the indicators on data sharing have proven to be too difficult to implement (see more explanation in chapter 3). The indicators on coordination and cooperation were not kept in the final proposal as the information on that topic will be provided through reporting, were it is explicitly required (Article 21(2)).

Consequently, the status and progress on data sharing practices and cooperation between stakeholders will be described through the 3-yearly report.

Chapter VII of INSPIRE, Article 21(1), describes additional elements to be monitored: the use of the infrastructure. This aspect will be monitored through one of the indicators proposed.

Chapter VII of INSPIRE, Article 21(2) describes also all the elements that shall be reported in the 3 yearly report.



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**Is it a lot of work to identify all spatial data sets and all the services that will be part of the INSPIRE infrastructure and will it thus be a burden for the MSs?**

The monitoring mechanism requires MSs first of all to make an inventory of all the spatial data sets and all the services that will be part of the INSPIRE infrastructure. This should involve all the relevant stakeholders and should result in an agreed list and an agreement on what will be monitored. It will not be easy but it is rather a matter of the implementation of INSPIRE than a matter of monitoring. Once this is done, the update of the list and the collection of the information (e.g. each year) are relatively straightforward. It will be important for MSs to follow the evolution of which spatial data sets and which services fall under the scope of INSPIRE e.g. by considering the “newly collected spatial data sets” as mentioned in article 7(3).

So indeed, setting up the monitoring mechanism at the beginning of the INSPIRE implementation process will take some time and workload, but MSs will need to prepare this list anyway to know the current status of their infrastructure for spatial information. In many cases, MSs are already doing this, at least partially, or they are currently asking themselves which spatial data sets are part of the different themes of the INSPIRE Annexes.

In short, this process cannot be avoided and is a preliminary task to the implementation of the INSPIRE Directive if the MS wants to know what kind of INSPIRE spatial data infrastructure they have and how they are progressing in relation to the Implementing Rules.

**Is it possible to automate the monitoring?**

It does not appear to be possible to fully automate the collection of the information required to monitor the data sets, the services and the metadata – this information mostly needs to be provided directly by the stakeholders. However partial automation of the collection of some parts of the data needed to calculate the monitoring indicators at national level could be possible.

The Drafting Team (DT) on Monitoring and Reporting will not propose any automation tool for monitoring, but will provide some templates and propose approaches which will help MSs to collect the data needed. Those templates and approaches will be described in the guidelines.

One of the approaches proposed is to use metadata elements in conformity with the IRs on metadata. The guidelines will indicate the elements that can be collected for monitoring. However it will just deliver a part of the information needed for monitoring. Indeed, the metadata as such can provide information on the existence and conformity of spatial data sets and services, though they will not provide any information neither on the metadata as such, nor on the link between spatial data sets and services.

.The DT on Monitoring and Reporting provides also two templates which will help MSs to collect additional information for monitoring and reporting:

- a spreadsheet to collect data for monitoring, which includes an automatic calculation of the indicators,
- a document to collect data for reporting.

The indicator on the “use of network services” could require specific automation by implementing a counter to keep track of requests for those services.

To conclude, it is not possible to create indicators directly from the metadata elements but metadata elements will provide part of the monitoring data. The collection of data for monitoring can be automated by tools to be developed by each MS for its own infrastructure.

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### **Are the indicators asking more than the requirements of INSPIRE? Is the monitoring feasible?**

The indicators have been developed with the implementation of INSPIRE in mind. All the indicators will help to respond to concrete questions that each MS will have to answer to implement INSPIRE in practical terms.

For example, to implement the requirement of INSPIRE: "Member States shall create the metadata" (from Article 6 of INSPIRE), each MS will have to decide:

- What are the spatial data sets falling under the scope of INSPIRE?
- Do they have metadata?
- If yes, are they in conformity with INSPIRE?

All these questions and answers are needed to manage the implementation of INSPIRE and the information needed to answer these questions will be reported through the indicators (in this example, existence of metadata and conformity of metadata).

The monitoring mechanism will be different in each MS because each MS will decide which stakeholder is responsible for what in the implementation of INSPIRE and therefore also for the monitoring activity. Each MS will also decide how monitoring data needed to calculate the indicators will be gathered. The monitoring mechanism will be progressive: some indicators will remain empty as long as no Implementing Rules exist (the last one should be adopted in 2012).

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## 2. Justification for each of the proposed indicators

The flow chart below (fig.5) provides an overview of the monitoring indicators. This flow chart is composed of 3 levels.

The first level of monitoring provides an overall picture of what exists within the INSPIRE infrastructure for spatial information without evaluating any conformity with the Implementing Rules: how many spatial data sets exist and cover the MS's territory; how many spatial data sets and services have metadata; how many data sets are discoverable, viewable and downloadable by means of network services; how often those network services are effectively used. The indicators that will be applied are:

- the existence of metadata (MDi1), which monitors the existence of metadata for spatial data sets and services;
- the geographical coverage of spatial data sets (DSi1), which monitors the territory covered by the spatial data sets;
- the accessibility of the metadata through discovery services (NSi1), which monitors the part of spatial data sets which can be discovered by mean of a discovery service making accessible their metadata;
- the accessibility of the spatial data sets through view and download services (NSi2); which monitors the part of spatial data sets that can be viewable and/or downloadable;
- the use of the network services (NSi3), which monitors the frequency of use of the services.

Based on this knowledge, the other indicators will target the conformity with the Implementing Rules for spatial data sets and services, metadata and network services. These indicators will act as a successive filter mechanism asking that some basic conditions of conformity must be reached before it is possible to measure conformities at a higher level.

The second level will monitor the conformity of metadata for spatial data sets and services. Monitoring the conformity of metadata is a priority as all existing metadata for data sets responding to the themes listed in Annexes I and II of INSPIRE Directive must conform to the IRs on metadata within 2 years of their adoption. Furthermore the network services should operate on spatial data sets and spatial data services having compliant metadata. The indicator that will be applied is the conformity of metadata (MDi2), which monitors the conformity of the metadata according to the Implementing Rules on metadata for the spatial data sets and services.

The third level will be to monitor the conformity of the spatial data sets according to the Implementing Rules on Data Specifications and the conformity of Network Services. INSPIRE Directive requires Member States to ensure that all newly collected and extensively restructured spatial data sets are available in conformity with the implementing rules within two years of the adoption, and that other spatial data sets still in use are available in conformity with the implementing rules within seven years of their adoption. The indicators that will be applied are:

- the conformity of spatial data sets (DSi2), which monitors the conformity of spatial data sets to the Implementing Rules on Data Specifications;
- the conformity of network services (NSi4), which monitors their conformity to the Implementing Rules on Network Services.

The following section provides a justification for each indicator proposed to monitor the implementation of INSPIRE.

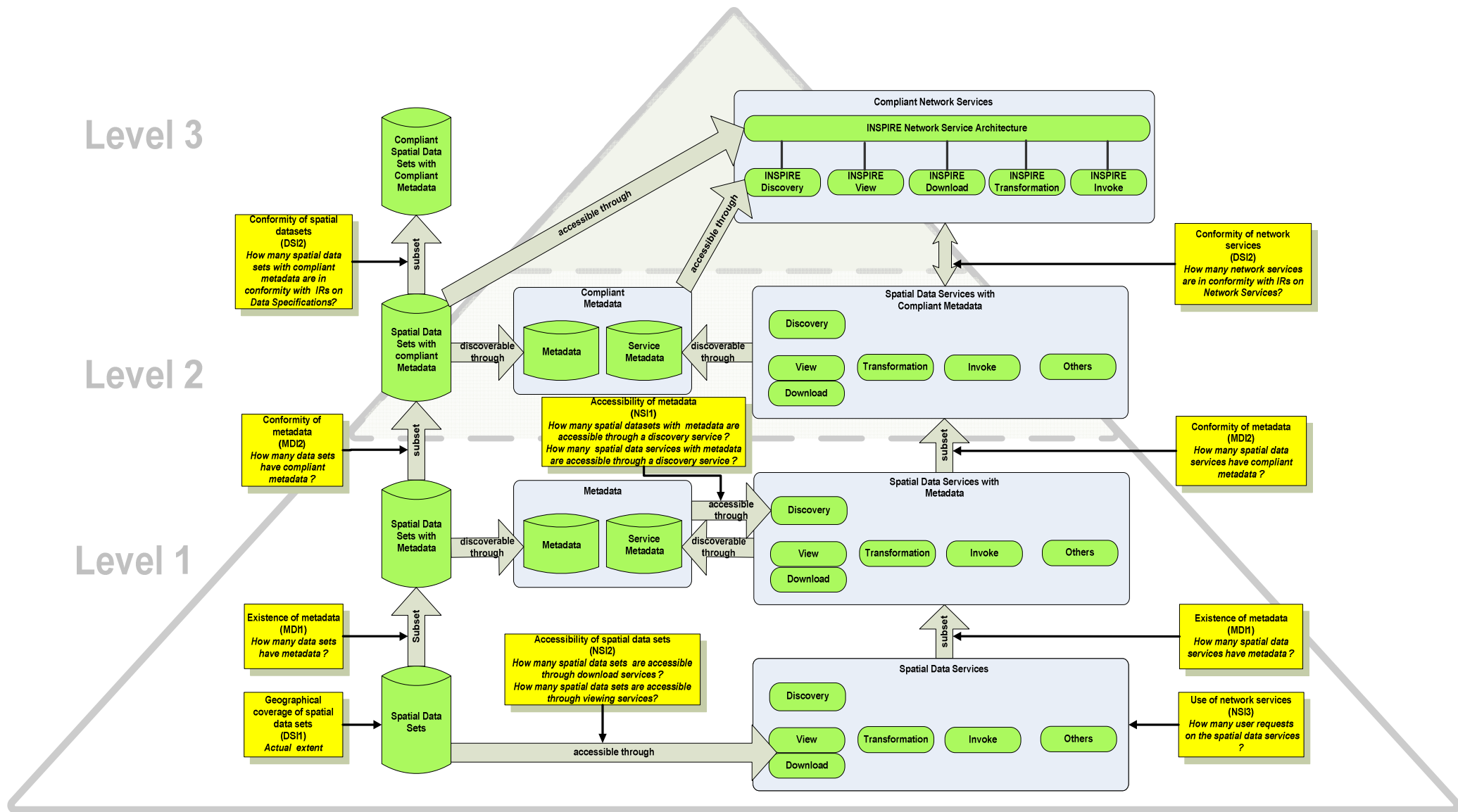


Figure 2 : The indicators flow chart

## 2.1. Existence of Metadata (MDi1)

### Definition

Metadata exist for spatial data sets and services falling under the scope of INSPIRE.

### Chapter of the INSPIRE Directive

Chapter II – Metadata, Article 5(1).

### Performance objective

Guaranteeing that metadata for the spatial data sets and services of the themes of the Annexes of the Directive exist.

### Rationale

Metadata for spatial data sets and services are a key component of the INSPIRE infrastructure as they allow to find and use those spatial data sets and services. Spatial data sets and services can't be discovered without metadata.

The general indicator (MDi1) monitors the existence of metadata for all spatial data sets and services because it is a requirement of INSPIRE (see Article 5). In order to have a better overview, four specific indicators are proposed:

- for each annexe (I, II, III), a specific indicator will monitor the existence of metadata for the spatial data sets corresponding to that annexe,
- one specific indicator will monitor the existence of metadata for spatial data services.

The indicator allows to determine the part of the spatial data sets and services belonging to the INSPIRE infrastructure, for which metadata exist. The objective is to reach 100%, although the timing according to the Directive is different for the different annexes.

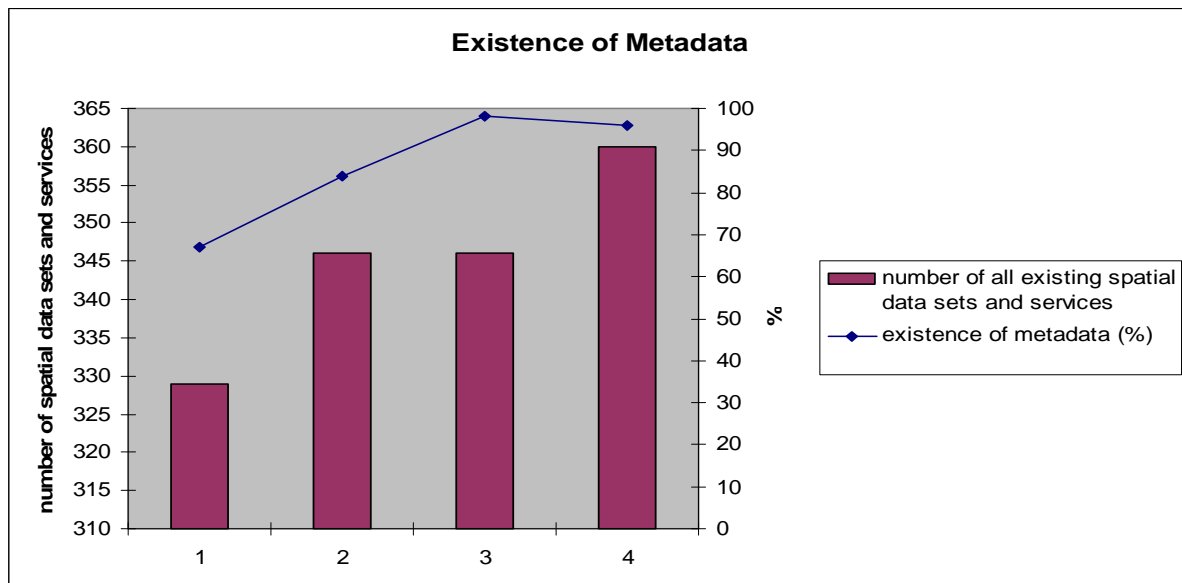


Figure 3

## 2.2. Conformity of Metadata (MDi2)

### Definition

The existing metadata for spatial data sets and services are in conformity with the Implementing Rules on metadata.

### Chapter of the INSPIRE Directive

Chapter II – Metadata, Article 5(2), 5(3) and 5(4).

### Performance objective

Guaranteeing that the metadata for the data sets of the themes of the Annexes of the Directive and for the services are in conformity with the requirements of the Implementing Rules for metadata

### Rationale

Metadata should not only exist but should also be created in such a way that they can be used for discovering spatial data sets and services within the INSPIRE infrastructure for spatial information. This requires conformity to the Implementing Rules on Metadata.

The general indicator MD i2 gives an overview on the existence of metadata in conformity with the Implementing Rules for all the spatial data sets and services. In order to have more detailed information four specific indicators are proposed:

- for each annexe, one specific indicator will monitor the conformity of metadata for the spatial data sets corresponding to that annexe;
- one specific indicator will monitor the conformity of metadata for the spatial data services.

The first three specific indicators will evaluate the conformity of metadata of spatial data sets at annex level and not at theme level. The main purpose of these specific indicators is to give a global impression of the progress that has been made during a period of time regarding the targets and milestones required by the Directive, which are described at annex level.

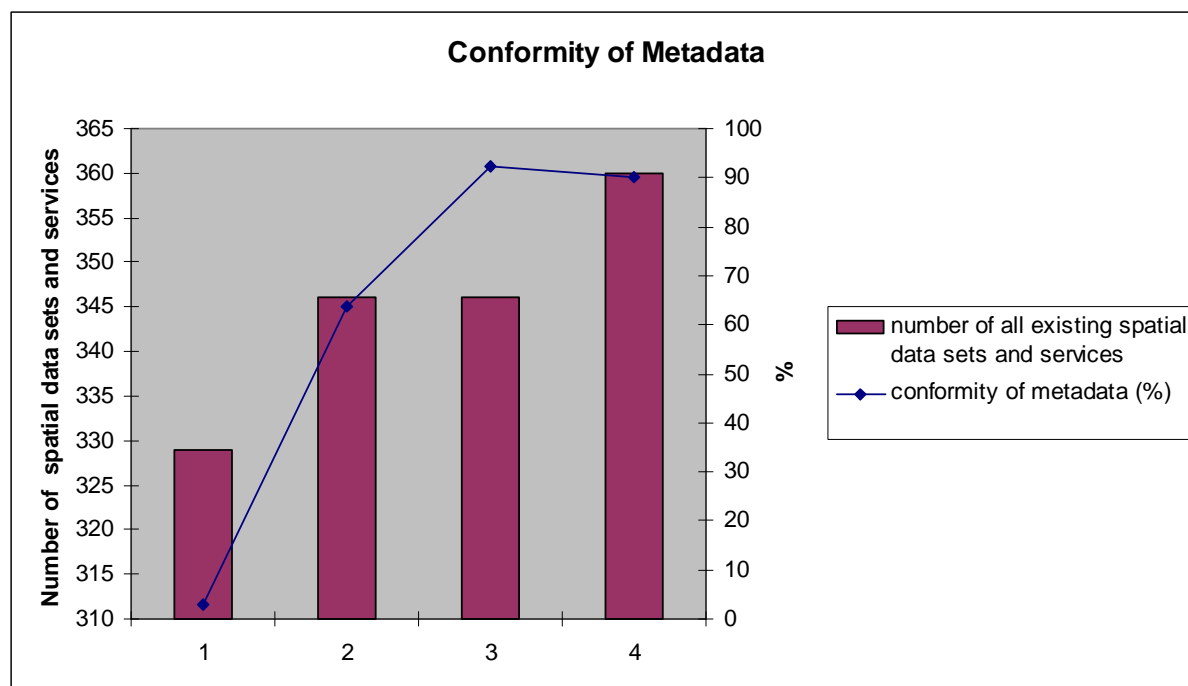


Figure 4

## 2.3. Geographical Coverage of Spatial Data Sets (DSi1)

### Definition

Spatial data sets for the themes of the Annexes I, II, III of the Directive exist in electronic format for (part of) the territory and are available to the users of the spatial data infrastructure.

### Chapter of the INSPIRE Directive

Recital 3 and Chapter I – General provisions, Article 4

### Performance objective

Spatial data sets falling under the scope of INSPIRE as well as their coverage are identified.

### Rationale

This indicator completes the information on which spatial data sets are available.

It is not enough to know if spatial data sets exist for the different themes (Y/N), or to know the number of spatial data sets for each theme (even if this information is used in other indicators). This information alone would not give a clear picture. What is important to know also is whether the spatial data set is covering the whole country, or only part of it.

The general indicator (DSi1) indicator will give information about the European coverage for all the spatial data sets. It is not important to know the exact area covered, but rather to have some reasonably accurate estimate of it.

In order to have a more detailed overview three specific indicators are proposed:

- for each annex, a specific indicator will monitor the extent of the spatial data sets corresponding to that annex.

The specific indicators will give an overview of which part of the territory is covered for an annex, whatever the themes and the number of spatial data sets included in that annex. Indeed the specific indicators will not monitor what part of a territory is covered for a theme but for an annex as a whole.

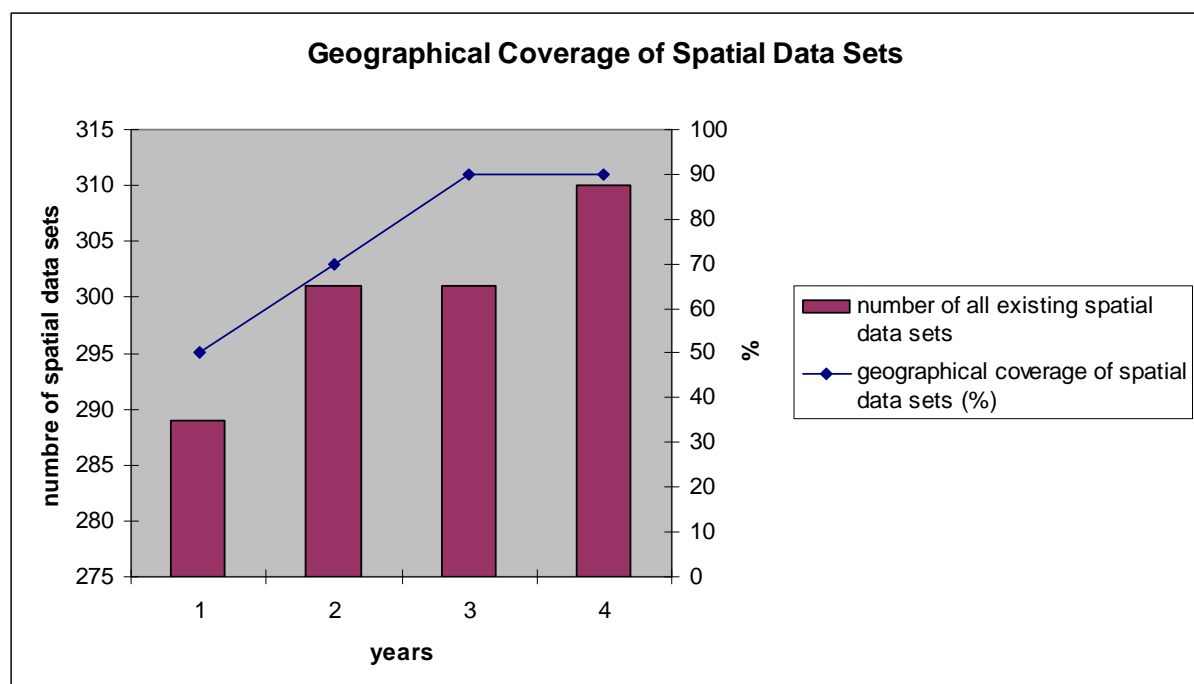


Figure 5

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## 2.4. Conformity of Spatial Data Sets (DSi2)

### Definition

The degree to which the spatial data sets are in conformity with the Implementing Rules for data specifications (application schemas, coordinate reference systems, classification system, identifier management, etc.).

### Chapter of the INSPIRE Directive

Chapter III, Interoperability of spatial data sets and services, Articles 7(1), 7(3), 7(4) and 8

### Performance objective

Existing spatial data sets with conformant metadata have been brought in conformity with the Implementing Rules on Data Specifications.

### Rationale

Spatial data sets should not only exist but be available in such a way that they can easily be used together for a wide range of applications in various policy areas: so they have to have metadata in conformity with the Implementing Rules for metadata and they have to be in conformity with Implementing Rules for data specifications. Although having data sets in conformity with the Implementing rules is not an obligation, it is mandatory to reach the INSPIRE conformity in either of two ways: by having spatial data sets according to the INSPIRE data specifications defined in the IRs, or by making them conformant through a transformation service. It is important to know the degree to which conformity has been achieved by whatever means.

The general indicator (DSi2) measures the degree to which spatial data sets, with conformant metadata, are in conformity with the Implementing Rules on data specification. The aim is to reach 100%.

In order to have a more detailed overview three specific indicators are proposed: for each annex, one specific indicator will monitor the conformity of the spatial data sets corresponding to that annex.

The three specific indicators will summarise the information on the conformity of spatial data sets at annex level and not at theme level. The main purpose of the indicator is to give an overview of the progress that has been achieved during a period of time with regard to the targets and milestones required by the Directive which are described at annex level.

The information is collected at spatial data set level. The unit used to measure the conformity of a spatial data set is a binary value: conformant (1) or not conformant (0), which provides no indication to what extent each spatial dataset is in conformity with the INSPIRE IRs. The main purpose of the indicator is not to measure the progress of each single spatial data set, but the progress of the INSPIRE infrastructure for spatial information as a whole (made up from all those individual spatial data sets).

The general indicator and the specific indicators will only monitor the conformity of spatial data sets that have conformant metadata. Even if it would be possible to monitor the conformity of the spatial data set independently from the conformity of the metadata the DT decided to follow the priorities given by the Directive i.e. that all the existing metadata must be conformant within 2 (5) years of the adoption of the IRs, followed by the conformance of the existing spatial data sets (within 7 years after the adoption of the IRs). It is further assumed that the newly collected data sets will reach conformity together with their metadata. Moreover, the conformant metadata store the information on the conformity of spatial data sets. Therefore spatial data sets that don't have conformant metadata, will not be monitored.

The monitoring mechanism will not use a weight factor that could give any estimation of the importance or complexity of a data set because the Drafting Team felt that it would increase the complexity of the monitoring. However, when an existing spatial data set covers many INSPIRE

themes, as might be the case for topographic data sets covering many themes of Annexes I and II, then that spatial data set will be counted in each theme. This can be a way to “weight” that spatial data set compared to other ones that may only cover one theme.

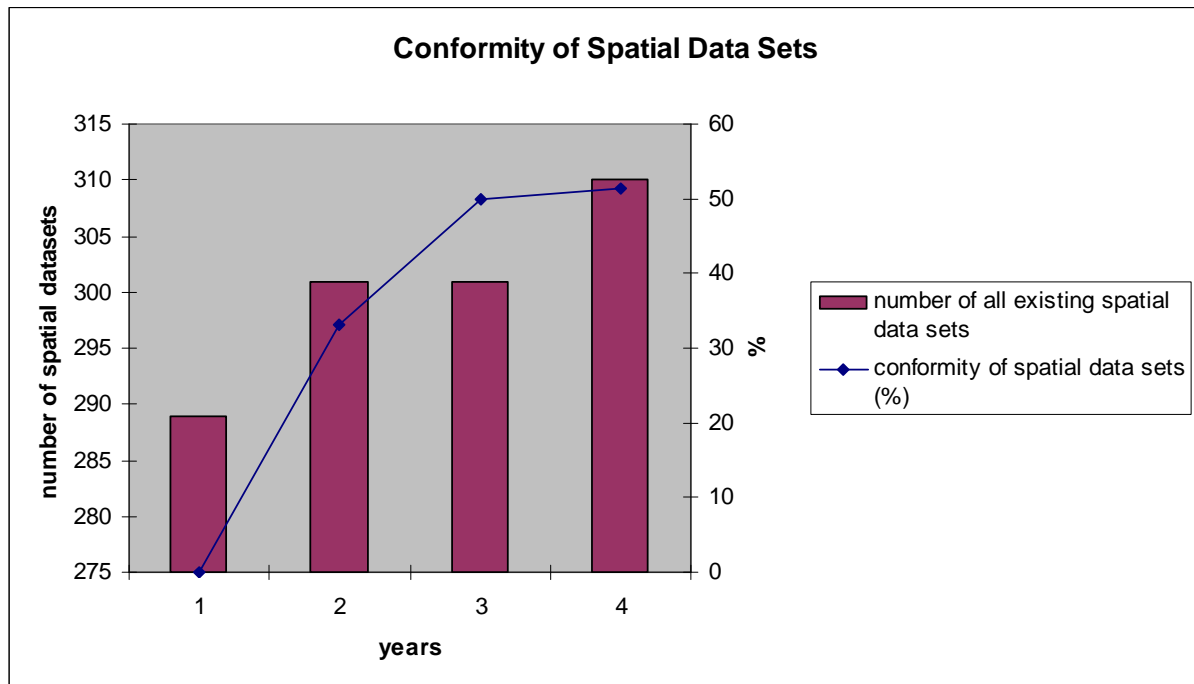


Figure 6

## 2.5. Accessibility of Metadata through Discovery Services (NSi1)

### Definition

Metadata for spatial data sets and services are discoverable through a discovery service.

### Chapter of the INSPIRE Directive

Chapter IV – Network Services, Article 11(1)(a), 11(2)

### Performance objective

Guaranteeing that metadata are accessible through public discovery services in order to allow (potential) users to discover spatial data sets and services and to know their characteristics.

### Rationale

This indicator will measure to what extent it is possible to search for spatial data sets and services on the basis of their corresponding metadata. Discovering spatial data sets and services is a key element of INSPIRE infrastructure. The general indicator (NSi1) will globally monitor the accessibility of both spatial data sets and services to get a picture of the overall progress but in order to have a better view, two specific indicators are proposed:

- the accessibility of metadata for spatial data sets through Discovery Services,
- the accessibility of metadata for spatial data services through Discovery Services.

This indicator will monitor the accessibility of all the existing metadata and will not take into account their conformity with the Implementing Rules. Indeed, the purpose of this indicator is to get an overall picture about which existing metadata are discoverable, without taking into account any conformity with the Implementing Rules.

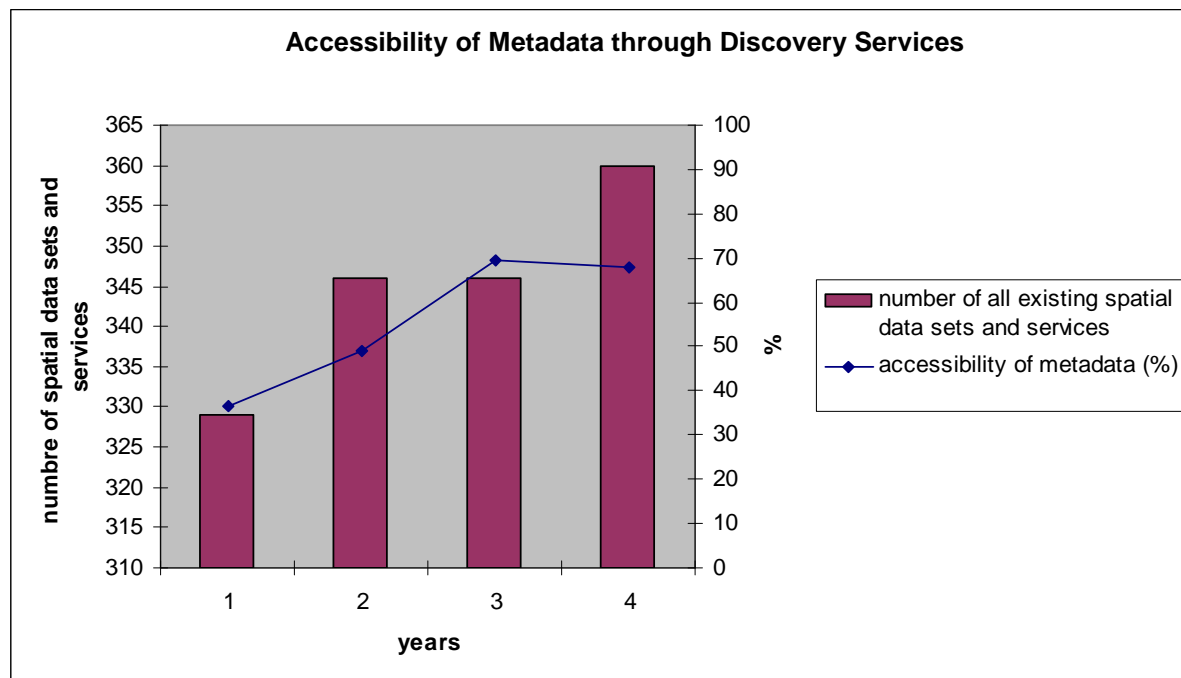


Figure 7

## 2.6. Accessibility of Spatial Data Sets through View and Download Services (NSi2)

### Definition

This indicator measures to what extent it is possible to have access to spatial data sets through view and download services.

### Chapter of the INSPIRE Directive

Chapter IV – Network Services, Article 11(1)(a), (11)(b), (11)(c)

### Performance objective

Guaranteeing that spatial data sets are accessible through view and download services. The objective is that all the spatial data sets are accessible through the INSPIRE network services .

### Rationale

Each spatial data set needs to be accessible by means of a view and a download service. It is expected that the number of accessible spatial data sets will increase over time.

The general indicator (NSi2) will globally monitor the accessibility of spatial data sets by both view and download services but there are also two specific indicators:

- the accessibility of spatial data sets through view services,
- the accessibility of spatial data sets through download services.

This indicator doesn't take into account the conformity of spatial data sets and network services because the purpose is to monitor the existing status within an INSPIRE infrastructure of spatial information, which includes the case where a spatial data set exists and is viewable, even if it isn't in conformity with INSPIRE, likewise for view and download services.

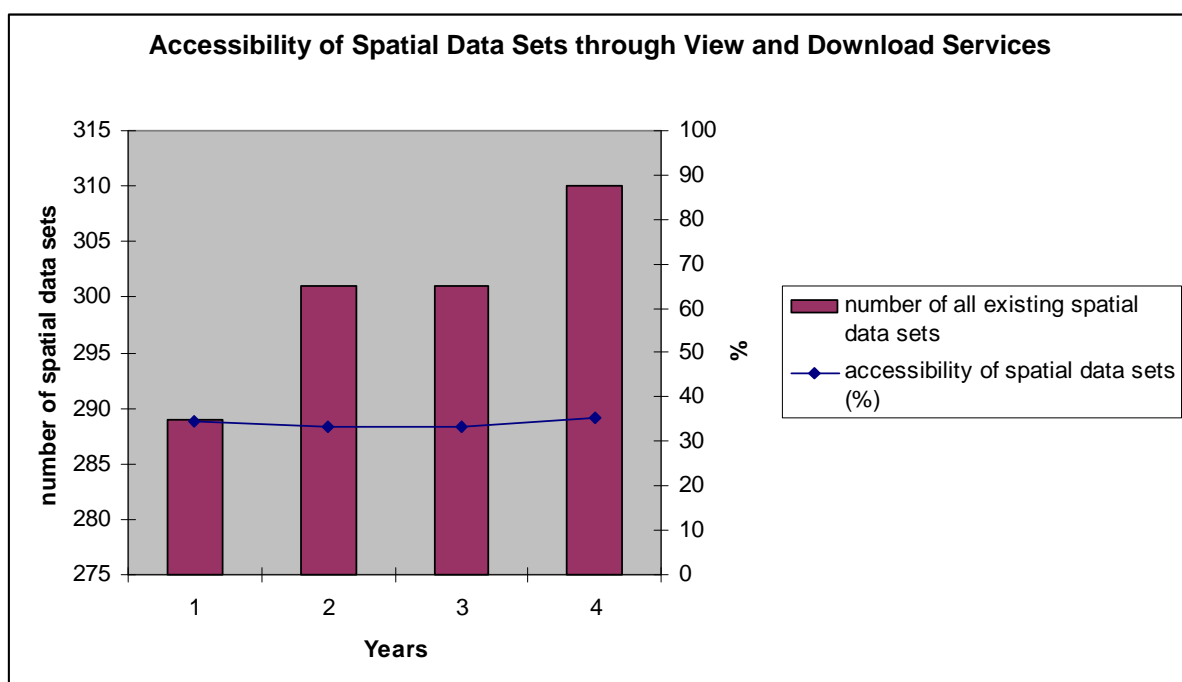


Figure 8

## 2.7. Use of Network Services (NSi3)

### Definition

Measures the real use of the network services with a counter keeping track of requests for those services.

### Chapter of the INSPIRE Directive

Chapter IV – Network Services, chapter VII article 21(2)(c)

### Performance objective

Increasing the use of the services of the infrastructure.

### Rationale

This general indicator (NSi3) will address the use of all the network services. The types of services are the discovery, view, download, transformation and invoke services.

In order to have a better overview five specific indicators are proposed, one for each type of services.

The effective use of network services is estimated by measuring the number of user requests done in a specific timeframe.

The average number of service requests per type of service is very indicative. Interpretation of the absolute figures should be avoided.

This quantitative information will give an overview of the evolution in the usage of those services and will show how intensively the INSPIRE infrastructure for spatial information is used.

To complete this information, a more detailed analysis of the use of the spatial data infrastructure will be described in the three yearly-reports.

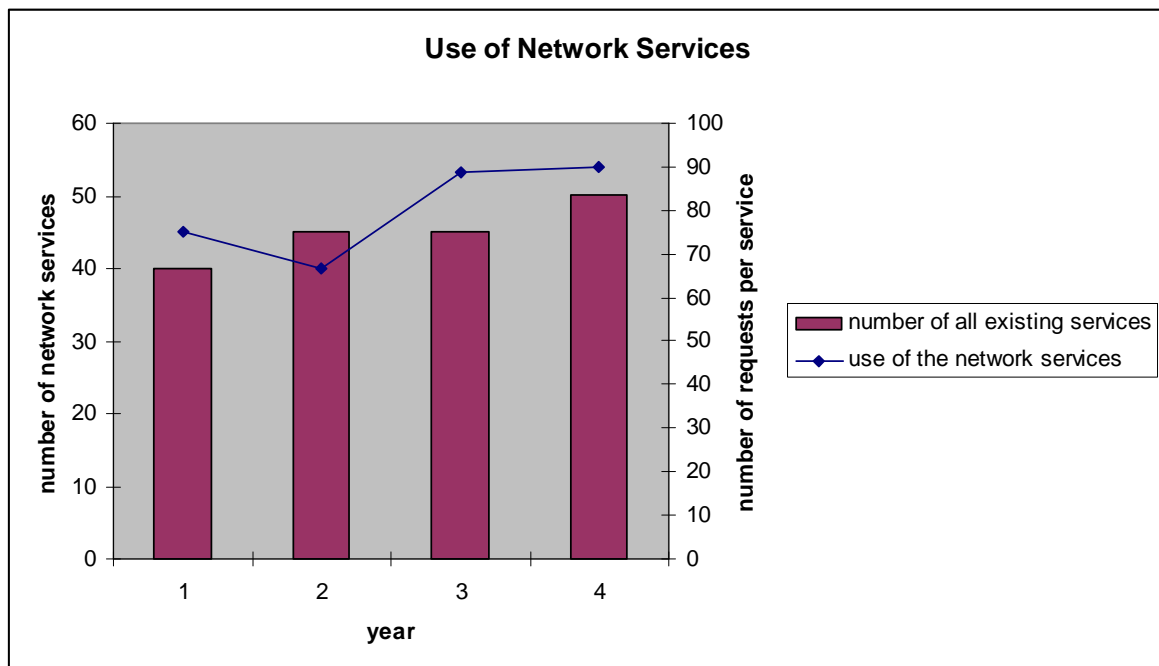


Figure 9

## 2.8. Conformity of Network Services (NSi4)

### Definition

The conformity of network services means the degree to which network services are in conformity with the Implementing Rules for Network Services.

### Chapter of the INSPIRE Directive

Chapter IV: articles 11, 12.

### Performance objective

A network service infrastructure including discovery, view, download, transformation and invoke services for the spatial data sets and services has been created and has been brought in conformity with the Implementing Rules on Network Services.

### Rationale

The network services should not only exist but also be available in such a way that they can fit the technical specifications and minimum performance criteria specified in the Implementing Rules on Network Services.

The general indicator (NSi4) measures the degree to which the network services are in conformity with INSPIRE. In order to have a better overview five specific indicators are proposed, for each type of services one specific indicator will monitor the conformity of that network service type.

The information is collected for each network service type. The unit used to measure the conformity of a network service is a binary value: conformant (1) or not conformant (0), which will provide no indication to what extent each network service is in conformity with the INSPIRE IRs. The main purpose of the indicator is not to measure the progress, or the degree of conformity, for each network service, but the progress and the degree of conformity of the network service infrastructure as a whole (composed of all those network services).

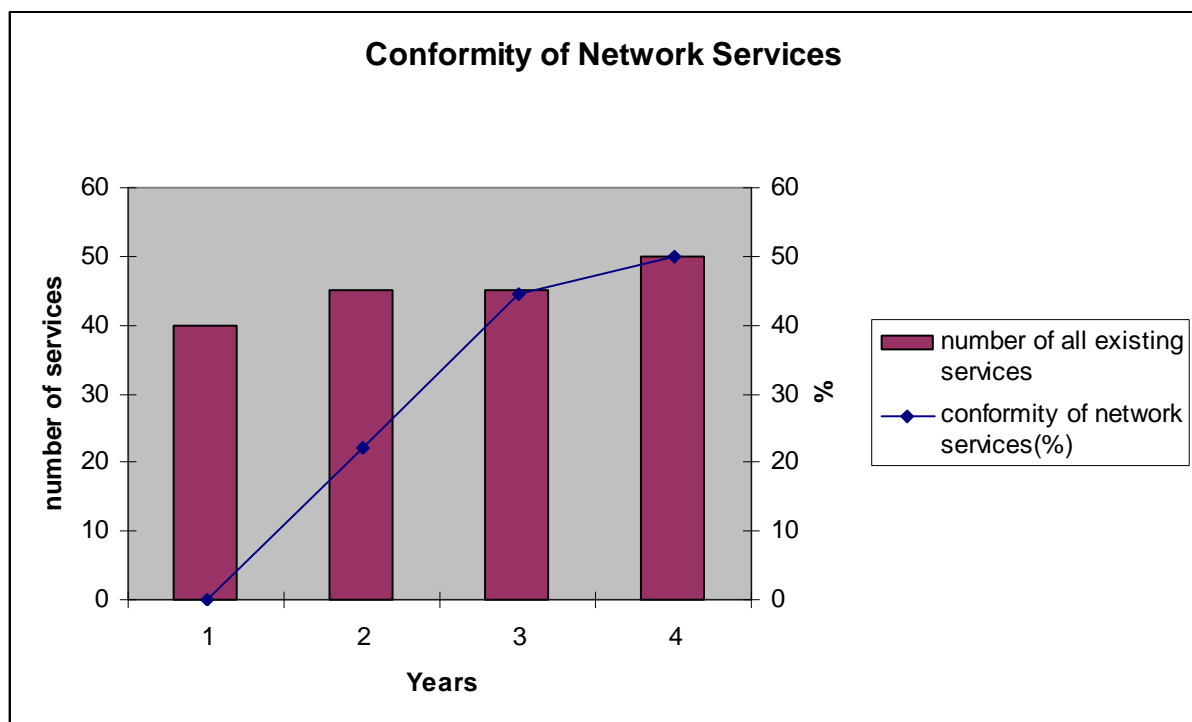


Figure 10

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### 3. Why no indicators on data and service sharing?

The Environment Action Programmes require that the Community's environmental policy follows an integrated approach taking into account regional and local differences. A number of problems regarding the sharing of spatial information, needed in order to achieve the objectives set out in that programme (recital 2 of the INSPIRE Directive), exist. These problems are common to a large number of policy areas and are experienced across the various levels of public authority (recital 3). Each MS shall adopt measures for the sharing of spatial data sets and services between its public authorities referred to in point (9)(a) and (b) of Article 3. Those measures shall enable those public authorities to gain access to spatial data sets and services, and to exchange and use those data sets and services for the purposes of public tasks that may have an impact on the environment (Chapter V Data sharing Article 17.1).

Indicators on data and service sharing should be capable to evaluate the progress of sharing. The DT Monitoring and Reporting tried on several occasions to define indicators that could measure data sharing (aspects) and consulted experts in this field to get their views. Draft indicators were initially proposed to measure:

- the level of sharing, i.e. the complexity of sharing arrangements that have been implemented in the MS (see recital 22);
- the usability, i.e. the degree of limitation to use the data sets for the purpose of public tasks (usually found in the "conditions of use").

However these indicators seemed far too complex and it was considered that data needed to calculate them would be very difficult to collect for the MS.

In a second attempt, simpler indicators were proposed in order to measure:

- the complexity of sharing agreements;
- the degree of constraints to use the data;
- the existence of free viewing services.

Although these indicators were specific indicators (not compiled/aggregated), the difficulty again was in the collection and measuring of data on agreements (or arrangements).

The DT also reviewed existing literature on the subject. They revealed some interesting ideas, indicators found where among others:

- the number of Suppliers;
- the number of participating institutes in a spatial data infrastructure network;
- the number of organizations willing to share data;
- the existing legal arrangements for suppliers/users/value adders;
- the existence of Partnership arrangements with GI-Council;
- the number of GI-Public/Private Partnerships;
- the existence of a Reference to sharing in (national) spatial data infrastructure mission;
- the number of court cases referring to data sharing.

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As with the other indicators considered none of them had ever been used in an operational environment. Finally, a last attempt was made to find some indicators by consulting experts in the field by tele-conference. The experts proposed a series of indicators, which were:

- the number of suppliers;
- the number of participating agencies;
- the number of shared data sets;
- the number of restrictions on use of data;
- the number of arrangements between agencies;
- the degree of data sharing;
- the number of free downloadable data;
- the existence of free download services supplying data by public sector bodies;
- the percentage of complaints referring to data sharing;
- the level of the data sharing problem;
- the number of data sharing problems to be solved by a National GI-Council;
- the time to access/download all the data relating the themes of annex I, II, and/or III and,
- the money to be spent to access/download all the data relating the themes of annex I, II, and/or III.

The DT felt that the same limitations as before applied, due to the complexity of evaluating these indicators in an operational environment. The only workable and promising indicator of this last list was related to the monitoring of complaints referring to data and service sharing (eventually together with free viewing services and constraints on use). However, this indicator was felt to be too negative and would not necessarily capture the data sharing problems it was trying to identify. Eventually, it was decided to try to identify data sharing practices through the 3-yearly report, using qualitative, rather than quantitative information.