Support to the evaluation of the implementation of the Directive 2007/2/EC on Infrastructure for Spatial Information in the European Community (INSPIRE)

Draft Final Report

(A final version of the report will be issued after the validation workshop)

Written by COWI A/S, Milieu, Technopolis Group
August 2021

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TEMPLATE XX – Evaluation Final Report

This document provides indicative **structure for the Evaluation Final Report** (language). As such it provides **overview of content** that should be covered by the report.

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Evaluation of the implementation of the Directive 2007/2/EC on Infrastructure for Spatial Information in the European Community (INSPIRE)

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Date: 30 July 2021

Table of Contents

LIST OF ABBREVIATIONS

AAQD	Ambient Air Quality Directive
BRG	Better Regulation guidelines
CAP	Common Agricultural Policy
CKAN	Comprehensive Knowledge Archive Network
EAP	Environment Action Programme
EEA	European Environmental Agency
EFA	Ecological Focus Areas
EFTA/ EEA	European Free Trade Association/ European Economic Area
EIS	Environmental Information Systems
EMODnet	European Marine Observation and Data Network
E-PRTR	European Pollutant Release and Transfer Register
GDPR	General Data Protection Regulation (2016/679)
GML	Geography Markup Language
GSAA	GeoSpatial Aid Application
HELCOM	Helsinki Commission
HILUCS	Land Use Classification System
HVD	High Value Datasets
IACS	Integrated administration and control system
IED	Industrial Emissions Directive
INSPIRE Directive	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)
ISO	International Organisation for Standardisation
IR	Implementing Rules
ITS	Intelligent Transport Systems
JRC	Joint Research Centre
LPIS	Land Parcel Identification System
MarSP	Macaronesian Maritime Spatial Planning
MIG	Maintenance and Implementation Group
MSFD	Marine Strategy Framework Directive
MSP	Maritime Spatial Planning
NCP	National Contact Point
NSDI	National Spatial Data Infrastructure
POP	Persistent Organic Pollutant

PSI	Reuse of Public Sector Information Directive
REFIT	Regulatory Fitness and Performance Programme
SDI	Spatial Data Infrastructure
SEANSE	Strategic Environmental Assessment North Sea Energy
TEN-T	Trans-European Transport Network
UWWT	Urban Waste Water Treatment Directive
WFD	Water Framework Directive

EXECUTIVE SUMMARY

The INSPIRE Directive was adopted in 2007 to establish the Infrastructure for Spatial Information in the European Union for the purposes of the EU environmental policies and policies and activities which may have an impact on the environment. INSPIRE aims to improve the availability, quality, organisation, accessibility and sharing of spatial information amongst various levels of public administration, across different sectors and across borders to assist policy-making with a direct or indirect impact on the environment. The INSPIRE Directive reacts to the growing need for sharing and exchanging interoperable spatial data across Europe for policy-making by removing obstacles to the sharing of spatial data across public authorities.

The purpose of this evaluation is to assess the effectiveness, efficiency, relevance, coherence and EU added value of the Directive and its implementation in line with the Better Regulation Guidelines. The evaluation covers the period between 2014 and 2020. Geographically, it covers all 27 EU Member States and four EEA/EFTA countries.[1] As regards the thematic scope, this evaluation study supports the evaluation of the implementation of the INSPIRE Directive and covers all provisions of the Directive and its Implementing Rules. Moreover, the study contributes to the wider coherence assessments required for the 'GreenData4All' initiative as part of the European Data Strategy.

The evaluation was conducted in the period from October 2020 to September 2021. Data was collected through an extensive desk research, interviews with key stakeholders, Focus Group interviews with selected Member State authorities, targeted surveys with spatial data, environmental, agricultural and marine communities, a public consultation and a validation workshop.

Current status

The current status analysis presents an overview of the implementation of the INSPIRE Directive in the Member States and EEA/EFTA countries and the effects that this has had on various stakeholders (EQ 1.1). By the beginning of 2021, the INSPIRE Directive has been partially implemented across Europe, with several countries lagging behind. While there have been some positive developments recorded in terms of coordination and governance structures, as well as data sharing arrangements and usage, the performance indicators have generated relatively low values. Furthermore, the analysis included an assessment of the implementation of the 2016 REFIT recommendations (EQ 1.2). The recommendations for the Member States have been addressed to a certain extent: whereas the number of environmental priority data sets has increased, there have still been limited linkages between the implementation of the INSPIRE Directive and other national initiatives related to e-Government and Open Data policies. The recommendations addressed to the European Commission have been implemented. The European Commission has put forward several initiatives and actions summarized in the MIG Work Programme, which have been completed to a large extent by the time of this evaluation.

Effectiveness

The assessment of effectiveness focused on the results achieved through the Directive as compared to the objectives initially set (i.e. the setting up of an infrastructure for spatial information (Article 1 of the INSPIRE Directive). The analysis of the implementation finds that there has been a progress towards the objectives set

[1] Iceland, Liechtenstein, Norway, Switzerland.

out in the INSPIRE Directive even though full implementation is not yet achieved (EQ 2.1 and EQ 2.2). However, the current monitoring system imperfectly captures the progresses made. The level of implementation varies across countries, with four groups of countries displaying different levels of achievement. In terms of geographical coverage of the INSPIRE Directive (EQ 2.3), the analysis indicates that it is not optimal as there are huge discrepancies in the number of available datasets across Member States. This is a bottleneck for achieving the objective of pan-European interoperability.

Based on the evaluation findings, it cannot be concluded that the implementation of the INSPIRE Directive in the Member States is effectively building further on the obligations of Directive 2003/4/EC on public access to environmental information (specifically the provisions under Articles 7 and 8 of Directive 2003/4/EC (EQ 2.4) mainly because the two Directives have different scopes (see EQ 5.4 on coherence). Furthermore, no additional barriers to achieving the objectives of the Directive in terms of implementation or use emerged from the analysis (EQ 2.5) compared to the ones identified in previous evaluations. There are still several difficulties related to technical requirements of the Directive that impact implementation and use of the INSPIRE related datasets. It is still difficult to precisely assess the extent to which INSPIRE is used for reporting under the environmental acquis (EQ 2.6). In addition, it is difficult to obtain a precise quantification about the use, the types of users and therefore impact of the Directive on users (EQ 2.7).

The information on qualitative and quantitative effects of INSPIRE on users active in economic sectors influencing environment is that information on use and users is too scarce to provide a clear overview of the effects of INSPIRE on users in these sectors (EQ 2.8). Studies and stakeholders involved in the INSPIRE implementation (at EU and Member State level) seem to be focused on making data available, without i) identifying upstream what are the expected effects on users ii) monitoring or following-up how data is used, by whom and for which reasons. At the end of the process, it is impossible to assess effects. Finally, there is limited information available about the users of spatial data from the private sector (EQ 2.9). Because of the incapacity to assess the use of spatial data by SMEs, the study tented to identify the main users of data from the private sector. Clearly, apart from some examples provided during the interviews, the knowledge of companies that use spatial data is very limited.

Relevance

The relevance assessment ascertained the extent to which the INSPIRE Directive continues to respond to the needs and problems that it is intended to address, i.e.: i) improve availability, quality, organisation, accessibility and sharing of spatial data; and ii) decrease costs for public sector in reusing spatial data. Since the full implementation of the Directive has not been achieved, initial needs have not been comprehensively addressed yet. The study demonstrated that needs are still valid, in particular in the policymaking context (EQ 3.1). The needs from the private sector have not been precisely defined and assessed (neither when the Directive was designed nor later).

The obstacles identified in the 2004 Impact Assessment identified were related to access to information, integration of information, status of information, cost, interoperability issues, harmonisation, quality of data and lack of long-term solutions. The incomplete implementation of the Directive has not overcome these obstacles therefore they remain (at least partially) valid still today (EQ 3.2). The technical specifications embedded in the INSPIRE framework constitute a barrier to current and future implementation as well as use (EQ 3.3).

The scope of Articles 7 and 8 of Directive 2003/4/EC on public access to environmental information is much broader than that of the INSPIRE Directive. Based on the evaluation findings, it cannot be explicitly concluded that the INSPIRE Directive effectively supports the implementation of PAEI, however, it can also not be concluded that Directive is irrelevant for the implementation of PAEI (EQ 3.4).

Efficiency

The assessment of efficiency of the INSPIRE Directive focused on whether the benefits of the Directive can be justified by the costs it generates. As such, for the efficiency analysis we focus on evidence that inform the assessment of the effects/benefits of the implementation of INSPIRE Directive, as well as, to the extent possible the assessment of the costs of the implementation of the Directive. In this regard, attention is paid to experienced costs, impacts and benefits to different stakeholders (e.g. national authorities, regional/local authorities, businesses, and NGOs). The evaluation also identifies areas/processes with scope for reducing inefficiencies, such as burdensome regulatory and administrative costs incurred by stakeholders, or cases where the Directive's provisions could be streamlined.

The analysis finds that the key benefits have been provision of *better overviews, discoverability, availability and access to data* and that these overall are proportional to the costs (EQ 4.1, 4.2 and 4.3). However, as costs and benefits are asymmetrically distributed amongst stakeholders, some stakeholders find that the costs are higher than their benefits. The assessment of the costs and benefits at the macro level leaves little reason to doubt that the overall benefits outweigh the overall costs for INSPIRE in general and the national SDI in specific (EQ 4.4). There is scope for simplifying the implementation in support of policy development (including reporting) as well as developing ways in which to ensure that the cost of harmonization and interoperability do not become a very large burden for specific stakeholder groups. Reasons for the increased costs are inter alia that some Member States implement INSPIRE separately for the national SDI, and thereby have additional costs in terms of staff, expertise and IT systems and maintenance.

In terms of whether INSPIRE has reduced the environmental reporting burden (EQ 4.7) for the Members States, this is too early to judge. INSPIRE has the potential, when fully implemented, to improve the access to harmonized environmental data for reporting and thereby reducing the effort and time deployed the Member States. Also, it is not assessed that a further streamlining of the provisions in Articles 7 and 8 of Directive 2003/4/EC on public access to environmental information would affect the administrative burden of the Member States (EQ 4.8). INSPIRE supports the implementation of Directive 2003/4/EC, by improving the capacity of the stakeholders which should have an indirect effect on the administrative burden.

Coherence

The **coherence assessment** considered whether the INSPIRE Directive and its provisions were coherent internally and with other policies and legislation, as well as with the EU legal framework on public data sharing (Directive 2003/4 on Public access to environmental information and Directive 2019/1024/EU on Open Data.

The coherence assessment did not find instances of internal incoherence. The INSPIRE Directive is however outdated with regards to its references to comitology procedures, which are not in line with Articles 290 and 291 of the Lisbon Treaty (EQ5.1).

A review of the relevant EU legislation (environmental and other legislation) did not find provisions that would potentially impede the applicability of INSPIRE rules within the scope of the legislation (EQ 5.2 and 5.3). In fact, many pieces of legislation make

direct reference to INSPIRE rules and it was found that such references do support compliance in practice. In particular regarding environmental legislation, work is ongoing to align reporting obligations with INSPIRE rules. However, stakeholders stressed that environmental reporting obligations are not yet fully coherent with INSPIRE, both in terms of data content and models.

By providing data services accessible to the public, the INSPIRE Directive has the potential to serve the objectives of the Public Access to Environmental Information Directive (Directive 2003/4) (EQ 5.4). However, as it was adopted before INSPIRE, Directive 2003/4 does not refer to INSPIRE rules for disseminating geospatial data covered by Article 7(e). The Directive in this regard could benefit from stronger alignment with INSPIRE. Potential conflicts have been identified between the INSPIRE Directive, the Open Data Directive and upcoming High Value Datasets Regulation, as INSPIRE provides more extensive possibilities to limit public access to spatial data, and to license and/or require payment for spatial datasets and services (EQ 5.5). This might require an alignment in the future. In addition, it should be ensured that INSPIRE remains in line with future developments in open data.

EU Added value

The assessment of the EU added value focused on the added value of the INSPIRE Directive compared to what could have been achieved at Member State and or regional level in the absence of the Directive (EQ 6.1). The EU added value of the Directive is limited due to its incomplete implementation. The main benefits of the EU intervention as acknowledged by the existing literature and the consulted stakeholders have so far related mostly to the policy-making and implementation purposes at national and European level, especially for the environmental reporting. At a national level, the Directive has led to the EU added value through the establishment of governance structures, achieving interoperability in a broader scope (EU-wide), unlocking public data and creating an EU level expertise.

The added value of this EU-wide Directive is less tangible for common users. Although the Directive has led to somewhat improved cross border collaboration, still many challenges persist which hamper a more EU-wide data sharing and usage. The environmental and climate spatial data is crucial for informed policy-making and implementation and for meeting the objectives of the European Green Deal. In light of the recent initiatives such 'GreenData4All' and emerging data legislation, it is crucial to ensure close coordination between the INSPIRE community and other relevant stakeholders when building up European data governance structures. The assessment also provided insights into the question whether the issues addressed by INSPIRE continue to require action at EU level (EQ 6.2). Most of the stakeholders acknowledge that the action is required at EU level and that the rationale behind and the principles of the INSPIRE Directive are justified.

Recommendations

Draft conclusions are listed in section 6.2. Based on the evaluation of the INSPIRE Directive and the corresponding findings outlined above, a summary of the **conclusions and recommendations** will be provided in the Final Report.

1. INTRODUCTION

The INSPIRE Directive was adopted in 2007 to establish the Infrastructure for Spatial Information in the European Union for the purposes of EU environmental policies and other policies and activities which may have an impact on the environment.[2] INSPIRE aims to improve the availability, quality, organisation, accessibility and sharing of spatial information among various levels of the public administration, across different sectors and across borders - to the benefit of policy-making with a direct or indirect impact on the environment. The INSPIRE Directive responded to the growing need for sharing and exchanging interoperable spatial data across Europe for policy-making and does so by removing obstacles to the sharing of spatial data across public authorities. Additionally, the access to the INSPIRE spatial data should be ensured for all other stakeholders, including private sector, NGOs, academia and citizens.

Within this overall context, the European Commission set out to conduct an **evaluation of the implementation of the Directive 2007/2/EC on Infrastructure for Spatial Information in the European Community (INSPIRE)**. The legal obligation to evaluate the INSPIRE Directive stems from Regulation 2019/1010 on the alignment of reporting obligations in the field of legislation related to the environment. It entered into force in June 2019 and it stipulates in Article 23 that by 2022 and at least every five years thereafter, the European Commission will carry out an evaluation of this Directive, and of its implementation. The purpose of such an evaluation is to assess the effectiveness, efficiency, relevance, coherence and EU added value of the Directive and its implementation in line with the Better Regulation Guidelines.[3]

The study (henceforth referred to as 'the evaluation') is a support study to inform the European Commission's evaluation of the INSPIRE Directive. The evaluation covers the period between 2014 and 2020. Geographically, it covers all 27 EU Member States and four EEA/EFTA countries.[4] As regards the thematic scope, it covers all provisions of the Directive and its Implementing Rules. Moreover, the study contributes to the wider coherence assessments required for the 'GreenData4All' initiative as part of the European Data Strategy. Beyond the coherence between the INSPIRE Directive and Public Access to Environmental Information Directive, the study provides answers to key evaluation questions on the efficiency, effectiveness and relevance of the provisions in Article 7 (Dissemination of environmental information) and Article 8 (Quality of environmental information) of the Public access to environmental information Directive.

This report presents the findings, conclusions, and recommendations of the evaluation of the INSPIRE Directive. The report is structured as follows:

- **Chapter 1**: Introduction – introducing the context and the structure of the evaluation
- **Chapter 2**: Background – presenting the legislative context, the objectives of the evaluation, the Intervention logic and the baseline for the INSPIRE Directive

[2] 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).
[3] Better Regulation Guidelines Toolbox Tool #47: Evaluation Criteria and questions.
[4] Iceland, Liechtenstein, Norway, Switzerland.

- **Chapter 3**: Evaluation questions – presenting an overview of evaluation criteria and evaluation questions
- **Chapter 4**: Methodology – presenting the evaluation tasks, the horizontal tasks of data collection and limitations gaps
- **Chapter 5**: Answers to the evaluation questions – presenting the findings of the evaluation concerning the current status analysis, as well as the effectiveness, efficiency, relevance, coherence and the EU added value of the INSPIRE Directive
- **Chapter 6:** Conclusions and recommendations - presenting the key emerging conclusions and possible recommendations

The report also includes several Appendices:

- **Appendix 1:** List of evidence sources
- **Appendix 2:** Current status analysis
- **Appendix 3:** Current status country forms
- **Appendix 4:** Synopsis report
- **Appendix 5:** Report on the public consultation

2. BACKGROUND TO THE INITIATIVE

2.1. Context and purpose of the INSPIRE Directive

While the concept of spatial data may seem difficult to understand to a layman due to its complex technical nature, the importance of a functioning spatial data infrastructure (SDI) in Europe should not be underestimated. As highlighted in several policy documents over the years (e.g. the Environment Action Programmes - EAPs), the development of EU environment policy and its implementation relies on a solid knowledge including data related to the state of the environment (water, air, biodiversity, etc.). The same applies to policies that have an impact on the environment (transport, energy, agriculture, regional development, etc.). Much environmental data can be classified as spatial data as it relates to specific locations. Spatial data, known also as geospatial data, contains information about a specific location on the Earth's surface. Besides the definition of the location in geometry terms (e.g. polygon, line, point), the location includes several attributes that describes the environmental specifics that are necessary to understand what is happening and in which location.[5]

A more efficient management, analysis and usage of spatially referenced geographic data and related information can be beneficial for a broad spectrum of problem-solving domains in the public sector, e.g. good governance, promoting economic growth, and sustainable resource management.[6] For example, in the case of floods, landslides or

[5] EEA (2014), EEA Newsletter, Issue 2014/3.

[6] Williamson, I. P., A. Rajabifard, and M. E. F. Feeney. 2003. Developing Spatial Data Infrastructures: From Concept to Reality. Boca Raton, FL: CRC Press.

erosion, it is crucial to have a quick access to all the necessary information. This allows for consequent and appropriate quick action on the ground. For example, it is important not to only know the size of the area but also what information (attributes) of that area is available: soil quality, share of forest/ land/ urban area, population density, the presence and location of houses, schools, emergency services, etc.

The INSPIRE Directive was a response to the growing need for sharing and exchanging interoperable spatial data across Europe and to the fact that the spatial data situation in Europe was then considered "one of fragmentation, gaps in availability, duplication of information collection and problems of identifying, accessing or using data that is available". This quotation is from the impact assessment for INSPIRE published in 2004.[7] Following the impact assessment, the INSPIRE Directive was adopted in 2007 laying out the requirements for sharing and exchanging spatial data. It is based on the existing SDIs established individually by Member States and it covers 34 themes of spatial data relevant for environmental applications.[8] By building on the national spatial data infrastructures (NSDI), it aims to establish a high-quality and interoperable spatial data base, readily available across Europe for the purposes of environmental policies and other relevant policies which may have an impact on the environment.

One of the main expected benefits of the EU SDI is that it improves the functioning of the public administration at all levels by facilitating the administrative access to geospatial information.[9] One important aspect in this regard relate to the associated capacity building which is facilitated by the European Commission and its services (i.e. JRC, EEA, ESTAT). Equally important for raising the digital competences and digital maturity are the EU initiatives such as e-Government strategy and the EU interoperability framework in general. The INSPIRE implementation must be considered in close connection with these initiatives and the competences and maturity that they bring.

As stipulated in its Article 1, the general objective of the INSPIRE Directive is to establish the Infrastructure for Spatial Information in the European Union for the purposes of the EU environmental policies and policies and activities which may have an impact on the environment. INSPIRE thus aims to improve the availability, quality, organisation, accessibility and sharing of spatial information among various levels of public administration, across different sectors and across borders to assist policy-making with a direct or indirect impact on the environment. It is structured as a Framework Directive around five main actions:

- metadata,
- network services,
- interoperability of spatial data sets and services,
- data and service sharing,
- monitoring and reporting.

The Directive is pursuing the above general objective through these actions that aim to remove obstacles to the sharing of spatial data across public authorities.

[7] European Commission (2004), Commission Staff Working Document: Proposal for a Directive of the European Parliament and of the Council establishing an infrastructure for spatial information in the Community (INSPIRE): Extended Impact Assessment.

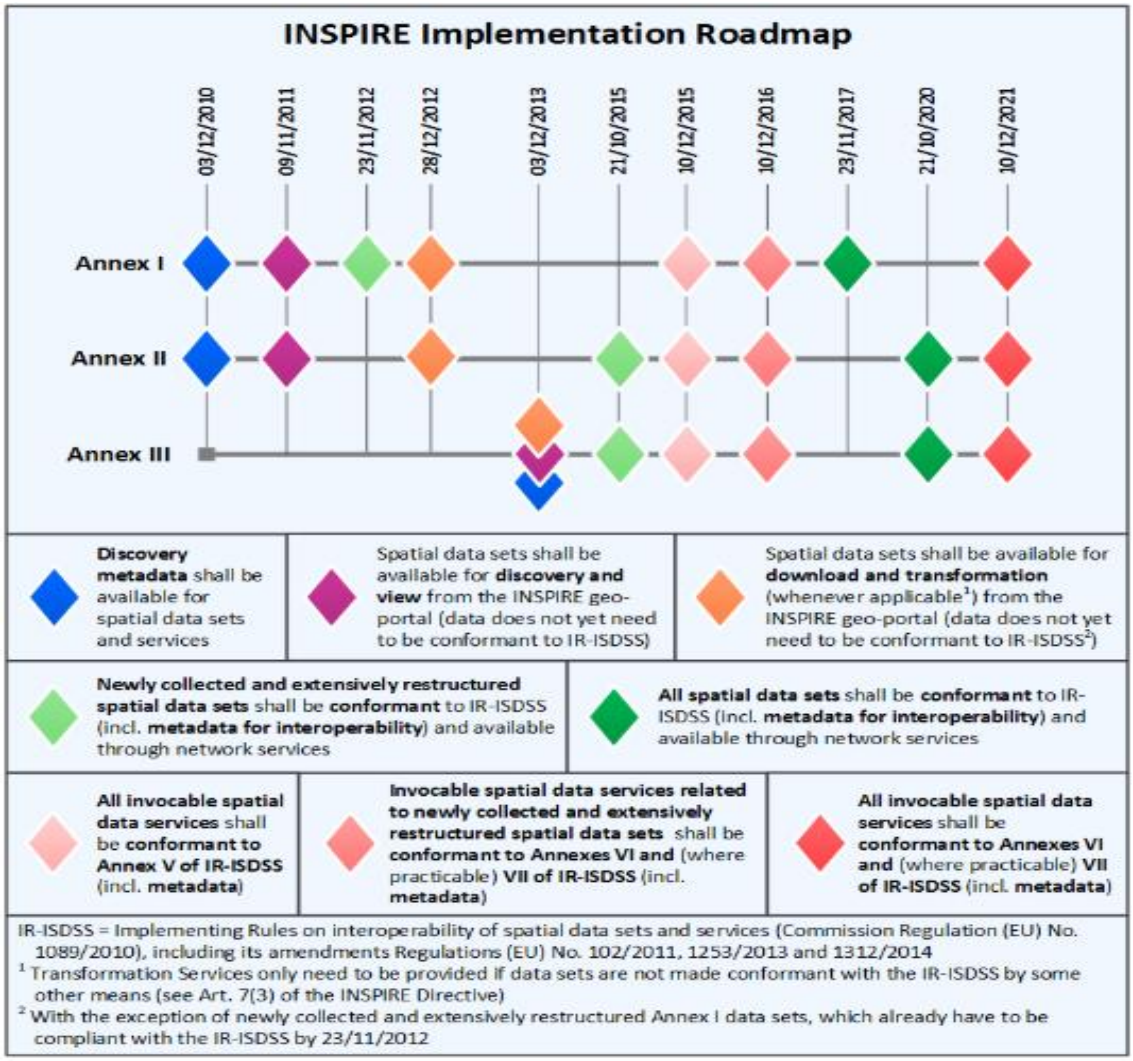
[8] EEA (2016), INSPIRE. Available at: https://www.eea.europa.eu/about-us/what/seis-initiatives/inspire-directive.

[9] Pashova, L. and T. Bandrova (2017), A brief overview of current status of European spatial data infrastructures – relevant developments and perspectives for Bulgaria, Geo-spatial Information Science, 20:2, 97-108.

Additionally, the access to the INSPIRE spatial data should be ensured for all other stakeholders, including private sector, NGOs, academia and citizens according to the Re-use of Public Sector Information (PSI) Directive (Directive 2003/98/EC).

The Directive lays down general obligations and rights which are then further specified by Implementing Rules (IR) for each of these five actions. All IR have been adopted as Commission Decisions or Regulations and are binding in their entirety. The implementation schedules for providing metadata, establishing network services and ensuring interoperability are different for the different spatial data themes referred to in each of the three Annexes to the Directive laying down 34 spatial data themes. The Directive came into force on 15 May 2007 and is implemented in various stages, with full implementation required by 10 December 2021. The implementation roadmap is shown below. The Roadmap must be considered when assessing initial outputs and effects of INSPIRE.

Figure 2-1 Step-wise implementation of the INSPIRE Directive



Source: European Commission (n.d.), Road Map Graphic.

2.2. Objectives of the evaluation and the Intervention Logic

Based on Article 23 of the Directive, the general objective of this study is to support the evaluation of the implementation of the INSPIRE Directive. The following specific objectives underpins this:

1. Carry out the stakeholder consultation to gather views by relevant stakeholders to inform the evaluation of the five evaluation criteria, as well as to pursue verification and acceptance of the evaluation findings that will feed into the status of implementation and the lessons learnt/ recommendations;
2. Document the status of implementation of the INSPIRE Directive at the EU and country level in order to provide an overview of the implementation progress, identify any shortcomings and the reasons behind (providing background for answering the evaluation questions regarding the effectiveness of the Directive) as well as to provide recommendations for further actions;
3. Assess the effectiveness, efficiency, coherence, relevance and EU added-value of the INSPIRE Directive by answering the evaluation questions. Within effectiveness and EU added value there is a specific focus on assessing use-cases such as sharing of geospatial data between public authorities and public access to geospatial environmental information for future orientations. Also, the evaluation includes an identification of lessons learned and challenges with regard to the coherence of INSPIRE with other instruments.
4. Focus on cost savings, social (e.g. health), and environmental benefits. These achievements have good economic impacts (not only from the cost-savings), however, while focusing on high quality evidence, the challenge is to attribute such impacts and describe them in a quantitative way. Hence the assessment is necessarily expanded in a more qualitative manner where quantification is not possible;
5. Identify and elaborate on the external factors that are relevant for the expected results and impact of the INSPIRE Directive, in terms of data sharing, accessibility, interoperability, etc.
6. Provide lessons learned and/or recommendations on how to address the identified shortcomings and present them in a form of most optimal policy options, facilitating effectiveness and efficiency of INSPIRE.

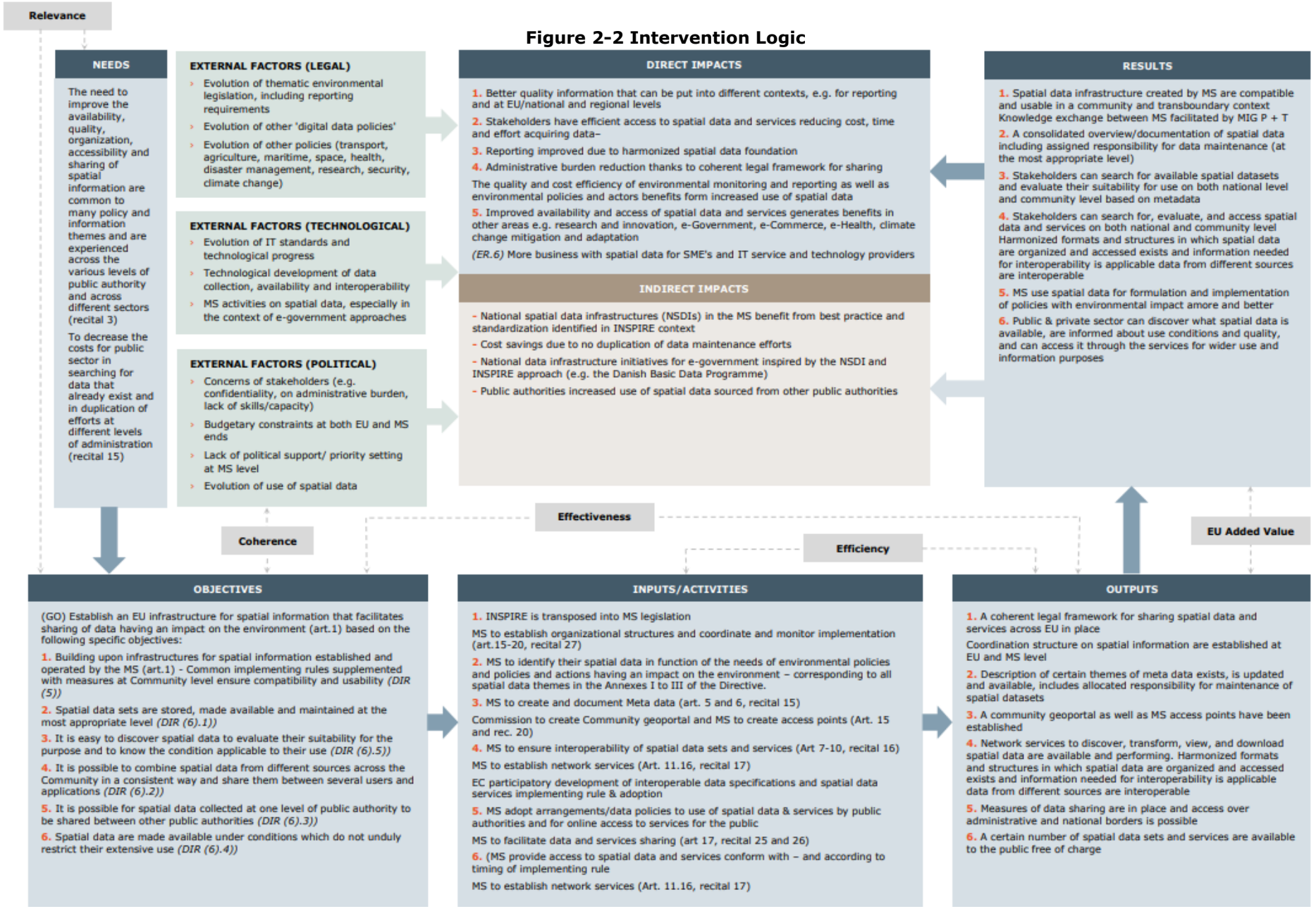
The REFIT evaluation[10] included an Intervention Logic. This intervention logic has been thoroughly scrutinized building on a thorough understanding of the implementation and context of INSPIRE. The resulting revised Intervention Logic serves to provide a solid foundation for the theory-based evaluation through clearly illustrating the causal chains and the underlying assumptions that guide the evaluation of the INSPIRE Directive and its implementation, The intervention logic is relevant at two levels: (a) to establish an overview understanding of the whole intervention ('helicopter view' of the implementation of the INSPIRE Directive) and the interlinkages between the different provisions, (b) to establish an in-depth understanding of the causal pathways and assumptions for each type of activity (granular information on the mechanisms and causal effects of specific types of activities).

Therefore, a key element in the revision of the intervention logic has been to establish a precise mapping of the cause-effect relationship of INSPIRE Directive. This allows for

[10] European Commission (2016), Report from the Commission to the Council and the European Parliament on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23 (COM/2016/0478 final/2).

setting out in operational terms how the Directive was expected to deliver its outputs, results and impacts and it supports the identification of intended and unintended impacts. For each objective, the intervention logic links the inputs, outputs, results and impacts thus illustrating the intended cause-effect relations. Literature and expert knowledge informed the further mapping of results and impacts of the resulting intervention logic. To the extent possible, the Intervention Logic also captures key indirect or unintended results and impacts deriving from the implementation of the directive. The applied and revised intervention logic is shown in the figure below.

Figure 2-2 Intervention Logic



2.3. Baseline

The baseline of this evaluation is the year 2014. This year marks an interim implementation milestone. The cut-off date set for this evaluation is January 2021 except for specific parts in the current status analysis due to specific circumstances outside the control of this evaluation. By the beginning of the year 2021, most of INSPIRE requirements should have been implemented (see the INSPIRE implementation roadmap in Figure 2-1). However, the full implementation is required only by the end of 2021, therefore, it must be considered that this evaluation does not yet allow for a full assessment of impacts and benefits of the Directive. Rather, with the defined baseline, this evaluation assesses the implementation progress between 2014 and 2021 and provides an understanding how the situation during this period has changed, also compared to the situation prevalent at the time of the adoption of the Directive in 2007. Such consideration helps to understand a rationale for the adoption in the Directive in the first place (2007) and to conclude whether and to what extent it has still been relevant over the last seven years (2014-2021).

Based on the conclusions of the REFIT evaluation in 2016, it seems that many of the barriers identified in 2003 Impact Assessment[11] were still relevant at the time of the preparation of that evaluation. Despite the progress in the recent years, political, legal, organizational, and cultural differences constitute barriers in the process of harmonization of spatial information across Europe. The REFIT evaluation identified some specific obstacles such as underdeveloped legal frameworks in national data policies, complex and heterogeneous data policies across Europe, various cost recovery models and lack of enforcement. Besides, a lack of digital competences and digital maturity is a pressing issue that must be addressed as well. Building a pan-European SDI is a complex undertaking employing concepts and technologies that are not fully mastered by the contributors to data infrastructure and that are continuously undergoing substantial development and maturing.

3. EVALUATION QUESTIONS

The support study to the evaluation of the INSPIRE Directive addresses the **current status analysis** and five evaluation criteria: **relevance** (i.e. whether the objectives of the Directive are still in line with the current needs and problems), **effectiveness** (i.e. whether the actual changes the Directive has generated, and the results are in line with the original objectives), **efficiency** (i.e. whether the costs resulting from the implementation of the Directive's provisions are in line with actual benefits), **coherence** (i.e. whether the Directive is internally coherent in terms of its provisions, as well as externally coherent with other policies and legislation) and **EU added value** (i.e. whether the Directive has delivered added value, beyond what could have been expected from national and regional policies). For this study, the evaluation criteria have been operationalised in 30 evaluation questions. The overview of questions is presented below.

Table 3-1 Overview of evaluation criteria and evaluation questions

CURRENT STATUS

[11] INSPIRE (2003), Report on the feedback of the Internet consultation on a forthcoming EU initiative establishing a framework for the creation of an Infrastructure for Spatial Information in Europe. Available at: https://inspire.ec.europa.eu/reports/analysis_consultation_01092003.pdf

- EQ 1.1: How has the implementation and application of INSPIRE evolved from 2014 to 2020 and how it has affected different stakeholders?
- EQ 1.2: To what extent has the recommendations from the 2016 INSPIRE REFIT been implemented?

EFFECTIVENESS

- EQ 2.1: What progress has been made over time towards achieving the objectives and targets set out in INSPIRE in various Member States?
- EQ 2.2: Is the progress made in line with the initial expectations and the INSPIRE implementation roadmap?
- EQ 2.3: Is the geographical coverage of implementation consistent with the Directive's objectives?
- EQ 2.4: To what extent does the implementation of the INSPIRE Directive in the Member States build further on the obligations of Directive 2003/4/EC on public access to environmental information (specifically the provisions under Articles 7 and 8 of the Directive 2003/4/EC)?
- EQ 2.5: Which main factors have contributed to – respectively stood in the way of achieving these objectives?
- EQ 2.6: To what extent is INSPIRE used for reporting under the environmental acquis?
- EQ 2.7: What are the qualitative and quantitative effects of INSPIRE on the policymaking users in the field of environment in Member States?
- EQ 2.8: What are the qualitative and quantitative effects of INSPIRE on users active in economic sectors influencing environment?
- EQ 2.9: What are the effects of INSPIRE on small businesses using spatial data?

RELEVANCE

- EQ 3.1: To what extent does INSPIRE still match current needs and do they continue to require action at EU level?
- EQ 3.2: Is INSPIRE still relevant to the issues (obstacles) it addresses?
- EQ 3.3: To what extent is INSPIRE future-proof?
- EQ 3.4: Are the Articles 7 and 8 of Directive 2003/4/EC on public access to environmental information still relevant in view of the current state of the INSPIRE infrastructures?

EFFICIENCY

- EQ 4.1: To what extent, and how has the intervention lead to improvements in the quality or efficiency of work of concerned stakeholders?
- EQ 4.2: Can any specific provisions in INSPIRE be identified that make cost-efficient implementation more difficult?
- EQ 4.3: Can the INSPIRE Directive and implementing rules be made more cost-efficient? What is the simplification potential?
- EQ 4.4: Are results achieved so far commensurate with the resources put forward and in line with the ones expected from the ex-ante evaluation of INSPIRE?
- EQ 4.5: How proportionate were the costs of the intervention for different stakeholder groups (enterprises including SMEs, private citizens …)?
- EQ 4.6: Have the resources needed to implement INSPIRE been available?
- EQ 4.7: How has the use of INSPIRE for environmental reporting affected the reporting burden?
- EQ 4.8: How would further streamlining of the provisions in Articles 7 and 8 of Directive 2003/4/EC on public access to environmental information with the active dissemination provisions of the INSPIRE Directive impact the administrative burden on the Member States.

COHERENCE

- EQ 5.1: To what extent is INSPIRE coherent internally?
- EQ 5.2: To what extent is INSPIRE coherent with environmental legislation with geospatial reporting obligations?
- EQ 5.3: To what extent is INSPIRE coherent with other relevant areas of EU policy with geospatial reporting obligations (transport, agriculture, maritime, space, health, disaster management, research)?

- EQ 5.4: To what extent is INSPIRE coherent with Directive 2003/4/EC on public access to environmental information and the objectives of the Common European Green Deal data space?
- EQ 5.5: To what extent is INSPIRE coherent with Directive 2003/98/EC on the re-use of public sector information and what are the implications of Directive 2019/1024/EU?

EU ADDED VALUE

- EQ 6.1: What is the EU-added value of INSPIRE in comparison to what could be achieved at Member States national and/or regional level activities?
- EQ 6.2: To what extent do the issues addressed by INSPIRE continue to require action at EU level?

4. METHODOLOGY

4.1. Evaluation tasks and phases

The study timeline is split into five evaluation tasks that span over four evaluation phases: inception, current status, analysis and final report phase. A brief overview of phases and key outputs is provided in the following paragraphs:

In the **inception phase**, the evaluation methodology (**Task 1**) was developed and the intervention logic from the REFIT evaluation was revised (**Task 2**). The corresponding outputs were presented in the Inception Report, which was approved in March 2021. The work performed as part of the inception phase included the completion of the list of evaluation questions and the approach to answering them (by defining judgement criteria, indicators, triangulation approach), assessment of the stakeholders' feedback to the Evaluation Roadmap, development of the public consultation questionnaire, preparation of the current status form template,[12] identification and mapping of stakeholders, collection of data sources and mapping of main data gaps and limitations.

In the **current status phase**, the first drafts of the 31 country forms were prepared. This was based on a desk review of the country fiches as well as other relevant materials. The resulting draft country forms, developed for the 27 Member States and four EEA/ EFTA countries, were shared with the respective National Contact Points (NCPs) on 25 March 2021 for their validation. The NCPs were given several weeks for the review and by mid-May feedback from all countries was received, based on which the country forms were updated and revised (see Appendix 3).

The current status phase was tightly intertwined with the **analysis phase**, during which a review and analysis of relevant available information and evidence (**Task 3**) was further performed and completed. In this task, quantitative and qualitative data from reports, scientific articles, evaluations and other data sources on the implementation of the INSPIRE Directive was collected and reviewed. Furthermore, as part of the stakeholder consultations (**Task 4**), several data collection activities were conducted, including scoping interviews and Focus Group interviews with various Member State authorities and stakeholders. In mid-April, the public consultation was launched for the duration of 12 weeks and four targeted surveys were launched at the end of April.

[12] A more detailed explanation about the current status analysis and the preparation of country forms is provided in EQ 1.1.

In the **final report phase**, the analysis of results from all stakeholder consultations, including from the public consultation and the targeted surveys was finalised. Findings from these consultation activities fed into the drafting of this report (**Task 5**) presenting also the draft final conclusions of the evaluation.

4.2. The horizontal tasks of data collection

The key horizontal data collection tasks included desk review, development of country forms and stakeholder consultations. The findings from these activities are provided under each evaluation question. A brief overview of the horizontal tasks of data collection are presented below.

Desk review: The desk review consisted of two parts: data identification and collection phase and a review phase. Throughout the study, relevant data sources were identified and compiled in an internal data repository (Excel). An overview of identified information sources is provided in Appendix 1. The repository contains a list of sources that were identified via various channels, including desk research and meetings with DG Environment and the Steering Group members. Further to the data sources indicated in the list, relevant databases, country fiches and summary reports, indicator data and dashboards were identified. These were used to extract relevant information to conduct a current status analysis: INSPIRE Geoportal, country reports provided on the 'INSPIRE in your country' website, INSPIRE Dashboard (for reference year 2018).

Development of the country forms: The country forms include an analysis of the status of the implementation of the INSPIRE Directive in the Member States and EEA/ EFTA countries. The assessment was conducted per country and for each country the form was developed describing the status of implementation by means of quantitative and qualitative indicators since 2014. The quantitative analysis is based primarily on the indicator harvesting results from December 2020 and the qualitative analysis includes Member States' updates in their country fiches submitted in March 2021. On 25 March 2021, country forms for the 27 Member States and four EEA/ EFTA countries were shared with the respective NCPs and the evaluation team received a feedback to all country forms by mid-May. Based on the comments received the country forms were completed. Due to special circumstances outside of the control of the study, the European Commission agreed to use indicator results from a later harvest (than December 2020) for Malta, Poland, France, Liechtenstein and Switzerland.

Field research and consultation activities: Consultation activities served the dual objective of collecting the evidence necessary to answer the evaluation questions and providing sufficient opportunities to all interested parties and the general public to provide input. It aimed to complement the information gathered through documentary review, in particular by providing data that could not be gathered through literature (e.g., data on costs and benefits, examples of uses of INSPIRE, implementation issues). The stakeholder consultation activities consisted of several different consultation tools including interviews, targeted surveys, open public consultation, and a stakeholder workshop. A detailed description of each consultation activity is included in the synopsis report, provided in Appendix 4 to this report. A short overview is provided below.

Table 4-1 Overview of consultation activities

Consultation activity	Number	Description
Scoping interviews	10 + 2 written inputs	**Objectives**: understand the key issues at stake for the evaluation; support the preparation of consultation tools; gather information on roles of different DGs in INSPIRE, use of INSPIRE in different

		policy area and ongoing / upcoming Commission initiatives **Participants**: Commission services and EU level stakeholders **Timing**: end of March / early May 2021
Focus group interviews	7 (56 participants)	**Objectives**: understand the different ways INSPIRE is being implemented in the Member States; gather information on implementation status, drivers and barriers, costs and benefits, and uses of INSPIRE by authorities and other users. **Participants**: National focal points and representatives from relevant national organisations involved in the implementation of INSPIRE. **Timing**: Mid-April – early May 2021
Targeted surveys	4 (144 responses)	**Objectives**: gather perspectives from a broader range of stakeholders (incl. sectoral data providers, data users) from all Member States, gather information from authorities responsible for environmental reporting, and from specific communities (marine and agriculture). **Participants:** Relevant authorities, agencies, and organisations in the fields of environment, geographic information, marine environment, and agriculture. **Timing**: 29 April to 4 June 2021 (online)
Public consultation	1 (93 responses)	**Objectives:** Provide all interested individuals and organisations to provide input to the evaluation **Participants**: All interested parties and the general public. **Timing**: 19 April to 12 July 2021 (online)
Validation workshop	1	**Objectives:** validate the preliminary findings and conclusions of the evaluation with stakeholders; support the formulation of the conclusions and recommendations. **Participants:** two representatives from each Member State, representatives from Commission services and agencies, EU level organisations, representatives of private sector and academia. **Timing**: 7 September 2021 (10-12 am)

Feedback to the evaluation roadmap was also taken into account in the evaluation and will be shortly summarised in the synopsis report on all consultation activities.

4.3. Data gaps and limitations

The approach to document the data gaps and limitations as well as the mitigation measures has been a rigorous process of mapping of data and data gaps as well as mitigation, e.g. though the identification of alternative data. An overview of key categories of evidence to be used for the analysis of different evaluation criteria, including current status was prepared for the inception phase. For each criterion it was assessed what the key limitations are and what a proposed mitigation measure could be, e.g. using alternative sources or types of data. The main limitations and gaps identified during this evaluation are described in the following paragraphs.

Comparison of implementation results across the reporting years: there is a significant shift in the trend observed, between the year 2018 and 2019, due to the change of the INSPIRE monitoring and reporting process. Since 2019, the process has been managed by the JRC and is fully automated using INSPIRE Geoportal and the INSPIRE Reference Validator software tools to process the metadata harvested from

the Member States' discovery services. The new automated approach based on the processing of all metadata harvested from countries' discovery services entails a stricter and more reliable validation method than previous self-declared country assessments. As a result of this change in data, the implementation results cannot be directly compared across the reporting years. In order to mitigate this limitation, the Member States and the four EFTA/EEA countries were given the opportunity to provide additional explanations in the country forms regarding their internal challenges and other reasons for the drop in their performance over the years. These explanations must be taken into consideration in the assessment of the implementation progress.

Measuring impacts of the INSPIRE Directive: It is difficult to measure the impacts, as users of spatial information data in different applications based on INSPIRE are not always aware where the data comes from. Users often do not know whether data they use/would like to use result from the implementation of INSPIRE or from something else (e.g. national legislation). One such example is the application presenting real time air quality data. Because of this challenge, it is sometimes difficult to trace a real driver for many important initiatives such e-Government and national open data strategies. For this reason, this evaluation aims to provide a transparent overview of where data comes from and how it is interpreted by different stakeholders. In addition, the evaluation conclusions are carefully drawn, acknowledging the limitations of results of different collection tools.

Quantification of costs and benefits: In the efficiency analysis, the main data gaps relate to assessment of costs and benefits in quantitative terms. Due to the limited data in this regard (from the country fiches), there are challenges related to the cost and benefit assessment as well as with the comparability of data across the Member States. In addition, national data providers often do not have a separate budget line for the implementation of the INSPIRE Directive. Further, available estimates and estimates provided by stakeholders are not comparable, e.g. they may include different cost items, they may not rest on the same methodologies and in often, INSPIRE costs have not been clearly separated from other costs. For example, costs of developing national SDIs are often included in the estimates. In order to mitigate this, we have collected and used the available studies on cost and benefits as well as dedicated cost-benefit analysis. In addition, we have collected qualitative data through the interviews, targeted surveys and public consultation.

Representativeness of consultation results: Reaching a representative number of respondents in each targeted survey and each stakeholder group and a balance between Member States proved difficult. In particular, the targeted surveys of the marine and agriculture communities experienced low response rates, and results from the targeted survey of the environmental community did not provide a very comprehensive picture across the EU of how INSPIRE is used for environmental reporting. For further detail please consult the report on the consultation activities in Appendix 4. To collect the opinions of a larger group of stakeholders, the deadlines for replying to the targeted surveys were extended by two weeks and several reminders were sent. The first reminder had a significant impact on the response rate, and additional responses were received during the extension, showing that those measures had at least some impact on the response rate.

In relation to the Focus Group interviews, they generally provided a satisfying range of stakeholders involved in the implementation of the INSPIRE Directive at national level. The selected Member States were free to identify the relevant Focus Group participants, most active in the implementation of the Directive. However, in several Focus Groups, environmental stakeholders (institutions responsible for sectoral environmental policies and therefore sectoral environmental datasets) were not represented, also because these organisations play a limited role in the governance structure in some Member States. As a result, some of these interviews did not

provide much information on the relations between INSPIRE and environmental reporting, on the use of INSPIRE for environmental policy making and the coherence of INSPIRE with the implementation of the Public Access to Environmental Information Directive. Also, several stakeholders participating in the Focus Groups had limited knowledge of the use of INSPIRE data and the user groups. In order to mitigate these challenges, the Focus Groups were given the opportunity to provide written answers from all relevant stakeholders in the national administration and list potential examples of use after the interviews. Furthermore, this evaluation aims to provide a transparent overview of data sources and the basis for the evaluation conclusions, considering all data challenges and limitations, including those identified during the Focus Group interviews.

Difficulty in distinguishing INSPIRE from other spatial data: during the Focus Group interviews, it became apparent that some stakeholders make the distinction between INSPIRE datasets and the data included in the overall national SDI (containing data not covered by the INSPIRE themes and/or data in other than INSPIRE data models), whereas others treat these two domains completely separately. Although the initial idea behind INSPIRE was to build on the national SDI, some Member States have developed two different spatial data infrastructures: one for national use and one for the implementation of the INSPIRE Directive. As a result, it is difficult to assess the effects of the INSPIRE Directive, especially when it comes to costs and benefits. Therefore, this evaluation is attentive to possible different interpretations of interview questions by different stakeholders. The statements provided during the Focus Group are summarized in a transparent and objective manner allowing for clear conclusions whether they concern INSPIRE datasets only or a wider set of national spatial data. This is also the case for the reports and studies included in the analysis and where possible, this has been taken into consideration in the analysis.

5. ANSWERS TO THE EVALUATION QUESTIONS

The support study to the evaluation of the INSPIRE Directive addresses the **current status analysis** and five evaluation criteria: **effectiveness**, **relevance**, **efficiency**, **coherence** and **EU added value.** Each evaluation criterion, including the current status analysis, has been translated into 30 evaluation questions (see **Error! Reference source not found.**) which are answered in the following sub-chapters. The analyses of the evaluating questions build on the desk review and on the results from the stakeholder consultations (i.e. Focus Group interviews, scoping interviews, targeted surveys and public consultation).

5.1. Current status

The current status assessment provides an analysis of the status, at the beginning of 2021, of the implementation of the INSPIRE Directive in the Member States and EEA countries and the effects that this has had on various stakeholders (EQ 1.1). The analysis also includes an assessment of the implementation of the 2016 REFIT recommendations (EQ 1.2). This analysis constitutes the first part of the evaluation and provides input to the evaluation criteria, especially, but not only, relevance, effectiveness, and efficiency.

5.1.1. EQ 1.1 How has the implementation and application of INSPIRE evolved from 2014 to 2020 and how it has affected different stakeholders?

The purpose of the current status analysis is to establish an implementation status of the INSPIRE Directive in each of the 27 Member States and the four EEA/EFTA countries[13]. That analysis is based on the reported information. Additionally, the analysis aims to provide an understanding on how various stakeholders are affected in terms of governance structures, data sharing and usage. The current status assessment are based on a desk review of monitoring data and country fiches. The analysis has been conducted per country. For each country a form was developed by the evaluation team. The country forms describe the status of implementation and identify important developments in the implementation since 2014. All country forms have been validated by the respective National Contact Points.

The key findings are described below. The detailed current status analysis, together with the methodological underpinnings, is provided in Appendix 2. The final versions of country forms are accessible in Appendix 3.

[13] Norway, Liechtenstein, Iceland and Switzerland.

Text box 5-1 ***Key/summary findings EQ 1.1: Current status analysis***

The **desk review** of monitoring data and country fiches over the years show that overall, there has been a partial implementation of the INSPIRE Directive across Europe. Fewer data sets were available in 2020 than in the previous years. In some cases this is a result of the data cleaning processes at national level, aggregating local and regional datasets and deleting for users irrelevant data sets and/or duplicates of data sets. However, a reason for removing data sets may also be that Member States consider this data cleaning process as an opportunity to improve their overall performance indicators.

According to the **qualitative analysis**, the INSPIRE Directive demands different coordination and governance structures, depending on the governance culture and constitutional organisation in the individual Member State. The JRC assessed the Member States' coordination and governance structures in 2016. In a few cases, the governance structure has not changed since then. When it comes to data sharing arrangements, the analysis shows that the public authorities are due to the INSPIRE Directive more aware of data availability and benefits of harmonized spatial data. Although open data strategies and other national initiatives are separate from the INSPIRE processes, they do not conflict with the principles and ambition of the INSPIRE Directive. More details on various impacts on stakeholders are provided in the effectiveness and efficiency analysis (see *Error! Reference source not found.*).

The **quantitative analysis** based on the INSPIRE performance indicators show that the status of the implementation of INSPIRE is heterogeneous across countries, with several countries lagging behind. It is important to consider that the new reporting and monitoring method introduced by Commission Decision (EU) 2019/1372 caused considerable breaks in the trend, lowering the values of INSPIRE indicators in the reference years 2019 and 2020. The new automated approach based on the processing of all metadata harvested from countries' discovery services entails a stricter and more reliable validation method than previous self-declared country assessments. Measured against the INSPIRE roadmap, the **monitoring results in 2020** for the 27 EU Member States and 4 EFTA/ EEA countries are relatively poor.

Summary of the current status of implementation analysis

A snapshot of the current implementation status for 27 Member States and the four EFTA/ EEA countries is provided in the table below. The overview is based on the qualitative indicators and the INSPIRE performance indicators introduced by the Commission Decision in 2019[14]. A detailed overview of the implementation of the INSPIRE Directive from 2014 to 2020 is described in Appendix 2.

Table 5-1 Summary of the current status of the INSPIRE Directive implementation (reference year 2020)

Qualitative analysis	Average performance
Effective coordination	☺
Data sharing arrangements and usage of the infrastructure	☺

[14] Commission Implementing Decision (EU) 2019/1372 of 19 August 2019 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards monitoring and reporting (notified under document C(2019) 6026)

Availability of spatial data sets and services	Total amount
DSi1.1: The number of spatial data sets for which metadata exist	83,805
DSi1.2: The number of spatial data services for which metadata exist	95,381
DSi1.3: The number of spatial data sets for which the metadata contains one or more keywords from a register provided by the Commission indicating that the spatial data set is used for reporting under the environmental legislation	2,068
DSi1.4: The number of spatial data sets for which the metadata contains a keyword from a register provided by the Commission indicating that the spatial data set covers regional territory	12,917
DSi1.5: The number of spatial data sets for which the metadata contains a keyword from a register provided by the Commission indicating that the spatial data set covers the national territory	4,456
Quantitative analysis	**Average performance**
MDi1.1: Percentage of metadata for spatial data sets conformant with Commission Regulation (EC) No 1205/2008 as regards metadata	59%
MDi1.2: Percentage of metadata for spatial data services conformant with Commission Regulation (EC) No 1205/2008 as regards metadata	55%
DSi2: Percentage of spatial data sets that are in conformity with Commission Regulation (EU) No 1089/2010 as regards interoperability of spatial data sets	50%
DSi2.1: Percentage of spatial data sets, corresponding to the themes listed in Annex I, that are in conformity with Commission Regulation (EU) No 1089/2010 as regards interoperability of spatial data sets	65%
DSi2.2: Percentage of spatial data sets, corresponding to the themes listed in Annex II, that are in conformity with Commission Regulation (EU) No 1089/2010 as regards interoperability of spatial data sets	52%
DSi2.3: Percentage of spatial data sets, corresponding to the themes listed in Annex III, that are in conformity with Commission Regulation (EU) No 1089/2010 as regards interoperability of spatial data sets	50%
NSi2: The percentage of spatial data sets that are accessible through view and download services	42%
NSi2.1: The percentage of spatial data sets that are accessible through view services	50%
NSi2.2: The percentage of spatial data sets that are accessible through download services	50%
NSi4: The percentage of the network services that are in conformity with Commission Regulation (EC) No 976/2009 as regards the network services	63%
NSi4.1: The percentage of the discovery services that are in conformity with Commission Regulation (EC) No 976/2009 as regards the network services	65%
NSi4.2: The percentage of the view services that are in conformity with Commission Regulation (EC) No 976/2009 as regards the network services	65%
NSi4.3: The percentage of the download services that are in conformity with Commission Regulation (EC) No 976/2009 as regards the network services	62%
NSi4.4: The percentage of the transformation services that are in conformity with Commission Regulation (EC) No 976/2009 as regards the network services	25%

Source: Country forms 2021.

5.1.2. EQ 1.2 To what extent has the recommendations from the 2016 INSPIRE REFIT been implemented?

This assessment considers the extent to which the recommendations from the REFIT evaluation have been implemented by the Member States and the European Commission. The assessment is primarily based on the desk review; however, the Focus Group interviews, scoping interviews and targeted surveys also served as an important tool for validation of the results stemming from the desk research.

Text box 5-2 ***Key/summary findings EQ 1.2: Implementation of recommendations from the 2016 REFIT of INSPIRE Directive***

The results from the **desk review** and the **Focus Group interviews** reveal that the recommendations put forward in the REFIT evaluation in 2017 for the Member States have to some extent been implemented. The Member States increased the overall availability of environmental priority data sets according to one of the REFIT recommendations. In terms of coordination between the national INSPIRE implementation and eGovernment, open data and other relevant processes at national level, there are limited linkages in terms logistical work and cooperation. Nevertheless, it is mostly considered that these initiatives are not contradicting the main principles of the INSPIRE Directive, and that in some cases, the national data policies benefit from its implementation by facilitating an environment of free and open data.

The **desk review** and **scoping interviews** show that the recommendations addressed to the European Commission have been to a large extent implemented. The European Commission has put forward several initiatives and actions summarized in the MIG Work Programme. In particular, these initiatives among other include the evaluation study on data sharing between public authorities and public access and use provisions; proposal for a regulation streamlining reporting obligations in the field of environmental policy; new monitoring and reporting decision; list of common datasets related to environmental reporting obligations; technical cooperation and coordination.

The results from the **targeted surveys** confirm that the environmental data sets were given priority however they also showed mixed results. While 36% of respondents indicated that the environmental spatial data have been given priority by Member States to a large extent since 2016, almost 40% considered that this was the case to a small extent only.

Desk review

The 2016 REFIT evaluation showed that greater effort at all levels by all actors is needed.[15] The overall recommendation included in the REFIT was that Member States needed to step up their efforts in implementing the INSPIRE Directive and to critically review the effectiveness of their data policies. This was in particular the case for a number of Member States that were lacking behind in terms of implementation.

The REFIT recommendations were directed to both the Member States and to the European Commission. The European Commission proposed several actions for the Member States and at EU level. These actions were translated into a multi-annual Maintenance and Implementation Work Programme (MIWP) for 2016-2020.[16] The table below outlines the recommendations provided in the REFIT and includes a short

[15] European Commission (2016), Report from the Commission to the Council and the European Parliament on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23 (COM/2016/0478 final/2).

[16] Maintenance and Implementation Work Programme for the INSPIRE Directive for the period from 2017-2020 (MIWP 2017), endorsed at the 5th MIG meeting on 30/11-1/12/2016. Available at: https://webgate.ec.europa.eu/fpfis/wikis/display/InspireMIG/MIWP+2016-2020?preview=/272860396/300878064/miwp-2017-3.0.pdf#MIWP2016-2020-MIWP2014-2016

description of corresponding actions and initiatives that were designed to implement the recommendations.

Table 5-2 REFIT recommendations, corresponding actions and their implementation

REFIT recommendation	Action	Status of the recommendation implementation[17]
Member States, in consultation with the European Commission, are recommended to:		
1) give priority to environmental spatial datasets, in particular those linked to monitoring and reporting, and those identified in relevant global processes	• Increased number of spatial datasets for eReporting: the priority datasets	• The number of environmental priority datasets in the INSPIRE catalogue made accessible by Member States is gradually increasing.
2) improve coordination between the national INSPIRE implementation and eGovernment, open data and other relevant processes at national level.	• Facilitating the Open Data initiative (and other relevant processes at national level) on the political agenda	• Member States implementing the INSPIRE Directive in some cases benefit from the implementation by facilitating an environment of free and open data, however, often these national initiatives are separate from the INSPIRE Directive implementation.
To complement national efforts, the European Commission will:		
A. evaluate the shortcomings of the national data policies in relation to Article 17 of the Directive in more detail and explore synergies with the 'free flow of data' initiative under the Digital Single Market with the view to resolving these issues through that;	• The Commission launched a study for the 'Evaluation and assessment of INSPIRE Directive 2007/2/EC data sharing between public authorities and public access and use provisions'.	• An evaluation study on data sharing between public authorities and public access and use provisions was published, which showed that additional efforts are needed to further harmonise data policies and licenses for data reuse across Europe.[18]
B. review, and possibly revise, the INSPIRE rules, in particular on spatial data harmonisation, to take into account the implementing risks and complexities with a view to reducing them (simplifying requirements);	• Monitoring and reporting has been aligned and streamlined by simplifying the legal provisions and amending the related Implementing Decision to make it more meaningful and effective.	• Fitness Check evaluation on reporting and monitoring of EU environment policy concluded that there is an alignment potential on some cross-cutting matters and for certain legislation pieces. As a follow up to these evaluation findings, the European Commission put forward in May 2018 a proposal for a regulation streamlining reporting obligations in the field of environmental policy.[19]

[17] Based on the current status analysis and the following report: DG Environment, Infrastructure for Spatial Information (INSPIRE), REFIT recommendations follow up - Overall State of Play.

[18] COWI, Epsilon, Alterra - Wageningen UR (2018), Evaluation and assessment of INSPIRE Directive 2007/2/EC data sharing between public authorities and public access and use provisions – Final Task 1 Report.

[19] The European Parliament adopted the text in plenary in March 2019, and the Council did so in May. The final act entered into force in June 2019: Regulation (EU) 2019/1010 on the alignment of reporting obligations in the field of legislation related to the environment.

REFIT recommendation	Action	Status of the recommendation implementation[17]
C. assist the Member States in applying and implementing the INSPIRE Directive (simplification of use), e.g. by the use of common tools, and promote priority setting together with the Member States.	• The Commission has selected monitoring and reporting under the environmental acquis as a priority use case for the development of a first set of pan-European information products. Based on the evaluation of reporting obligations under the environmental legislation, a preliminary list of common datasets that the Member States are obliged to report under the EU environment acquis was prepared by the Commission in collaboration with the Member States.	• Monitoring and reporting under the environmental acquis has been selected as a priority use case for the development of a first set of pan-European information products. A preliminary list of common datasets related to environmental reporting obligations was prepared by the European Commission in collaboration with the Member States. The number of priority data sets has been slowly, but gradually increasing.
D. work closely with Member States to explore opportunities arising from the use of existing EU-level funding programmes to help capacity building and close the INSPIRE implementation gaps (e.g. through the Interoperability Solutions Administrations).	• The Commission is facilitating the exchange of best practices and support the INSPIRE Conferences. • The Commission is seeking links with the ISA action: European Location Interoperability Solutions for eGovernment (ELISE). • Other actions in the context of the Digital Single Market will also contribute to implementing the INSPIRE Directive (e.g. the eGovernment Action Plan and the European Interoperability Framework).	• The European Commission has been assisting the Member States through capacity building and (technical) cooperation and coordination (MIG, the Interoperability Solutions Administrations, etc.). In addition, initiatives in the context of the Digital Single Market and other actions are also expected to contribute to the implementation of the INSPIRE Directive.

The actions put forward in the Maintenance and Implementation Work Programme for 2017-2020 have been continuously monitored and several actions have been completed over the period. Some of the actions require continuous work and have been transferred into the new Maintenance and Implementation Work Programme (WP) for 2021-2024.[20] This programme was endorsed in November 2020 and has three main area of work: 1) digital ecosystem for the environment and sustainability, 2) Towards a common implementation landing zone, 3) GreenData4All.

The table below describes the transfer of actions included in the MIWP 2016-2020 to the WP 2020-2024. Actions from the MIWP 2016-2020 that will be further pursued will be included in Area of Work 2, either under action 2.2: Roadmap for priority-driven implementation or action 2.4: Central INSPIRE infrastructure opponents.

Table 5-3 Transition of actions from the MIWP 2016-2020 to the WP 2020-2024

ID and title of an action	Status in the MIWP 2016-2020	Status in the WP 2020-2024
2016.1 INSPIRE fitness for purpose – Analysis	• Completed in June 2020	
2016.2 Streamlining the monitoring and reporting for 2019	• Completed in 2017 (phase 1); follow-up carried out under a new action 2018.1	
2016.3 Validation and conformity testing	• Completed in 2017; follow-up to be carried out under action 2017.4	
2016.4 Theme specific issues of data specifications & exchange of implementation experiences in thematic domains	• Ongoing	• included in Annex 1 under Area of Work 2 as part of action 2.4
2016.5 Priority list of data sets for eReporting	• Ongoing	• included in Annex 1 under Area of Work 2 as part of action 2.4
2017.1 Drafting of "Master Guidelines" for the INSPIRE Directive	• On hold	• Removed from WP.
2017.2 Alternative encodings for INSPIRE data	• Completed in March 2020	
2017.3 Improved client support for INSPIRE data	• Completed in March 2020	
2017.4 Validation and conformity testing	• Completed in March 2020	
2018.1 Streamlining the monitoring and reporting for 2019 (phase 2)	• Ongoing. Proposal to close. (Completed in March 2020)	• A new action for the further maintenance and development of the system to be introduced.
2019.2 Improving accessibility of data sets through network services	• Ongoing	• Included in Annex 1 under Area of Work 2 as part of action 2.2

[20] Maintenance and Implementation Work Programme for the INSPIRE Directive for the period from 2021-2024: "Towards a Common European Green Deal data space for environment and sustainability", endorsed at the 12th MIG meeting on 26-27 November 2020. Available at: https://webgate.ec.europa.eu/fpfis/wikis/display/InspireMIG/INSPIRE+work+programme+2021-24

2020.1 OAPIF – OGC API Features encoding good practice	• Ongoing	• Included in Annex 1 under Area of Work 2 as part of action 2.2

Source: Based on the Maintenance and Implementation Work Programme for the INSPIRE Directive for the period from 2021-2024: "Towards a Common European Green Deal data space for environment and sustainability", endorsed at the 12th MIG meeting on 26-27 November 2020.

Consultation activities

Scoping interviews

DG ENV and the EEA confirmed that considerable efforts were made to address the REFIT recommendations. In a scoping interview, the EEA provided a detailed assessment of the technical aspects related to the monitoring and reporting and to the progress related to Action 2016.5 'Priority list of data sets for eReporting'.

In relation to recommendation A related to Article 17, the EEA suggested that it is important to continue to make certain requirements lighter and less technical. The Member States are regarded as less proactive because they do not always appreciate the direct benefits of many INSPIRE steps. As further elaborated in the effectiveness analysis, the Member States cannot always use the INSPIRE infrastructure at a national level because it is difficult to navigate through relatively complex INSPIRE data models and use the INSPIRE formats.

In terms of the REFIT recommendation B regarding the need to simplify and streamline monitoring and reporting, the EEA explained that the European Commission has tried to improve the inclusion of the INSPIRE reference into the environmental legislation. In some cases, an alignment of data models of reporting data sets with INSPIRE data models was achieved, e.g. when it comes to protected sites, national designated areas, EU registry of industrial facilities, and water legislation. As further elaborated in the EQ 2.6, INSPIRE is however not always best suited for reporting requirements under thematic legislation, which are very precisely defined and are subject to continuous modifications.

When it comes to the REFIT recommendation C to assist Member States by priority setting, the scoping interview with EEA also confirmed the finding that there has been a substantial increase of environmental data sets being available and discoverable (mostly part of Annex III of the Directive). The Member States have mostly focused on topographical data. However, it is an uneven progress and several countries are still lagging behind.

Focus Group interviews

In terms of coordination structures and synergies between INSPIRE and open data policies, the situation varies between Member States. Several Focus Group participants revealed that there is no direct formal coordination between the implementation of INSPIRE Directive and national eGovernment/ Open Data policies. However, some participants pointed to good informal relations. One Focus Group participant suggested that in their country, there has been no synergy with INSPIRE or any other initiatives. In the participant's view, INSPIRE might even be perceived as a risk to their national success on open data in terms of the ease by which one can create open data, a much higher consumption rate of open data compared to the INSPIRE data, and the general engagement of data providers working with the open data.

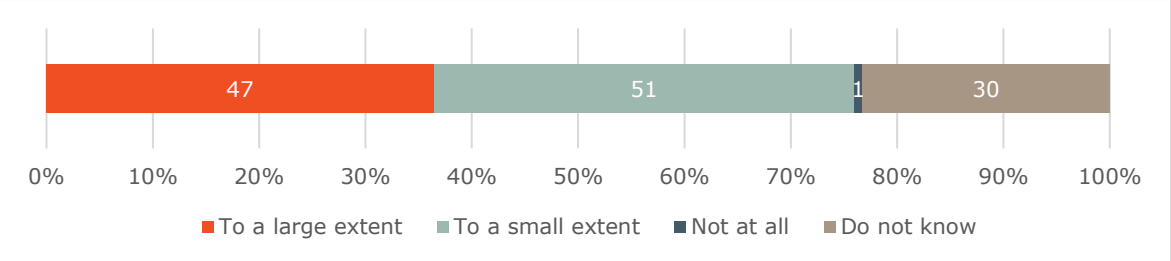
Other Member States provided different examples of a beneficial cooperation between the two areas, including e.g. the establishment of a national agency responsible for the national catalogue of geospatial data and the national catalogue for open data; the

usage of the same infrastructure for open data initiatives and the INSPIRE implementation; a creation of an e-Government agency, which is responsible for the implementation of the Directive. One Focus Group participant suggested that it is still early to discuss the synergies because the implementation of other initiatives and directives is still ongoing. However, in this respondent's view, the implementation of INSPIRE is in all cases beneficial because it makes data and metadata available and accessible.

Targeted surveys

The results from the targeted surveys showed that the environmental spatial data sets have been given priority by Member States since 2016, as recommended by the European Commission. However, the results were mixed in terms of the magnitude of this development. Around one third of respondents (47 respondents out of 129, 36%) stated that environmental spatial data have been given priority to a large extent by Member States since 2016, while a bigger majority (51 respondents out of 129, 40%) considered this to be the case to a small extent. Only one respondent had the opinion that priority had not been given at all to this type of data sets.

Figure 5-1 Extent to which environmental spatial data has been given priority by Member States since 2016 (N=129)



Source: All respondents, Targeted surveys (combined) April-May 2021, Question 7: In your opinion, to what extent have environmental spatial data been given priority by Member States since 2016, as recommended by the Commission?

Public consultation

This question was not addressed in the Public consultation and no comments were made by respondents on this issue.

5.2. Effectiveness

The effectiveness assessment includes an analysis of how the results achieved so far through the implementation of the INSPIRE Directive, correspond to the objectives initially set. The INSPIRE Directive's objectives primarily relate to the setting up of an infrastructure for spatial information (Article 1) based on the following specific objectives, as presented in the updated Directive intervention logic[21] (see section 2.2):

- Building upon infrastructures for spatial information established and operated by the Member States following common implementing rules;
- Spatial datasets are stored, made available and maintained at the most appropriate level;
- It is easy to discover spatial data to evaluate their suitability for the purpose and to know the condition applicable to their use;
- It is possible to combine spatial data from different sources across the Community in a consistent way and share them between several users and applications
- It is possible for spatial data collected at one level of public authority to be shared between other public authorities;
- Spatial data are made available under conditions which do not unduly restrict their extensive use.

The following evaluation questions seek to verify the extent to which these objectives have been met. The evaluation questions can be divided into two groups.

The first group of questions, EQ 2.1 to EQ 2.4, systematically address implementation progress of implementation of the Directive. The four evaluation questions consider the progress achieved; whether progress is in line with the INSPIRE implementation roadmap (see Figure 2-1); and whether the geographical coverage of implementation is in line with the INSPIRE Directive's requirements. A subsequent evaluation question, EQ 2.5, is concerned with the understanding of barriers and facilitators of the Directive implementation.

The second set of questions relates to the effects of the Directive implementation on the users of the infrastructure, data sets and related services. EQ 2.6 explicitly seeks to measure whether and how INSPIRE has been used in the mandatory reporting on the environmental acquis. EQ 2.7 considers the effects on policy makers in the field of environment in the Member States. EQ 2.8 further expands the scope of investigation about the effects of the INSPIRE Directive by means of considering its contributions in economic sectors influencing the environment such as the maritime domain, agriculture, transport and mobility. EQ 2.9 assesses the effects of the Directive on small businesses active in the economic sector and using spatial data.

[21] The updated intervention logic was prepared as part of this evaluation.

5.2.1. EQ 2.1 What progress has been made over time towards achieving the objectives and targets set out in INSPIRE in various Member States?

EQ 2.1 assesses the progress and the state of play, as of 2020, of the achievement of the INSPIRE Directive objectives in different Member States. The analysis aims to provide evidence on the extent to which infrastructures for spatial information have been set up and whether spatial data is made available according to the Directive's requirements and its implementation plan.

The following text is mainly based on the desk review of the monitoring data, performed in the current status analysis (see EQ 1.1, Appendix 2). As was previously noted in the current status analysis, the calculation of the monitoring indicators changed in 2019 with the adoption of Commission Decision (EU) 2019/1372. As a result, a strict comparison between the period pre- and post-2019 cannot be made. Therefore, it is difficult to assess the progress made over time based on the monitoring indicators. The analysis is further supported by the evidence collected during the scoping interviews.

Text box 5-3 Key/summary findings EQ 2.1: INSPIRE implementation progresses in Member States

The main finding is that there has been a progress towards achieving the objectives set out in the INSPIRE Directive, even though a full implementation has not been yet achieved. When interpreting the results, it is important to consider that the monitoring system based on the INSPIRE performance indicators does not fully account for the progress made due to the limited scope of the indicators and due to the drastic changes in the calculation method introduced in 2019.

Based on the **desk review**, there is some evidence of progress in the implementation since 2016, including when it comes to governance aspects of the INSPIRE framework and data sharing. The **scoping interviews** pointed that the monitoring data currently available could not give a complete overview of the implementation progress. In particular, improvements in the functioning of governance systems and coordination structures had not properly been reflected in the INSPIRE implementation reporting and monitoring system.

Desk review

In 2017, the JRC report on the implementation of the INSPIRE Directive indicated that '*the state of implementation still shows different levels of maturity across Member States*'.[22] The current status analysis based on the quantitative and qualitative analysis shows a similar picture (see EQ 1.1. and Appendix 2).

The quantitative analysis for the present evaluation is based on the 2020 monitoring data. Although the change in the monitoring system introduced in 2019 renders it impossible to exactly compare the progress for each Member State over the years, the main following conclusions can be drawn from the latest monitoring data for the EU Member States and EFTA/EEA countries:

[22] Cetl V., V. Nunes de Lima, R. Tomas, M. Lutz, J. D'Eugenio, A. Nagy, J. Robbrecht (2017), Summary Report on Status of implementation of the INSPIRE Directive in EU.

- There is no single country that has yet achieved full implementation according to the implementation roadmap.
- On average, in 2020, 42% of datasets were available through both view and download services (NSi2), 50% were viewable (NSi2.1) and 50% were downloadable (NSi2.2). This means that around half of available data sets were not yet accessible across the EU Member States and EEA/EFTA countries.
- The analysis also shows low conformity of metadata. Although the values of indicators MDi1.1 and MDi1.2 are very different across countries, the average values of 59% and 55% of conformant metadata for spatial data sets and spatial data services, respectively, are very low and suggest that data providers have not extensively used the INSPIRE Reference Validator before the monitoring and reporting process.
- Conformity of spatial data sets is also very heterogeneous and low on average, with some countries providing very few interoperable data sets. Overall, 50% of all listed data sets are in conformity with Commission Regulation (EU) No 1089/2010 as regards interoperability of spatial data sets (DSi2). The interpretation of the results must, however, take into consideration that these indicators will in many cases never reach 100%, since majority of countries provide their national data sets (as-is data) in addition to the INSPIRE harmonised data sets.
- The conformity of network services has quite improved since 2019, and at least in half of the countries it is relatively high.[23] On the other hand, several countries still offer only a few interoperable network services and most of the countries do not offer transformation services. The overall average percentage of conformant network services (NSi4) amounted to 63%.

The analysis also shows that the Member States implement the Directive with different speeds and levels of engagement. The heterogeneity of the implementation progress is reflected in the four implementation groups of countries (Member States and EFTA/EEA countries) that were identified based on the current status analysis (see Appendix 2).

Table 5-4 summarizes the number of countries falling under different implementation groups, in 2016 and 2020, for each implementation category: conformity of metadata, conformity of spatial datasets, accessibility of spatial datasets through view and download services, conformity of network services. Depending on the performance results, the countries have been divided into four implementation groups, from Group I (top implementation) to Group IV (lowest level of implementation).

One has to be cautious with drawing strict conclusions from this analysis, as the data cannot be directly compared across the years due to the changes in the reporting and monitoring system introduced in 2019. Furthermore, this analysis is limited to the official performance indicators and does not reflect other relevant qualitative indicators. Therefore, the results of the analysis can only be used to show a rough indication of the implementation progress. In all categories, except the conformity of metadata, the number of countries in the highest performance implementation group (i.e. Group I) increased in 2020 compared to the 2016 data, suggesting a positive progress towards achieving the objectives of the INSPIRE Directive.

[23] The performance results are higher because the conformity of transformation services is excluded from the analysis due to the fact that Member States have so far offered a limited amount of transformation services.

Table 5-4 Number of countries falling under the four implementation groups based on their INSPIRE performance indicators' results in four implementation categories

	Conformity of metadata		Conformity of spatial data sets		Accessibility of spatial datasets through view and download services		Conformity of network services	
	2016	2020	2016	2020	2016	2020	2016	2020
Group I: 80-100%	20	11	0	6	4	6	8	15
Group II: 55-79%	5	5	2	11	7	8	4	3
Group III: 30-54%	1	6	7	4	8	6	6	3
Group IV: 0-29%	1	5	18	6	8	7	9	6
Total number of Member States	27	27	27	27	27	27	27	27

Source: Country forms.

When considering the self-declared results based on qualitative indicators measuring the progress in terms of coordination structures, data sharing arrangements and usage of the infrastructure, there has been certain progress recorded for some Member States (see **Table 5-5** below). More countries recorded an improvement in terms of data sharing arrangements and usage of the infrastructure than effective coordination structures. No concrete progress in establishing effective governance structures, data sharing arrangements and usage of the infrastructure was recorded in a handful of Member States.

The analysis indicates an overall positive trend; however, several Member States still need to step up their implementation efforts. It is important to consider that this qualitative analysis is based on Member State's self-assessments and is not supported by strict criteria or validation methods.

Table 5-5 Synthesis of the implementation status in 2020 across the Member States regarding coordination structures, data sharing arrangements and usage of the infrastructure compared to the reference year 2016

Number of Member States	Effective coordination	Data sharing arrangements and usage of the infrastructure
Improvement of the implementation status	3	8
No improvement of the implementation status	6	5
Status quo: Implementation of this provision is well advanced or (nearly) completed. Outstanding issues are minor and can be addressed easily.	18	14

Total[24]	27	27

Source: Country forms.

Consultation activities

Scoping interviews

In the scoping interview, the JRC explained that even if none of the Member States has fully achieved conformity requirements, there have been some positive developments when it comes to governance structures in the Member States (see EQ 2.2). For example, one specific Member State that did not perform well in the monitoring indicators was exemplary in the implementation thanks to a very well developed organisational set up. The JRC confirmed that the monitoring data is not providing a full picture about the achievements of the objectives set in the Directive.

5.2.2. EQ 2.2 Is the progress made in line with the initial expectations and the INSPIRE implementation roadmap?

EQ 2.2 assesses the extent to which the current achievements of the Member States in implementing the Directive matches the initial expectations set out in the INSPIRE implementation roadmap (see ***Figure 2-1***). The analysis in this question aims to identify the implementation gaps that need to be filled. The limitations in the analysis are that the level of implementation varies a lot from Member State to Member State.

The following assessment is mainly based on the current status analysis and INSPIRE performance indicators that allow for a global estimate of the state of play in the implementation. The Focus Group interviews complemented the analysis by addressing the specific topics related to governance structures and coordination for implementation. The interviews, however, did not provide strong evidence for this evaluation question.

[24] As the coordination structures and data sharing arrangements were not assessed for the EEA/ EFTA countries in 2016, the progress assessment for the relevant countries (NO, LI, CH, IS) is not possible and is excluded in this analysis.

Text box 5-4 Key/summary findings EQ 2.2: Implementation gaps

There are still gaps in the implementation of the Directive as none of the Member States fully achieved it. As of 2021, most of the implementation deadlines according to the INSPIRE implementation roadmap are in the past. The level of implementation is uneven across the European Union, with many Member States lagging behind.

The results from the **desk review** revealed the implementation gaps and a significant heterogeneity in terms of implementation across the Member States.

The **Focus Groups interviews** addressed the challenges related to governance structures and coordination of implementation. The situation varies a lot from one Member State to another because institutional and political set ups are different (federal vs. centralised State, larger vs. smaller Member States, etc.). There is no pattern emerging from the analysis about which would be the best type of governance set up to achieve full implementation of the Directive.

The respondents to the **targeted surveys** mostly believed that the progress made so far as regards the provision of INSPIRE-compliant data services is not in line with the initial expectations and the INSPIRE implementation roadmap.

Desk review

It has proven difficult to give a clear-cut answer on the implementation gaps as a whole due to the fact that the implementation is very heterogeneous in different Member States. The assessment of the implementation progress is based on the current status forms (see Appendix 2).

A detailed overview of the INSPIRE implementation milestones is provided in the INSPIRE roadmap (see ***Figure 2-1***). The major implementations steps of the INSPIRE Directive implementation are the following:[25]

(1) set up coordination structures and adopt and implement legal measures to remove procedural obstacles to the sharing of spatial data;

(2) identify their spatial data relevant to environmental policies and policies and actions with an environmental impact according to themes listed in the annexes of the Directive;

(3) document the spatial data so that they can be accessed on the internet together with information on aspects such as their source, geographical coverage, quality and conditions of use, in line with the metadata specifications;

(4) implement interoperable online services allowing the discovery, visualisation and download of spatial data;

[25] European Commission (2016), Report from the Commission to the Council and the European Parliament on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23 (COM/2016/0478 final/2).

(5) gradually organise and publish the spatial data according to common data models for greater interoperability and improved productivity.

The analysis of the current status is less useful to assess the progresses made in terms of governance and coordination (Step 1). This is mainly due to the fact that the information given about governance has not been updated by all Member States and EFTA/EEA countries since the last reporting round. Therefore, the Focus Group interviews were used to fill these gaps.

The assessment of the implementation progress as regards the steps 2, 3, 4 and 5 is covered in the analysis of the current status (See Appendix 2). The current status analysis identifies four implementation groups of countries based on the INSPIRE indicator results in 2020, from the least to the best performing.

- When it comes to the availability of spatial data sets and services, the progress cannot be measured as no quantitative objectives have been set for this indicator. The results of the desk review showed that Member States do not have the same number of data sets and services at national or regional level (see EQ 2.3). Furthermore, several Member States reduced the number of spatial data sets in the recent years, for example, by combining several local and regional data sets into national ones. Thus, the total number of data sets and services available cannot be considered as an evidence on implementation maturity.
- The progress can however be more effectively measured for other INSPIRE indicators, expressed in percentages (see Appendix 2). The main finding when comparing the current state of play and the initial implementation roadmap is that implementation for all Member States is still lagging behind the initial implementation schedule (see the table below). As can be observed, most of the actions in the plan should have been achieved by the end of 2020, however, the monitoring data shows that this has not been the case in the Member States (see EQ 2.1). EQ 2.5 explores the barriers to the full implementation.

Table 5-6 INSPIRE Directive articles and milestones for implementation

ARTICLE	Milestone Date	DESCRIPTION
21§1 21§2	15/05/2010	Implementation of provisions for Monitoring and Reporting
6(a)	03/12/2010	Metadata available for spatial data sets and services corresponding to Annex I and II
15	30/06/2011	The EC establishes and runs a geo-portal at Community level
17(8)	19/10/2011	Implementation of Regulation as regards the access to spatial data sets and services of the Member States by Community institutions and bodies under harmonised conditions for new arrangements
16	09/11/2011	Discovery and view services operational
7§3, 9(a)	23/11/2012	Implementation of Commission Regulation (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services for Newly collected and extensively restructured Annex Ispatial data sets
16	28/12/2012	Download services operational

16	28/12/2012	Spatial data sets shall be available for download and transformation (whenever applicable) from the INSPIE Geo-portal (data does not yet need to be conformant with the COMMISSION REGULATION (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services)
7§3, 9(a)	04/02/2013	Implementation of Commission Regulation (EU) No 102/2011 of 4 February 2011 amending Regulation (EU) No 1089/2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services for newly collected and extensively restructured Annex I spatial data sets
17(8)	19/10/2013	Implementation of Regulation as regards the access to spatial data sets and services of the Member States by Community institutions and bodies under harmonised conditions for existing arrangements
6(b)	03/12/2013	Metadata available for spatial data sets and services corresponding to Annex III
7§3, 9(b)	21/10/2015	Newly collected and extensively restructured Annex II and III spatial data sets available
-	10/12/2015	All invocable spatial data services shall be conformant to Annex V of Commission Regulation (EU) No 1089/2010 as amended by Regulation (EU) No 1312/2014 of 10 December 2014 (...) as regards interoperability of spatial data services
-	10/12/2016	Invocable spatial data services related to newly collected and extensively restructured spatial data sets shall be conformant with Annex VI and, where practicable, Annex VII of Commission Regulation (EU) No 1089/2010as amended by Regulation (EU) No 1312/2014 of 10 December 2014 as regards interoperability of spatial data services
7§3, 9(a)	23/11/2017	Implementation of Commission Regulation (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services for other Annex I spatial data sets still in use at the date of adoption
7§3, 9(a)	04/02/2018	Implementation of Commission Regulation (EU) No 102/2011 of 4 February 2011 amending Regulation (EU) No 1089/2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services for other Annex I spatial data sets still in use at the date of adoption
7§3, 9(b)	21/10/2020	Other Annex II and III spatial data sets available in accordance with IRs for Annex II and III
-	10 /12/2021	All invocable spatial data services shall be conformant with Annexes VI and (where practicable) VII of Commission Regulation (EU) No 1089/2010 as amended by Regulation (EU) No 1312/2014 of 10 December 2014 (...) as regards interoperability of spatial data services

Source: European Commission (n.d.), INSPIRE roadmap.

Consultation activities

Focus Groups interviews

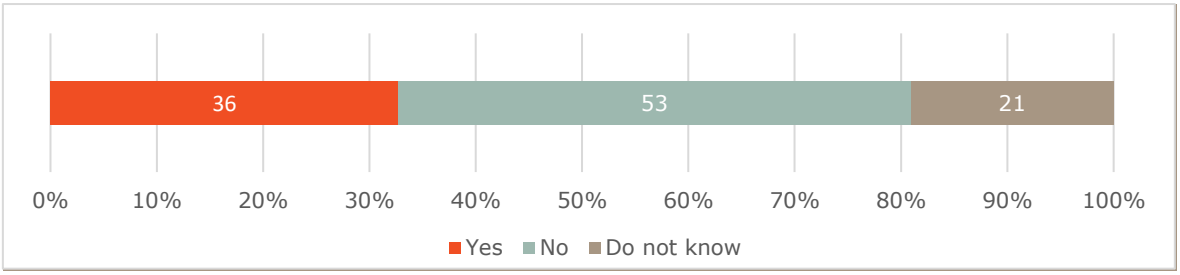
The Focus Group interviews allowed to obtain information on the first step of the implementation roadmap (governance and coordination structures). They provided examples of the heterogeneity in the type of governance and coordination structures established at the national level. The institutional set ups for the implementation of INSPIRE varies in terms of sectors involved (environment, landplaning, agriculture, data etc.) as well as level of public authorities involved (national, federal, regional etc.). Each Member State has tried to fulfil the INSPIRE Directive requirements based on their national context. In this context, it is difficult to assess the extent to which progress was made in terms of governance and coordination compared to the initial expectations. It is also impossible to judge on the level of effectiveness of one governance structure compared to another.

It shall be noted that participants in two Focus Groups reported that INSPIRE was a driver for more effective governance structures and coordination between regional and federal authorities. One participant reported that in their country '*there are five different models of cadastre. The implementation of the INSPIRE Directive enables them to be coordinated and to offer the same products and services even if they use a different implementation of cadastre across the territories. This is very beneficial for users and citizens who don't have a global vision of the cadastre (in the country)*'.

Targeted surveys

In the targeted surveys, respondents were asked to indicate whether they considered that the progress made so far in the provision of INSPIRE compliant data services is in line with the initial expectations and the INSPIRE implementation roadmap. 48% of respondents (53 out of 110 respondents) considered that the progress made so far is not in line with the initial expectations and the INSPIRE implementation roadmap. 33% believed the opposite. The rest (21%) of the respondents could not provide an answer.

Figure 5-2 Provision of INSPIRE compliant data services in comparison with initial expectations and INSPIRE implementation roadmap (N=110)



Source: All respondents, Targeted surveys (combined) April-May 2021, Question 6: Do you consider that the progress made so far in the provision of INSPIRE compliant data services is in line with the initial expectations and the INSPIRE implementation roadmap?

5.2.3. EQ 2.3 Is the geographical coverage of implementation consistent with the Directive's objectives?

EQ 2.3 assesses the extent to which the geographical coverage of the implementation of the INSPIRE Directive is consistent with the Directive's objectives. Article 4 paragraph 1 indicates that '/…/ *Directive shall cover spatial data sets which /…/ relate to an area where a Member State has and/or exercises jurisdictional rights'*. Article 4 paragraph 4 of the INSPIRE Directive indicates that '/…/ *this Directive shall cover spatial data sets held by or on behalf of a public authority operating at the lowest level of government within a Member State only if the Member State has laws or regulations requiring their collection or dissemination*'. National as well as regional/ local spatial datasets are thus all required to be covered by the Directive. The investigation in the evaluation did not include the assessment of requirements for local/ regional spatial datasets (article 4 paragraph 4) because this information is not available on the INSPIRE geoportal. A separate analysis would be required for this purpose, reviewing the requirements for data sets individually.

The analysis conducted with regards the Directive's geographical coverage has therefore tried to focus on the geographical coverage for the purpose of achieving the objective of interoperability. Interoperability of national SDIs becomes effective when users can find similar harmonised and 'made interoperable' spatial datasets other different Member States. The level of the geographical coverage is used as a proxy for assessing the level of harmonisation and homogeneity of the datasets. Behind the

analysis, there is the assumption, confirmed by the investigation, that datasets within the INSPIRE framework are heterogeneous, in particular regional datasets. As the Directive does not require a collection of new data, it is assumed that regional (and national) data have been created to meet specific regional authorities' needs, which vary from one region to another, and to a lesser extent, from one Member State to another. If the number of datasets is significantly different from one country or one region to another, it can be assumed that it is less likely that a large part of the data contained in the INSPIRE geoportal is interoperable.

Therefore, the investigation focused on i) assessing the overall level of the geographical coverage in terms of the number of datasets available on the INSPIRE geoportal for countries and regions ii) collecting views on the geographical coverage of the INSPIRE framework in the light of harmonisation and interoperability of spatial data sets through scoping interviews and the Focus Groups interviews.

Text box 5-5 Key/summary findings EQ 2.1: geographical implementation

Any conclusions in terms of the geographical coverage of the implementation of the INSPIRE Directive are difficult to draw as the datasets could not be verified individually in the framework of this evaluation. When considering the interoperability requirements stemming from the INSPIRE Directive, the current geographical coverage is not deemed optimal as there are huge discrepancies in the number of datasets across Member States, used as a proxy to assess the level of harmonisation and homogeneity of data sets required for interoperability.

The results from the **desk review** showed that the geographical coverage is uneven across the Member States. The number and geographical scope of datasets are very different from one Member State to the other.

In addition to the heterogeneity in terms of numbers, the **scoping interview** confirmed that there is an overall issue with the heterogeneity of INSPIRE data sets in terms of content but also technical standards, which limits the added value of the INSPIRE Directive.

The results from the **Focus Group interviews** also confirmed that the geographical coverage of the INSPIRE Directive was a challenge for the Member States since the data at national and regional level were heterogeneous and needed to be harmonised as part of the INSPIRE Directive implementation.

Desk review

The desk review consisted in collecting and analysing the number of metadata records, downloadable datasets and viewable datasets available on the INSPIRE Geoportal at national level and regional level, and their geographical distribution.

The first finding, as illustrated in ***Table 5-7*****Error! Reference source not found.**, is that the Member States offer a varying amount of INSPIRE-relevant datasets. For instance, While Germany or Italy (and France in the past) have offered several thousands of datasets, some other Member States has only made less than 100 datasets available. France reduced drastically the number of datasets available in the recent years. In 2016, France offered 29,700 spatial datasets for which metadata existed and has reduced the number to 214 data sets in 2020.

Table 5-7 **INSPIRE geoportal data set statistics: number of data sets available**

Number of Member States Number of datasets available	Meta data records	Downloadable data Sets	Viewable Data Sets
below 100	5	15	17
between 100 and 299	14	7	5
between 300 and 699	6	4	4
above 10,000	2	1	1
TOTAL	**27**	**27**	**27**

Source: Based on the data from INSPIRE geoportal, July 2020

The second finding is that there are more than twice as many regional metadata records available on the INSPIRE geoportal than national metadata records (see Table 5-8 below). Under the assumption made that regional data are more heterogeneous than the national data, it is unlikely that the current geographical coverage allows yet for a good pan-European interoperability as there is too much heterogeneity in the number of spatial datasets made available by different Member States.

Table 5-8 INSPIRE geoportal data set statistics: regional and national coverage

Data sets	National spatial scope coverage	Regional spatial scope coverage
Total number of metadata records	5,459	13,747
Downloadable datasets	2,131	1,948
Viewable datasets	2,308	2,828

Source: Based on the data from INSPIRE geoportal, July 2020

In conclusion, the Directive does not set the requirement to collect new data. This means that the INSPIRE framework operates with a legacy of datasets that have been produced for the purpose of different national and regional contexts. The heterogeneity in the number and geographical scope of datasets available indicates a heterogeneity in the content and technical standards that renders it difficult to achieve interoperability.

Consultation activities

Scoping interviews

The scoping interview with EEA confirmed that there is a high level of heterogeneity in terms of the data available in the different Member States, which makes the pan-European added value limited (as discussed in the section on EU added value).[26] The heterogeneity is a barrier to interoperability.

Focus Group interviews

None of the Member States interviewed in the Focus Groups interviews gave an opinion on the geographical coverage of INSPIRE *per se.* Five Member States

[26] Scoping interview with EEA: *"There is a huge heterogeneity of datasets and services that the countries provide. They can all fulfil the INSPIRE requirements, but it is the question whether the this huge heterogeneity does not bring obstacles for users. It can take a lot of effort and time to find the suitable datasets*".

highlighted the complexity and efforts in harmonising and articulating their regional data sets but also the benefits of doing so (see EQ 4.1 on efficiency). Harmonisation is a challenge and is costly as highlighted in EQ 4.2 on efficiency, in particular in Member States where there is a large number of regional datasets available. As clarified by one of the Member States, the coordination efforts required to aggregate harmonised data from the regional to the national level is an obstacle to optimal geographical coverage: '*everyone publishes their data on their own, and we have no seamless harmonised data at the national level yet'.* The harmonisation process triggered by INSPIRE is also seen as a driver for improving intra-national geographical coverage as a Member State explained: '*INSPIRE is an opportunity for […] administrations to share data both with Europe and also internally. The country can use the INSPIRE specifications and requirements to harmonise data at national level*'.

5.2.1. EQ 2.4 To what extent does the implementation of the INSPIRE Directive in the Member States build further on the obligations of Directive 2003/4/EC on public access to environmental information (specifically the provisions under Articles 7 and 8 of the Directive 2003/4/EC)?

EQ 2.4 assesses the extent to which the implementation of the INSPIRE Directive in the Member States builds further on the obligations of Directive 2003/4/EC on public access to environmental information (specifically the provisions under Articles 7 and 8 of the Directive 2003/4/EC)[27]. It investigates the extent to which INSPIRE has supported the Member States to carry out their obligations in dissemination of environmental information but also in the quality of information. Indeed, Article 7 of the Directive on public access to environmental information (PAEI Directive)[28] focuses on the dissemination of environmental information while Article 8 relates to the quality of environmental information. The links between the PAEI Directive and the INSPIRE Directive are addressed in several other evaluation questions, providing different angles of the assessment (see EQ 3.4 for the relevance assessment, EQ 4.8 for the efficiency assessment and EQ 5.4 for the coherence assessment) that complement this evaluation question on effectiveness.

The following analysis is based on the desk review, scoping interviews and Focus Group interviews and the public consultation.

[27] Directive 2003/4/EC of The European Parliament and of The Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC

[28] Directive 2003/4/EC of The European Parliament and of The Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC

Text box 5-6 Key/summary findings EQ 2.4: INSPIRE Directive building on PAEI Directive

The evaluation did not provide explicit conclusions that the implementation of the INSPIRE Directive in the Member States is effectively building further on the obligations of Directive 2003/4/EC on public access to environmental information (specifically the provisions under Articles 7 and 8 of the Directive 2003/4/EC) mainly because the two Directives have different scopes (see EQ 5.4 on coherence).

The results from the **desk review** did not provide additional evidence regarding the coherence between the INSPIRE Directive and the PAEI Directive. The **scoping interviews** pointed to the fact that the two Directives have different scope rendering it difficult to judge on the effectiveness. The **Focus Group interviews** confirmed that here is no real interaction between the two Directives. The results from the **public consultation** revealed that respondents mostly did not know to which extent the INSPIRE Directive has supported an active dissemination of environmental data and information to the public in a series of policy areas.

Desk review

Articles 7 and 8 of the PAEI Directive focus on the dissemination of environmental information (Article 7) and the quality of environmental information (Article 8). The desk research did not provide additional evidence on whether the INSPIRE Directive has been effectively building on the PAEI Directive. Most of the analysis is related to the coherence between the two Directives (see EQ 5.4).

Consultation activities

Scoping interviews

The scoping interview with DG Environment highlighted the difficulty to assess the compliance of INSPIRE with the PAEI obligations because the concepts used in the PAEI Directive are broader than in the INSPIRE Directive. Furthermore, Article 7 of the Directive indicates that information would be '*progressively'* made available without a very strict obligation/requirement. The interview respondent also reported that there is a large discrepancy between sectors where some are advanced in their implementation (e.g., air quality) while other sectors lag behind. One major problem identified was the capacity of Member States to provide access to environmental information in 'a user-friendly way'. Interviews with Member States highlighted the complexity of navigating in the INSPIRE geoportal for instance.

Focus Group interviews

Very few comments were made in relation to Directive 2003/4/EC during the Focus Group interviews. One comment made by a public authority underlined that there are relatively little interactions between the two Directives as Directive 2003/4/EC is mainly about providing aggregated information, as well as analyses and conclusions on the state of the environment in a given area, while INSPIRE (and the Open Data Directive) require publishing the raw data, on which this analysis is based. The absence of comments from most authorities on the interactions between the two Directives during the Focus Group interviews might indicate that most authorities do not see major interactions between them.

Public consultation

Question 19 of the public consultation asked respondent to what extent the INSPIRE Directive supports the active dissemination of environmental data and information to the public in a series of policy areas (water, waste management, air, nature, marine protection, industrial emissions, transport, chemicals, health, agriculture, and maritime spatial planning). Results were limited as for most policy areas, between 40% and 60% of respondents replied 'Don't know'. Regarding environmental policy areas covered by Directive 2003/4, respondents tended to respond positively (strongly or slightly supports) more often than for non-environmental policy areas, in particular for nature, water, and air policies. Results are less positive for waste management, industrial emissions, marine protection and chemicals. A detailed overview of this question is presented in the public consultation report, figure 40.[29]

5.2.2. EQ 2.5 Which main factors have contributed to – respectively stood in the way of achieving these objectives?

EQ 2.5 has the objective to identify the various factors that hindered the full implementation and use of the INSPIRE Directive. For this specific evaluation question, the ambition is to check whether the barriers identified in previous evaluations remains or have been removed, and whether new barriers have arisen.

The analysis takes its point of departure in the barriers to implementation and use identified in the Member States in previous evaluations (2014). In order to test if these barriers still persist, we have, through desk research and interviews, checked whether Member States still identify these barriers. The barriers identified by Member States include 1) technical barriers, 2) licencing and sharing barriers, 3) knowledge barriers, 4) legal barriers, 5) financial and organisational barriers. In addition, we have asked the users in the targeted surveys and the public consultation to identify barriers to use.

The following text is based on desk review, scoping interviews, Focus Groups interviews and the targeted surveys.

[29] Report on the public consultation, section 4.3, figure 40, corresponding to Question 19 'To what extent does the INSPIRE Directive support the active dissemination of environmental data and information to the public in the following policy areas?'

Text box 5-7 Key/summary findings EQ 2.5: barriers to objectives' achievement

The main finding is that no new barriers to implementation and use emerged from the investigation compared to the ones identified in previous evaluations. The already existing barriers are to a large extent technical.

The **desk review** showed that licensing and sharing as well as coordination were important barriers to implementation and use that remain a matter of concern compared to the list of barriers identified in the 2014 INSPIRE evaluation.

The **Focus Groups interviews** highlighted the issue of technical barriers to implementation and use, which ranked first in the 2014 evaluation. The technical barriers trigger resources issues (that are addressed in the efficiency section of the present evaluation) but also issues in terms of the use of the data made available through the INSPIRE framework.

The results of the **targeted surveys** showed that the main barriers to the use of spatial data from the point of view of the users are firstly the technical access to data, then the level of data, the format and the quality of data available. Cost of access, technical access to metadata and quality of metadata are barriers less often chosen by respondents.

The **public consultations** showed that finding data, assessing the relevance of data available compared to needs, accessing data, combining data, re-publishing data, re-using data and using data from a technical point of view is not a major issue (for people with a minimum of knowledge of what INSPIRE is and what geospatial data made available thanks to INSPIRE relate to).

Desk review

The first finding of the desk review is that the implementation of the INSPIRE infrastructure and its use, experiences several barriers as already listed in the 2014 midterm evaluation.[30] The 2014 mid-term evaluation of Directive indicated that '*Cultural, institutional, financial and legal barriers prevent or delay the sharing and reuse of existing spatial data.*[31]

The table below lists the common types of obstacles identified by Member States in the 2014 evaluation.[32] From the greatest identified barriers to the least identified barriers were: 1) technical barriers, 2) licencing and sharing barriers, 3) knowledge barriers, 4) legal barriers, 5) financial and organisational barriers to the same extent.

Table 5-9 Common types of obstacles to data sharing identified by Member States from the 2014 INSPIRE evaluation

Category	Type of barriers	Number of issues	%
Legal	Legal barriers, lack of strategic policies, low usability and	18	12.4 %

[30] EEA & JRC (2014), Mid-term evaluation report on INSPIRE implementation, EEA Technical report No 17/2014, ISSN 1725-2237.
[31] Ibid.
[32] EEA & JRC (2014), Mid-term evaluation report on INSPIRE implementation, EEA Technical report No 17/2014, ISSN 1725-2237., P.7.

	added value (for specific users or cases)		
Technical (29.6 %)	Diversity of existing information systems, duplication of data resources, difficult change to new technology	10	6.9 %
	Additional (specific) technical and infrastructure resources are required, lack of appropriate tools	18	12.4 %
	Quality of data, metadata and services	7	4.8 %
	Level of standardisation, clarity of technical documentation is still low, high complexity of services and data specifications	8	5.5 %
Knowledge	Lack of human resources, capacity and knowledge	19	13.1 %
Financial	Additional financial resources are required/high financial demands, difficult financial planning	16	11.0 %
Cooperation and organisation	Low cooperation between institutions and organisations, administrative and organisational barriers, lengthy procedures, bureaucracy	16	11.0 %
Licencing and sharing (22.7 %)	Heterogeneous licensing models and sharing arrangements (or lack of those); modernisation	6	4.1 %
	Restrictions are applied: charges and conditions for access and use (different user types, different conditions, etc.)	20	13.8 %
	Specific issues: resistance to open data, responsibility for use, protection of personal information	7	4.8 %

Source: EEA & JRC (2014). Mid-term evaluation report on INSPIRE implementation, EEA Technical report No 17/2014, ISSN 1725-2237.

Building on these initial findings, the desk review allowed to check that two barriers to implementation and use, identical to those identified in 2014 the Mid-term evaluation[33], have been the subject of specific analysis, illustrating the extent of their impact:

- Licencing and sharing: A 2018 study[34] highlights a technical problem related to access and licensing: '*Today unfortunately, it is not a straightforward task to figure out if an INSPIRE resource is open and ready for reuse. More than 800 different terms of use were identified in our sample, where most were in the form of multilingual, unstructured texts*'[35]. Efforts are being pursued by the JRC to study and harmonise licensing conditions.
- Cooperation and organisation: The coordination of the implementation of INSPIRE is generally identified as crucial to the development and use of SDI. A study from the JRC[36] highlighted that because SDIs are internet-based, it is difficult to identify communities of users and specific related needs. An SDI governance must therefore be sufficiently coordinated, inclusive and form a cohesive whole to be able to identify and address different communities of user's needs.[37]

[33] Ibid.

[34] Hernández Quirós, L. Nunes de Lima, V. Smith, R.S. (2018) Study of the terms of use applied in the INSPIRE resources and their usability barriers, JRC Technical report.

[35] Ibid.

[36] Craglia M, Annoni A. (2007), INSPIRE: An Innovative Approach to the Development of Spatial Data Infrastructures in Europe Concepts. In: Onsrud H, editor. Research and Theory in Advancing Spatial Data Infrastructure Concepts. Redlands (United States of America): ESRI Press. JRC37929. Available at: https://publications.jrc.ec.europa.eu/repository/handle/JRC37929.

[37] "*This dynamic nature of SDIs poses a number of challenges for their development and maintenance as there is a constant need for interpreting and responding to political and technological changes and new user needs, which may have been unforeseen at the initial stage of the SDI. Whilst there are well-documented challenges in the design, implementation and maintenance of information systems that are confined within the bounds of an organization and respond to clearly-defined applications and user groups (…), additional challenges exist in the context of SDIs because their Internet-based nature*

While the knowledge and financial barriers remain after the 2014 (further analysed in the efficiency section), the legal and technical barriers do not appear in the desk review, while they are highlighted in the scoping interviews and Focus Groups interviews (see below). Overall, the desk analysis did not identify new barriers.

Consultation activities

Scoping interviews

In terms of obstacles to the use of data made available through INSPIRE, and taking the 2014 evaluation list of barriers as a reference, the scoping interviews highlighted the following elements with regard to the technical barriers in the implementation of the INSPIRE Directive and the licensing issue.

The technical requirements of INSPIRE results in different levels of complexity. Interviews with EEA[38] and Eurogeographics[39] pointed to the issue of the format of the data which is difficult to process or at least requires substantial processing before use. If the data requires processing before use, this will have an impact on the user groups as identified during scoping interviews. Today, the Directive includes technical specifications that do no longer correspond to the current technical standards.[40] Interviewees overall agreed that the Directive is technologically over-specified.

A second element relates to the pan-European nature of INSPIRE. Today, there is a high level of heterogeneity in the data available in the different Member States, which makes the pan-European added value limited (see EQ 2.3). In addition, many users that need data for regional or national purposes will not use INSPIRE data: '*INSPIRE is sometimes too complex. INSPIRE is designed for pan-European data exchange, and as they work at the national level, they usually prefer national datasets, in formats that they already know and can easily integrate it in their existing system*'[41].

A third element relates to the different licensing terminology throughout the Member States. The INSPIRE Directive leaves it up to the Member States to decide on the licensing conditions for data access. '*It is a barrier if data is available and accessible but not usable*'[42]. '*Licensing needs to be harmonised to be able to use a product, to make it usable for other users across services. Not only licenses are different but the terminology across licenses is different*'[43].

The other barriers (Legal, technical, knowledge, financial, cooperation and organisation, Licencing and sharing) were not highlighted during the scoping interviews.

Focus Groups interviews

makes it more difficult to identify user communities and hence respond to their needs. This is also why the coordination aspects of an SDI are so critical. Without effective coordination, it is possible to have different components in place: reference data, metadata, clearinghouses, but no cohesive whole" (Craglia M. and A. Annoni 2007).

[38] Scoping interview with EEA: "*The uptake of INSPIRE is hindered by the fact that there is a lot of processing required before using the data. The data models are very complicated to read. The format that allows the INSPIRE data models to be implemented are GML. This format is not practical for users and is posing obstacle to its wider update*".

[39] Scoping interview with Eurogeographics*: "The preparation of INSPIRE compliant datasets is very complicated and their updating will be even more difficult".*

[40] Scoping interview with JRC: *"Directive conceptualised in a completely different technological context and lot of technological aspects are very rigid in the legislation".*

[41] Scoping interview with ESTAT.

[42] Scoping interview with JRC.

[43] Scoping interview with Eurogeographics.

The Focus Group interviews allowed for the discussion of several barriers to implementation identified in the 2014 evaluation but also barriers to the use of the INSPIRE infrastructure, in line with the desk review and scoping interviews. The barriers identified are interlinked.

The main barrier identified is the technical requirements of INSPIRE. Focus Groups reported on the competition between INSPIRE data and any other open datasets which are available in a variety of formats (OGC REST / ESRI REST) that users want to use. Most Focus Groups mentioned the standards (e.g., GML, WFS) required in the INSPIRE Directive and provided the following statements: 1) *'are not easy to use and not efficient (…) a key problem is that the technological requirements are included in the Directive and are now outdated', 2) 'I can think of no cases where someone would use GML'*, 3) *'The XML format is not user-friendly. Almost nobody asks us for this format'*

As a consequence of the technical barrier, Focus Groups mentioned that there are resource issues within some Member States which can have an impact on implementing and using the infrastructure. The complexity makes it time consuming to comply with the technical requirements, in addition to a lack of relevant and available competences. In line with the resources needed to implement the infrastructure, the question of coordination hampers the deployment of INSPIRE '*one obstacle for the provision of public sector data is the multitude of responsible parties and stakeholders to be involved in each domain. Participation process takes a lot of time and efforts and therefore slowed or still slows down implementation or adjustments, especially in terms of harmonised and seamless national data sets for environmental reporting*'. The resource/financial issue is tackled in the efficiency question EQ 4.2.

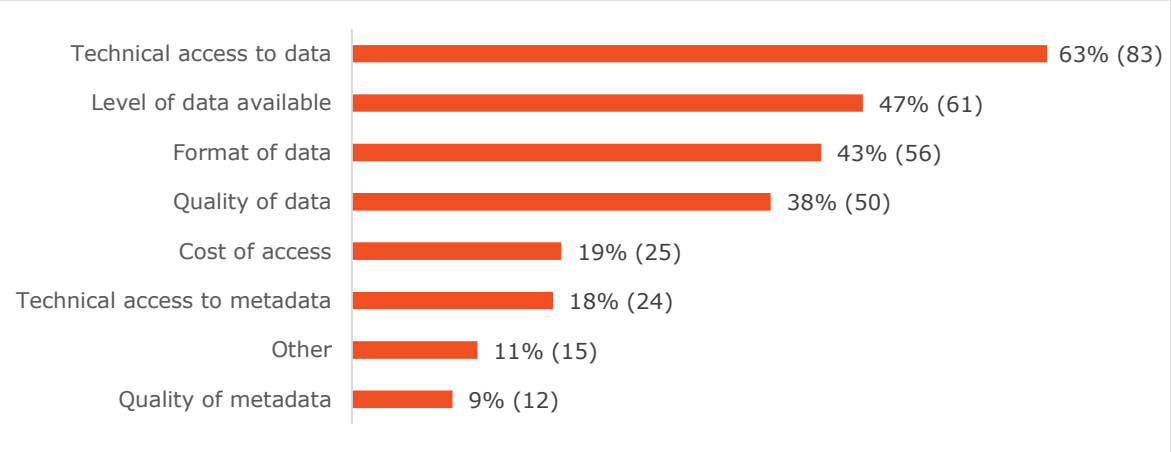
As a consequence, the technical issues, the limited resources, and the questions regarding the use and users of INSPIRE seem to impact on the perceived usefulness of INSPIRE. Focus groups mentioned that more effort in increasing the compliance to INSPIRE was made, rather than working on solutions for targeted users. One Member State mentioned that '*The INSPIRE monitoring has an indicator to assess how many datasets are provided in the INSPIRE format. People think we must reach 100% in this indicator, and then they don't provide the datasets in original format in the infrastructure because they want to have good performance in the monitoring (and you get worse results if you put data in the original format). This is contradicting the purpose of INSPIRE which is to provide as much data as possible, including in original format as they correspond to use cases'.* Another Member State found that *'Sometimes organisations see INSPIRE as an obligation rather than an opportunity – they don't always see it as something that will help them fulfil certain of their tasks'.* This results in the lack of motivation from Member States toward INSPIRE, in its current technical format, and is also a final barrier to its full deployment.

The Focus Groups did not specifically mention other barriers. As for barriers related to resources, this is analysed under efficiency.

Targeted survey

In the targeted surveys, respondents were asked to select up to three main barriers to the use of spatial data from the point of view of the users. 63% identified technical access to data as the most important barrier. The second barrier is the level of data available (47%). Format and quality of data are respectively third and fourth barrier, for 43% and 38% of respondents. Cost of access and technical access to metadata are considered as barrier by one fifth of respondents (respectively 19% and 18%). Quality of metadata is the least important barrier (9%).

Figure 5-3 Barriers to the use of spatial data from the point of view of the users (N=131)



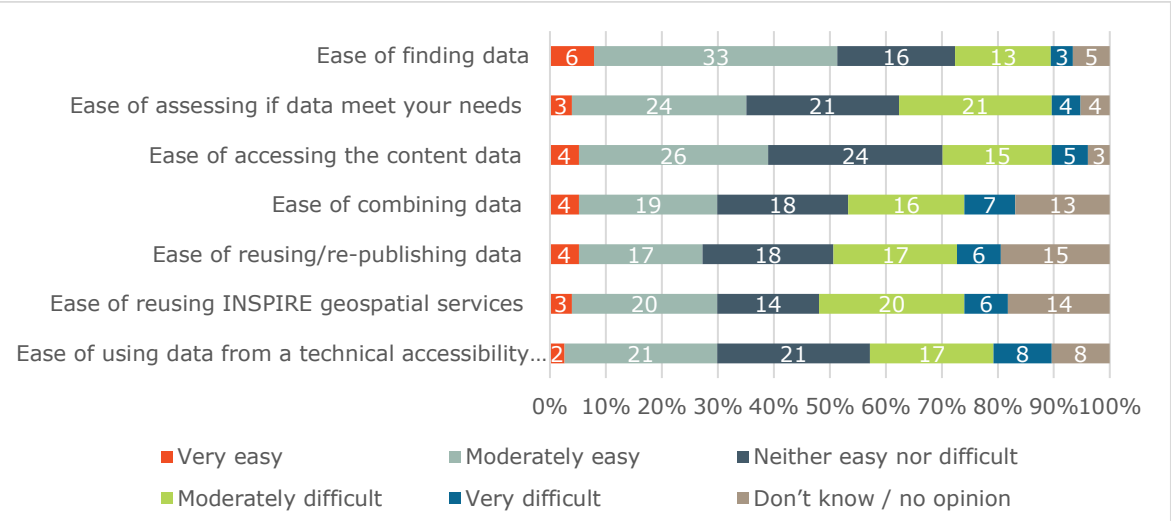
Source: All respondents, Targeted surveys (combined) April-May 2021, Question 15: What are the main barriers to the use of spatial data from the point of view of the users? Please tick three choices maximum.

Public consultation

In the public consultation, respondents were asked to rate the ease to find data, assess relevance, access data, combine data, re-use or republish data, reuse services or use data from a technical point of view.

The respondents considered that in the context of the INSPIRE Directive, it is moderately easy i) to find relevant geospatial data for 43% of them; ii) to assess if relevant geospatial data meet his/her needs (for 31%); iii) to get access to the content of geospatial data (for 34%); iv) to combine geospatial data (for 25%); v) to reuse or re-publish geospatial data (for 22%); vi) to reuse geospatial services for 26%); and vii) to use the geospatial data published from a technical accessibility point of view (for 27%).

Figure 5-4 Ease to find data, assess relevance, access data, combine data, re-use or republish data, reuse services or use data from a technical point of view (N=76-77)



Source: All respondents, public consultation May-July 2021, Questions 11-17: How easy is it to find/assess/access/combine/reuse or republish relevant geospatial data published under the INSPIRE Directive? How is easy is it to reuse geospatial services published under the INSPIRE Directive i.e. are the data access and use conditions clear)? How easy is it to use the geospatial data published under the INSPIRE Directive from a technical accessibility point of view? (e.g., standardised and/or well-documented data formats, tools for data retrieval / download etc.)

5.2.3. EQ 2.6 To what extent is INSPIRE used for reporting under the environmental acquis?

EQ 2.6 aims at providing evidence on the level of use of INSPIRE data and infrastructure for reporting under the environmental acquis.

The desk research was used to identify examples of reporting under the environmental acquis in Member States and draw conclusions on the effectiveness. The scoping interviews helped in obtaining more details about why and how INSPIRE was or was not used for reporting. The results link to EQ 4.7 on the reporting burden that INSPIRE may add when reporting under the environmental acquis and EQ 5.2 on the coherence of INSPIRE with the geospatial reporting obligation under environmental legislation.

The following analysis is based on desk review, scoping interviews, Focus Groups interviews and targeted surveys.

Text box 5-8 Key/summary findings EQ 2.6: use for reporting under the environmental acquis

The main finding is that it is still difficult to precisely assess the extent to which INSPIRE is used for reporting under the environmental acquis. However, results show that there has been progresses and that even though challenges remained for Member States, in particular considering the harmonisation process. The INSPIRE directive do not add administrative burden in the process as described in EQ 4.7.

The **desk review** showed that the use of INSPIRE for reporting under the environmental acquis has been fostered through several JRC initiatives. The assessment was that it had faced numerous technical issues. However, the use of INSPIRE was judged to offer promising results when the framework would be fully implemented, which was not the case at the time of the experimentation.

The **scoping interviews** highlighted the different limitations when using INSPIRE for reporting under the environmental acquis, one main concern being related to harmonisation.

The **Focus Groups** reported both on challenges and successes of reporting under the environmental acquis. Overall, Member States indicated their satisfaction in the improvement of the practical alignment between INSPIRE and reporting requirements in EU environmental legislation. They were positive about the use of INSPIRE when it will be fully implemented.

The **targeted survey** on the environment sector show that national authorities and national environmental authorities to some extent find that spatial data made available by INSPIRE is used in the reporting under the environmental acquis. However, respondents also highlight that the purpose of data collection in environmental monitoring and reporting differs from the purpose of INSPIRE, hence the data cannot be always fully used.

Desk review

The question regarding the use of INSPIRE to report on the environmental acquis, as a legal requirement, as opposed to monitoring (non EU-binding), was addressed in previous evaluations e.g. in the 2014 mid-term evaluation of the INSPIRE implementation.[44] The INSPIRE Directive was indeed designed in order to optimise data transfer and processing through the harmonisation requirements, as Member States rely on many different networks of thematic and regional data providers for environmental reporting. The before mentioned evaluation provided an example from the MDI-DE (Marine Dateninfrastruktur Deutschland) project, as example of infrastructure dedicated to that purpose[45].

Several pilot initiatives between the JRC and Member States have been undertaken to foster the streamlining of the reporting requirement and INSPIRE provisions e.g. Air Quality e-Reporting,[46] the different projects seem to have experienced difficulties of technical nature. The communities responsible for reporting the environmental acquis (or other thematic expertise) do not have the technical data expertise required to understand and implement INSPIRE provisions, and in many or most cases, the INSPIRE expert teams did not belong to authorities in charge of reporting the environmental acquis. The key factors identified for successful projects were a '*balanced set of experts with good domain knowledge and where either the complexity of the topic was feasible to address or where the data work had a long tradition*'.[47]

The 2017 report 'Support to the Fitness Check of monitoring and reporting obligations arising from EU environmental legislation' highlights another type of non-alignment between INSPIRE and the reporting activity.[48] Given the resource constraint faced by most Member States in the reporting processes, the changing reporting needs could bring '*risks inherent in converting too much data to INSPIRE compliance as technical specifications and formats quickly become outdated, resulting in cumbersome systems whose value erode overtime without continued maintenance.*[49]. The report mentioned that new methods, such as systematic data harvesting thanks to the development of open data policies in all Member States, should be considered. INSPIRE is regarded as an opportunity on this issue, when fully implemented, although not operational at the time (2016).

In more operational terms, the 2019 report on environmental information systems (EIS) indicated that in the question '*Is there a link between the EIS and the national INSPIRE portal, is the monitoring data found via the EIS and provided through INSPIRE?*'[50] Only in 15% of the evaluated Member States and regions declared that the link between the EIS and INSPIRE was properly provided. In 38% of the cases, reference to INSPIRE was made within the EIS, but no links were found, in 47% of the evaluated Member States and regions there is no reference and no links between the

[44] EEA & JRC (2014), Mid-term evaluation report on INSPIRE implementation, EEA Technical report No 17/2014, ISSN 1725-2237., P.7.

[45] '*The distributed service-oriented architecture and implementation of INSPIRE services and data models allows serving information on several environmental policies (such as Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy',* EEA & JRC (2014).

[46] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

[47] EEA & JRC (2014), Mid-term evaluation report on INSPIRE implementation, EEA Technical report No 17/2014, ISSN 1725-2237., P.7

[48] European Commission (2017), Support to the Fitness Check of monitoring and reporting obligations arising from EU environmental legislation. Final Report, drafted by Rayment, M., Rupert H., M. Nesbit, A. Illes and Y. Verstraeten.

[49] From the Public consultation.

[50] European Commission (2019), Promotion of good practices for national environmental information systems and tools for data harvesting at EU level. Final Report, drafted by Wageningen University and Research (The Netherlands), Umweltbundesamt GmbH (UBA) (Austria), Epsilon (Greece), COWI (Belgium).

EIS and INSPIRE were found. This suggest a lack of connection between the environmental information platforms and INSPIRE and that the incomplete integration.

Consultation activities

Scoping interviews

The scoping interviews pointed to the limitations of the use of INSPIRE for reporting under the environmental acquis. The major problem identified is the discrepancy between the dynamics of the environmental legislation, that evolves and needs to adapt to present and future needs, and the INSPIRE implementation. The timeframe for the reporting is also an issue as some policies may need annual data and other have other time requirements (biannual etc.). INSPIRE implementation and environmental reporting were referred to as '*two processes taking place parallel*'.[51]

As of 2021, a new platform for monitoring is being developed: Reportnet 3.0, operated by EEA. One of the functions will allow for intake of the INSPIRE data sets however, there is no automatic uptake of INSPIRE services by the Eionet Portal Reportnet. Indeed, reporting is one use-case and for certain legislative provisions, reporting happens only every six years. It is not always meaningful to develop services for that purposes. All in all, in most of the cases, the data from the INSPIRE services cannot be just 'grabbed', as the data models are not aligned with the requirements of thematic legislations, which are very strictly defined.[52]

Focus Group interviews

The Focus Groups did not permit to fully assess the extent to which INSPIRE was used to report on the environmental acquis. Indeed, all seven Member States interviewed mostly stressed the challenges of reporting under the environmental acquis. They also indicated that it was were INSPIRE will be the most useful when the Directive will be fully implemented.

The specific challenge in using INSPIRE to report on the environmental acquis that was identified relates to the harmonisation of data. One Member State pointed to the example of the Water Framework Directive reporting relating to man-made objects (Annex I on Hydrography) for which all Member States have data under different semantics. The harmonisation process is now ongoing for more than seven years according to one Member State. '*It's a lot of work to bring INSPIRE and reporting obligations together, especially as there's no real added value at national level – expect if it were to be done for all topics'.*

The Member States interviewed were overall positive about the alignment process of INSPIRE with EU reporting requirements which would ease the reporting. One Member State indicated that: '*The alignment of INSPIRE and all of the different thematic directives that is currently ongoing in the Commission is a very positive thing. It won't be easy as it requires a lot of agents and people from different fields, to analyse and agree how the directives will be aligned. But this would be a very good use of INSPIRE*', but also mentioned that there was still '*room for improvement*'. It was added that directives such as the Air Quality Directive, Water Framework Directive, the Industrial Emissions Directive and Bathing Water Directive are examples where the alignment process has been achieved.

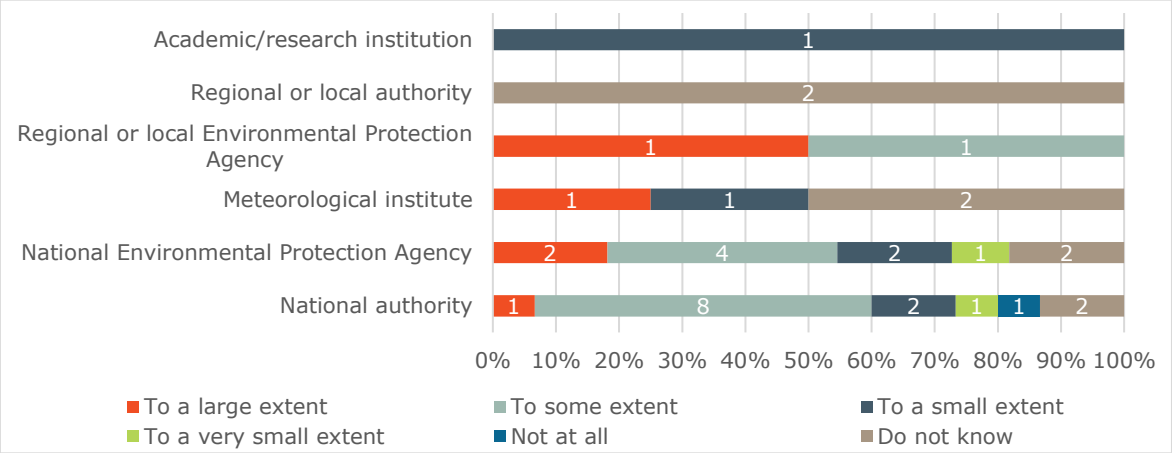
[51] Scoping interview with EEA
[52] Scoping interview with EEA.

One Focus Group expressed that the use of INSPIRE for environmental reporting seemed nevertheless to be progressing, each user adopting some elements of INSPIRE without reaching full compliance*: 'we are also starting to use INSPIRE scheme to harmonise data for EMODnet. There are some infrastructures on which INSPIRE has a small influence for data harmonisation. It is not driven by compliance; it is more to have a framework that can be used by everyone'.* The same Focus Group added that the Directive has had an influence on many platforms. However, the platforms would not become fully compliant and only adopt elements of INSPIRE.

Targeted surveys

The targeted survey on the environment sector shows that national authorities and national environmental authorities to some extent find that spatial data made available by INSPIRE is used in the reporting under the environmental acquis. All other stakeholder groups do not find that this is the case. This is likely to reflect that they are less involved in the reporting process.

Figure 5-5 Use of INSPIRE spatial data for environmental reporting (N=35)



Source: All respondents, Targeted survey to the environmental community April-May 2021, Question 13: To what extent are the environmental spatial data made available thanks to INSPIRE used by authorities/agencies in their reporting to the EU institutions under the environmental acquis?

EQ 20 (Survey of the environmental community) provided the possibility of giving additional comments to the use of INSPIRE for environmental reporting. Two respondents pointed to that the purpose of data collection in environmental monitoring and reporting differs from the purpose of INSPIRE. Two other respondents underlined that environmental reporting is often done over long timeframes (every five or six years) and that historical data is of great importance for the purpose of environmental reporting. This it is not the case for INSPIRE, which requires more frequent updates and does not require the provision of historical data. On the contrary, meteorological data is updated on an hourly or sub hourly basis, and, as a result, a vast amount of meteorological data and forecasts are produced each day by meteorological institutes. One of these institutes commented that, because of the amount and frequency of updates, it is very difficult to make this data compliant with INSPIRE.[53]

[53] Survey of the environmental community, Q15 and 20 (as quoted in footnote 119).

5.2.4. EQ 2.7 What are the qualitative and quantitative effects of INSPIRE on the policymaking users in the field of environment in Member States?

EQ 2.7 has the objective to assess the level of use of INSPIRE metadata, spatial data sets, view and download services and network services by a range of stakeholders involved in the environment policy cycle, at various level (local regional, national, EU). The analysis aims at providing evidence on if and how these different policy users are using INSPIRE (and not only policy makers).

The approach taken to answer the question was first to check if and how the INSPIRE framework has been made available to policy makers and policy users (being agencies, the general public, etc.). We have checked the existence of geoportal at national and subnational level making use of the INSPIRE infrastructure by analysing the current status forms. The extent to which INSPIRE was used at the EU policy making level has been addressed in the scoping interviews and how INSPIRE was used at Member State level through the Focus Group interviews.

The analysis faced two main challenges: i) 'policymaking users' of INSPIRE are not defined per se as and goes beyond policy makers; ii) Member States do not track who are the users of specific INSPIRE datasets even though they may, for some of them, collect information on the number of users for geospatial data in general. Overall, most of the Member States do not have monitoring systems that support the precise identification of INSPIRE framework users.

Text box 5-9 Key/summary findings EQ 2.7: qualitative and quantitative effects of INSPIRE on the policymaking users in the field of environment

The main finding with regard to the use and effect of INSPIRE on policymaking users in the field of environment is that outside some example of policy makers, which are also data providers, it was difficult to quantify the use and therefore effect on policy making.

The **desk review** did not provide a very precise landscape of the use and effects of INSPIRE on policymaking users as the information contained in the current status form is not specific and mostly quantitative (examples and numbers of geoportals in use in the Member State). First, it is difficult to assess the content of national geoportals and what type of information they provide (100% INSPIRE compliant datasets or any other types of geospatial data as countries provide with multiple examples of portals).

The **scoping interviews** with different European Commission services, revealed that INSPIRE was not fully aligned with sectoral needs (transport, energy, marine etc) and therefore with uses at the EU level and European Commission level.

The **Focus Groups** highlighted the difficulty for Member States to identify the nature of INSPIRE users if they are not the data providers. The fact that the implementation of the Directive was not completed was also seen as reason not to be able to properly identify users.

The **targeted surveys** showed that INSPIRE Directive contributed to access, exchange and reuse of geospatial data across public sector organisations.

The **public consultation** testifies that national public authorities do not have necessarily a clear view of what INSPIRE / INSPIRE geospatial data are, since half of then indicated that they do not know whether INSPIRE supports process of planning and assessing impacts.

Desk review

The analysis of the current status forms provides a mixed picture of the use of INSPIRE for policy users.

Table 5-10 shows an analysis of the country forms in terms of the existence of infrastructures for sharing spatial information. Out of the 27 forms, six Member States report one example of a web portal, 14 Member States report examples of between two and six web portals, and seven Member States report examples of between seven and ten web portals. Many of the links refer to portal which are in national language, making it difficult to assess the relevance of the example provided. The number of geoportals does not indicate 1) whether these are making use of INPIRE conformant datasets, or 2) if the examples provided were exhaustive. The country forms provide only partial information on the access to INSPIRE geospatial information.

Table 5-10 Examples of spatial data portals provided by Member States

Member State	Number of examples of geoportals	Member State	Number of examples of geoportals
Latvia	10	Slovakia	5
Sweden	9	Italy	4
Croatia	8	Netherlands	4
Cyprus	8	Slovenia	4
Finland	7	Spain	4
Belgium	7	France	3
Greece	7	Hungary	3
Austria	6	Ireland	2
Bulgaria	6	Portugal	1
Denmark	6	Estonia	1
Czechia	5	Lithuania	1
Germany	5	Luxembourg	1
Romania	5	Malta	1

Source: Current status country forms for 27 Member States.

When assessing the information in the country forms, it is in general difficult to discern between when Member States refer to the INSPIRE compliant metadata, data sets, network services, etc., and when they discuss the use of other spatial data available. The descriptions provided in the current status forms show the existence of SDIs or other geospatial data platforms and the levels of openness to different users, rather than providing examples of concrete use of the data (either number and type of users and frequency of use or use-case).

- For instance, for Greece there is no measurement of the usage of the INSPIRE infrastructure.
- for Austria, the use is partly monitored, but in any case, is not monitored separately from the use of geospatial applications.
- for Luxembourg it is explicitly mentioned that '*independently of the special geoportal dedicated to INSPIRE, the national geoportal of Luxembourg has been a great success and is widely used by the general public. It counts more than 50,000 visitors per day, through its different viewers, webservices and APIs*'. Indeed, the INSPIRE portal is an independent subsection of the Luxembourgish SDI.

In the current status forms, there are examples of Member States where the national INSPIRE geoportal has been instrumental in developing access and use of the spatial

data. For example, one Member State mentioned that: '*The main source of spatial data sets and services is the National INSPIRE geoportal, where all the relevant resources are harvested, in some cases stored in the databases of the geoportal'.* Another Member States reported that '*Public authorities are using the infrastructure for different tasks, e.g. town planning, environmental studies, statistical analysis, network development (water, sewerage, telecom, electricity etc), census, web applications (e.g. on-line applications for controlling the COVID-19 pandemic, cadastral applications, cartographic applications etc), and academic research*'. Other Member States provide similar use of the INSPIRE infrastructure (e.g. Latvia).

There are some example of Member States indicating that policy makers would prefer to use other infrastructures than INSPIRE to access the data they need: '*Both public administrations and the private sector are still not widely using the INSPIRE infrastructure to access and use spatial data, mainly because their public tasks are at the local or regional leve*l'.[54] This is also the case in another Member State, for instance where '*local public sector preferred to use other possibilities than INSPIRE to collect data*'.

Scoping interviews

The scoping interviews conducted with different European Commission services highlight the efforts made to optimise the alignment between INSPIRE and data development and use in different thematic domains (transport, energy, marine etc.), in particular through pilot project over the last 5 years.[55] Interviewees report that alignment is a long process and technical difficulties arise in relation to data quality (for instance, frequency of data collection: annual data versus real-time data for traffic information or spatial accuracy). This alignment is still a work-in-progress between the JRC and DG MOVE and has proven to be difficult/impossible to collect information on the level of use of the transport data.

Other examples were provided by DG AGRI with regard to the alignment between the integrated administration and control system (IACS) and INSPIRE. '*One of the issues is that we are still in the process of convincing Member States to feed INSPIRE with IACS data. This is a long process, and we are not very advanced. So today, we cannot measure much usage of IACS data*'.[56] Also, INSPIRE has not been designed for this kind of use: '*we can measure what is inputted into INSPIRE but not what is used. Although we would be really interested to have data about the use of our data*'.[57]

Focus Group interviews

The Focus Group interviews revealed a mixed picture when it comes to measuring the effect of the Directive on policy making in the field of environment. One of the limitations is that the participants in the Focus Groups were not always able to provide precise information about the use or users of data because i) it is not specifically monitored, ii) because policy data users are numerous and come from different authorities (at local, regional or national level), iii) because users are also the data providers for their own needs (mainly at local, regional, national level) and do not need to use the datasets in INSPIRE formats.

Furthermore, most Focus groups considered that INSPIRE is not yet fully implemented and as such, the effects cannot be observed yet: '*It is maybe too early to assess this,*

[54] Current status report Germany.
[55] See: https://inspire.ec.europa.eu/inspire-pilots/59289
[56] Scoping interview with DG AGRI.
[57] Scoping interview with DG AGRI.

we are still struggling to provide data according to INSPIRE, we need more time to see the results. For soil, we need to harmonise data with our neighbouring states, but we are still in the process of providing our own data, so this will be only a second step'.

The use of INSPIRE seems limited by the nature of the final usage as reported by a Focus Group: '*Open data is easier to provide than INSPIRE data. Even though these are not harmonised, they are easier to use and process than INSPIRE data. But very often, harmonisation not necessary for the use cases. Most use cases come from inside the regions, especially regarding biodiversity*'.

In terms of the use, there is a strong documented growth in the demand and use of geospatial data in general (examples were provided for instance in two Member States with four times more visitors per days in six years in a case, or 3 times in 3 years another case), but there does not seem to be a specific growth in the usage of the INSPIRE data as reported by traffic numbers. '*There is generally a low usage level of INSPIRE data, from what we see in the traffic numbers*'. '*We have had no request for INSPIRE compliant data at the EPA, we are only asked for open data. The use of open data is growing, in 2018, we had 18,000 views, now it has gone up to 56,000 views*'.

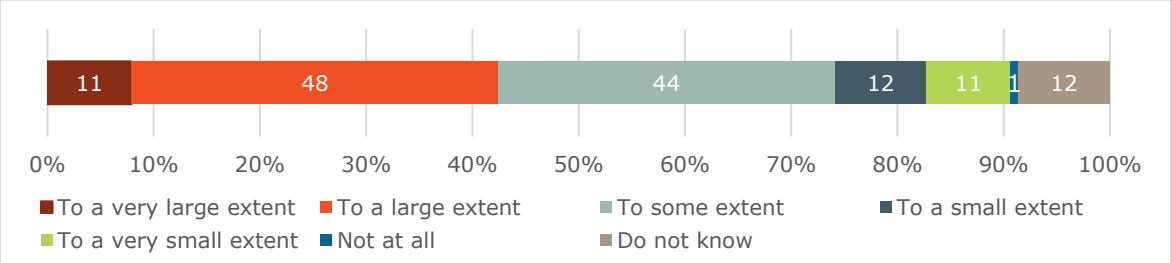
The INSPIRE Directive was reported to have a positive effect on the policy makers in two Focus Groups. The Directive was a driver to a better organisation of the governance in particular between regional and national levels. INSPIRE had driven the development of portals and centralised access to the datasets. In one of the Focus Groups it was mentioned that INSPIRE had different parts of the administration work together addressing an institutional set-up is complex. In the other Focus Groups, it was mentioned that INSPIRE was used as catalyst for coordination within different ministries or regions align different models of cadastre to offer the same products and services.

Targeted survey

In the targeted surveys, respondents were asked to indicate to what extent the implementation of the INSPIRE Directive has contributed to access, exchange and reuse of geospatial data across public sector organisations.

35% of respondents considered that the INSPIRE Directive contributed to a large extent to access, exchange and reuse of geospatial data across public sector organisations. Another third (32%) considered that it contributed to this to some extent.

Figure 5-6 Contribution of INSPIRE to access, exchange and reuse of geospatial data across public sector organisations (N=139)



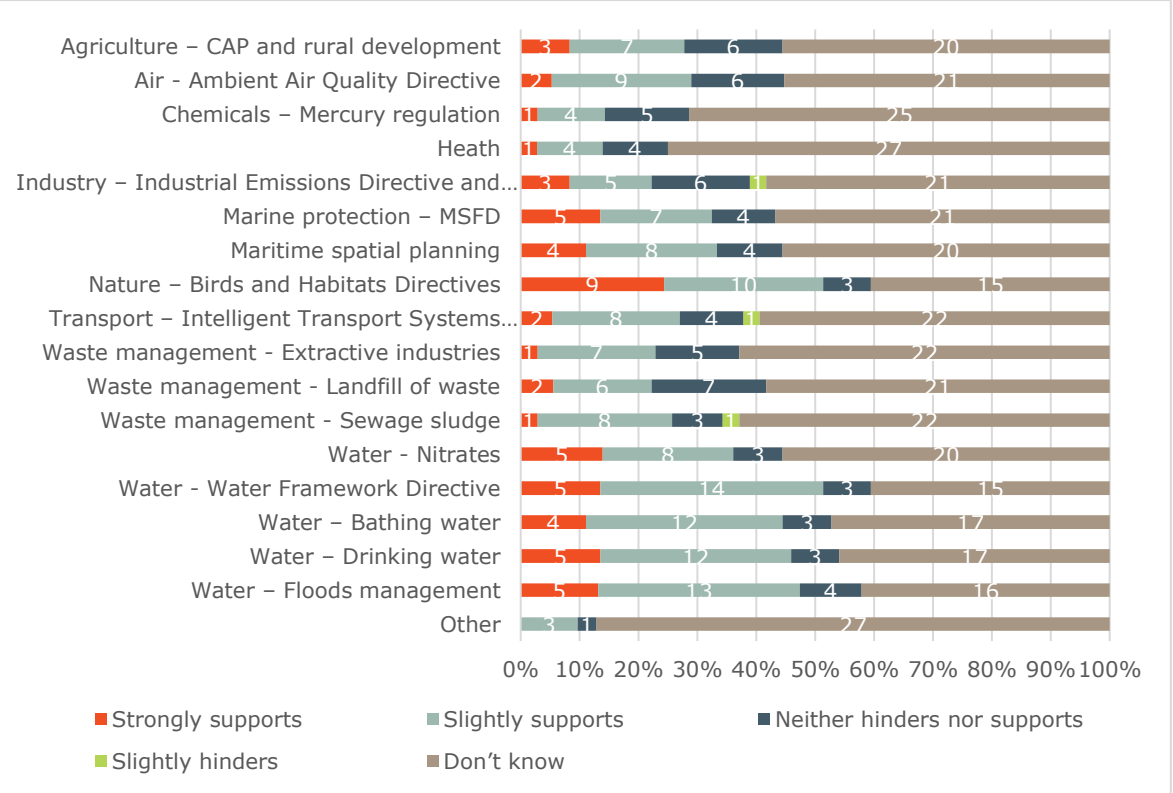
Source: All respondents, Targeted surveys (combined) April-May 2021, Question 5: To what extent has the INSPIRE Directive contributed to access, exchange and reuse of geospatial data across public sector organisations?

Public consultation

In the public consultation, respondents were asked to assess the extent to which INSPIRE supports process of planning and assessing impacts and support process of active dissemination of environmental data and information to the public in different policy areas.

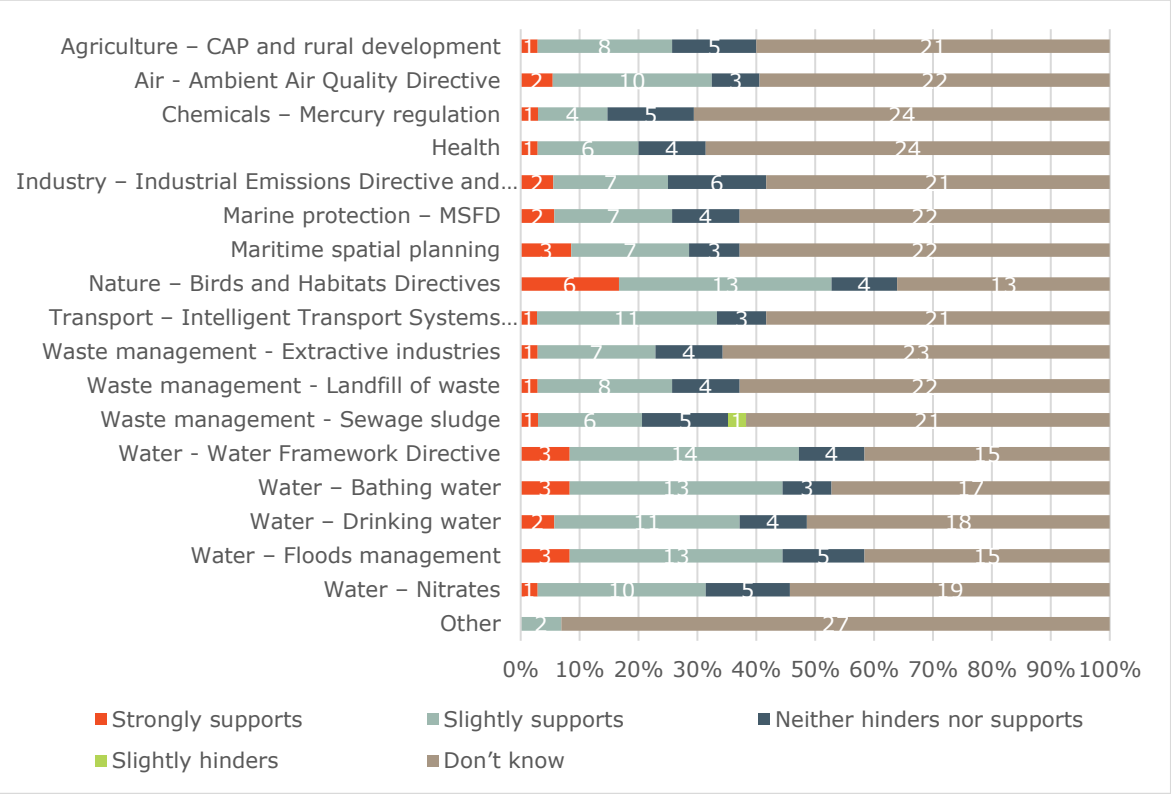
More than 50% of respondents that are public authorities indicate that they do not know (57% on average for the 18 topics). The same level (53%) applies to all types of respondents. Similarly, the same percentage of respondents indicating that they do not know is obtained regarding the extent to which INSPIRE Directive support the active dissemination of environmental data and information to the public (53%).

Figure 5-7: Support of INSPIRE to the process of planning and assessing impacts in different policy areas – responses from the public authorities (N=65-67)



Source: Public authority respondents, public consultation May-July 2021, Question 18: To what extent does the INSPIRE Directive support the process of planning and assessing impacts in the following policy areas?

Figure 5-8 Support of INSPIRE to the process of active dissemination of environmental data and information to the public in different policy areas - responses from the public authorities (N=62-65)



Source: Public authority respondents, public consultation May-July 2021, Question 19: To what extent does the INSPIRE Directive support the active dissemination of environmental data and information to the public in the following policy areas?

5.2.5. EQ 2.8 What are the qualitative and quantitative effects of INSPIRE on users active in economic sectors influencing environment?

This question expands the scope of investigation about the effects of the INSPIRE Directive in sectors other than environment such as maritime, agriculture, transport, mobility, but which have an influence on the environment. It is aimed at assessing the extent to which improved availability and access of spatial data and services generates benefits in other areas, e.g. maritime, transport (ITS), agriculture, mobility. The question is twofold: 1) what are the expected effects and impacts, 2) how to measure them.

In the first part of the eventuation question, we assess what is happening towards the end of the implementation process of the Directive. Here we look at the effects, both quantitative and qualitative, for the users of the INSPIRE data in the different sectors mentioned above.

- Regarding effects, the analysis of efficiency shows that overall, 58% of Member States indicated in their country forms that *Better overview, discoverability, availability, accessibility of data* as a main benefit of INSPIRE (see EQ 4.1). During the Focus Group interviews, harmonisation and interoperability were put forward as the main direct benefits while increased openness to share data by data providers and national infrastructure and development of national geoportals were considered the main indirect benefits.

- The intervention logic produced for this evaluation (see section 2.2) identified the following expected impact: 'Improved availability and access of spatial data and services generates benefits in other areas e.g. research and innovation, e-Government, e-Commerce, e-Health'. The reasoning is that if spatial data is available, different types of actors would use it to monitor national or regional policies, to make recommendations on these policies, to produce policy notes or to create new products or services. These activities in turn would generate positive effects for both the actors and the society/economy as a whole.

The second question relate to how to measure expected effects of the use of data one this has been defined. On that point, data that is available on the users and uses of the INSPIRE framework mostly come from the targeted surveys run for this study. However, provided the limited number of respondents, it is not possible to precisely analyse the use by type of actors, at sector level (e.g. marine, agriculture, etc.).

Text box 5-10 Key/summary findings EQ 2.8 Qualitative and quantitative effects of INSPIRE on users active in economic sectors influencing environment

The main finding on qualitative and quantitative effects of INSPIRE on users active in economic sectors influencing environment is that information on use and users is too scarce to provide a clear view of the effects of INSPIRE on users in these sectors. Studies and stakeholders involved in the INSPIRE implementation (at European Union and Member States levels) seem to be focused on making data available, without i) identifying upstream what are the precise effects that are expected on each type of users ii) monitoring or following-up how data are used, by whom and what for. At the end of the process, it is very difficult to assess the effects.

As far as uses are concerned, reporting and planning purposes rank first. This is coherent with the fact that the first users of spatial data are national / local authorities or agencies.

The **desk review** showed that the availability of data and the way data are or could be used have often been assessed but there is no precise or comprehensive information on effects of availability of the data on the users in different sectors. Even studies carried out at sector level did not directly assess the effects of use of data on the types of users in economic sectors.

The **Focus Groups** showed that Member States do not systematically have information on the nature of users of data. Most often, they do not monitor who uses the data and for what. As a matter of fact, they do not have precise information on the actual use of data and even less on what effects are associated to the use of data.

The **targeted survey** showed that stakeholders think that spatial data are used first by national governments / ministries followed by regional and local authorities and national and regional agencies.

The **public consultation** indicated that the purposes for using data are (logically) dependent from the type of users. The most important purposes are related to reporting and planning and to a lesser extent to research. Reporting and planning purposes are more cited for the Water Framework Directive and the Nature – Birds and Habitats Directives compared to Transport / the Intelligent Transport Systems Directive or Marine protection / Marine Strategy Framework Directive.

Desk review

The actual level of use of data and the effect of the use of data has not been analysed to any extent in studies, nor is this data systematically monitored in the Member States that have been part of this analysis. Several reports assessed the availability of data and how they were, or how they could be used to deliver positive effects. For instance, regarding the availability of data, indicators are published once a year for each country and available on the European Commission's INSPIRE dedicated webpages. There are also the country fiches and current status country forms. There are also regular assessments of data and metadata available, e.g. Vandenbroucke / KU Leuven (2014)[58]; Cetl V., V. Nunes de Lima, R. Tomas, M. Lutz, J. D'Eugenio, A. Nagy, J. Robbrecht (2017)[59]; Minghini M., A. Kotsev, M. Lutz (2019)[60].

However, these reports do not include much information about the effects of availability of the data on the users in different sectors. From that perspective, reports most often investigate what potential effects could be expected from the use of spatial data but do not directly measure the actual effects of the use of spatial data. It can also be argued that since INSPIRE has not been fully implemented, the potential effects that were initially identified are still to come.

The JRC carried out two projects in the past years to assess how geospatial data made available by the Member States, as a result of INSPIRE, can be used to tackle energy efficiency issues or mobility issues. The two projects were similar in spirit:

- The more recent project, completed in 2019, aimed at analysing gaps and overlaps of the INSPIRE Directive and the Multimodal Travel Information Services Directive as regards the relevant standards to be used for the sharing and reuse of data.[61] The study initiated five use-cases that addressed both data providers and data consumers. The use-cases start from a very specific need (called 'goal') from a final user, like for instance to "provide the relevant location data to the end-user, by combining information from different datasets in an unambiguous way."
- A similar study was conducted for the energy efficiency topic in 2015.[62] Five use-cases were carried out. Again, the starting point was to address a specific need of policymakers, namely the fact '*the different energy efficiency policies involve a diverse range of data requirements to assemble the necessary monitoring against targets at the different administrative levels*'. The project was aimed at assessing how INSPIRE provides solution to respond to these needs. However, nothing is mentioned regarding the effects of the use of INSPIRE data on the environment. INSPIRE data are seen as a means to achieve high-level objectives but it is not indicated whether this is achieved or not and what effects can be identified.

[58] Vandenbroucke / KU Leuven (2014), INSPIRE Evaluation: Summary of findings for EU Member States – Assessing data and services metadata resources through direct observations.

[59] Cetl V., V. Nunes de Lima, R. Tomas, M. Lutz, J. D'Eugenio, A. Nagy, J. Robbrecht (2017), Summary Report on Status of implementation of the INSPIRE Directive in EU. EUR 28930 EN. Luxembourg: Publications Office of the European Union.

[60] Minghini M., A. Kotsev, M. Lutz (2019), Comparing INSPIRE and OpenStreetMap data: how to make the most out of the two worlds. The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences 2019: XLII-4/W14.

[61] Bourée, K., De Vries, B., Duquesne, C., Dodson, C., Jugelt, S., Martirano, G., Minghini, M., Pignatelli, F. (2019), INSPIRE-MMTIS: overlap in standards related to the Delegated Regulation (EU) 2017/1926, EUR 29975 EN, Publications Office of the European Union, Luxembourg.

[62] Hans Bloem, Ray Boguslawski, Maria Teresa Borzacchiello, Piergiorgio Cipriano, Albana Kona, Giacomo Martirano, Isabella Maschio, Francesco Pignatelli (2015), Location data for buildings related energy efficiency policies, European Union Location Framework (EULF) Project Feasibility Study, JRC Technical report.

The assessment of the effects is therefore challenging to establish a direct link between the availability of data as a result of the implementation of INSPIRE and the positive effects on users in economic sectors.

Consultation activities

Scoping interviews

The scoping interview with the EEA indicated that INSPIRE provides more raw data than other sources of data which are relevant for GIS experts, but far less useful for general end-users. This could explain the limited use of data by the different users.

Focus Group interviews

The Focus Group interviews reveal that the assessment of the actual use of data by external users is not systematically made by the Member States. Member States do not monitor or follow-up the use of the data made available through INSPIRE implementation. For instance, one Focus Group indicated that it is hard to evaluate the use of INSPIRE data, since data is accessible with no login required and that no feedback on the services is given by users. Further, another Focus Group mentioned that the public authorities do not have much information on whether there are many use-cases for INSPIRE data.

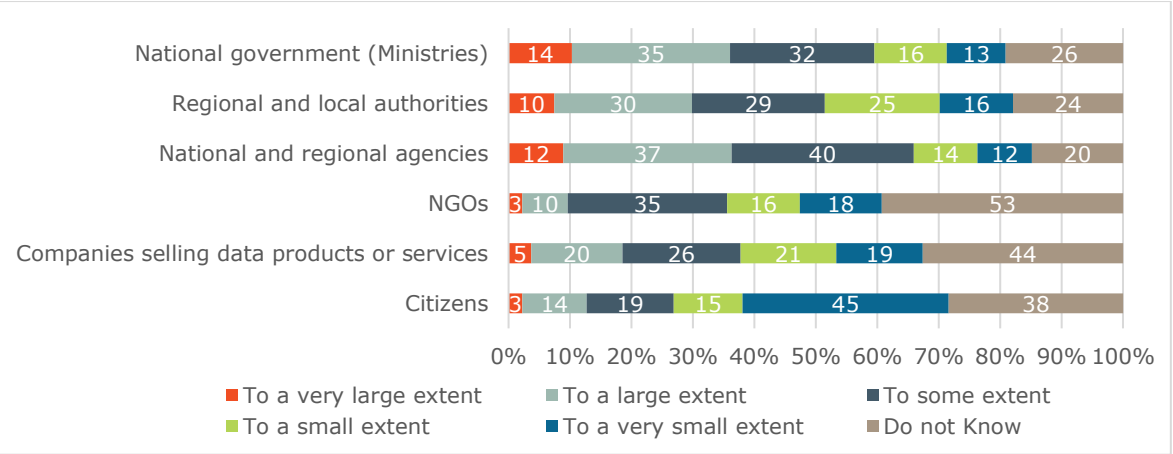
Two Focus Groups mentioned, however, that national administrations do have precise information on the users and know which datasets have been requested by whom. Nevertheless, when information is available on the use of data, it seems that the use remains limited.

Targeted survey

In the targeted surveys, respondents were asked to indicate to what extent are the spatial data made available thanks to INSPIRE used by different stakeholder groups in their Member State.

According to respondents, the spatial data made available thanks to INSPIRE are used to a very large extent or a large extent by national governments / ministries for 36% of them, by regional and local authorities for 29%, by national and regional agencies for 36%. Few respondents (9%) have the opinion that NGOs use the data to a very large extent or a large extent.

Figure 5-9 Use of data by the different stakeholder groups in the Member States (N=134-136)

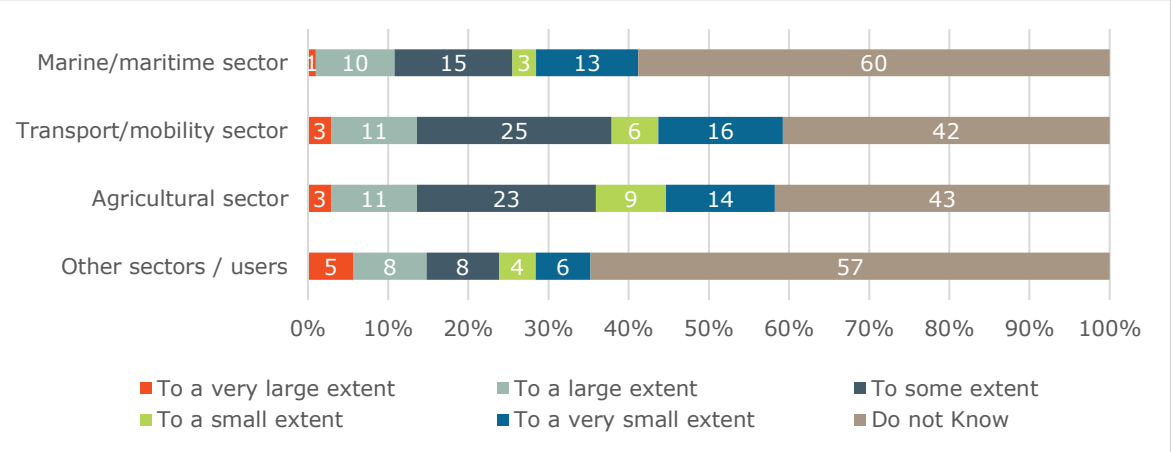


Source: All respondents, Targeted surveys (combined) April-May 2021, Question 12: In your opinion, to

what extent is the spatial data made available thanks to INSPIRE used by different stakeholder groups in your Member State?

Respondents were then asked to assess the use of spatial data at sector level. Spatial data made available thanks to INSPIRE are used to a very large extent or a large extent by the marine/maritime sector for 11% of respondents, the transport/mobility sector for 14% of respondents, the agricultural sector for 14% of respondents and other sectors / users for 15% of respondents.

Figure 5-10 Use of data at sector level (N=88-102)

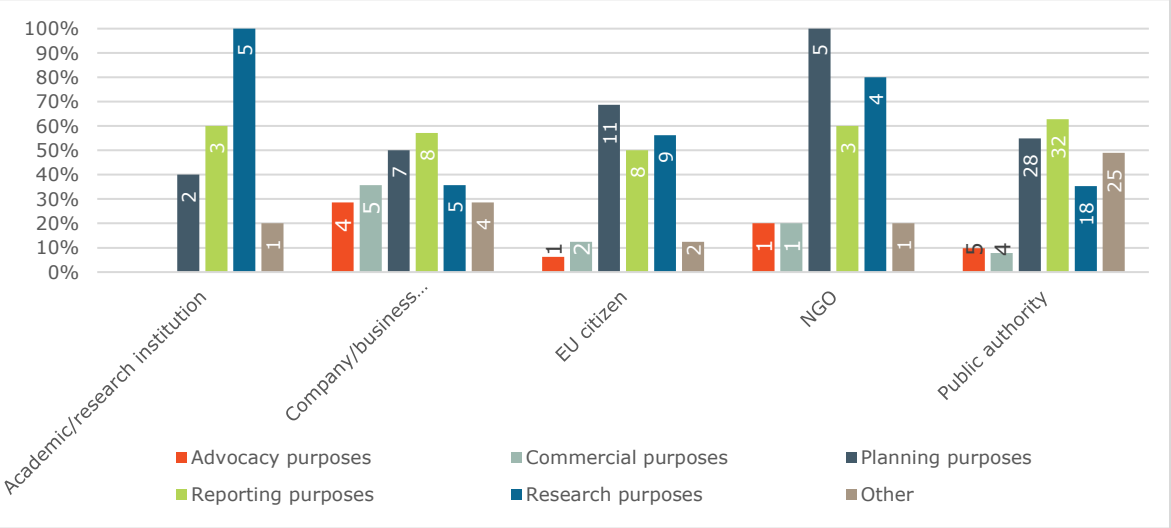


Source: All respondents, Targeted surveys (combined) April-May 2021, Question 13: In your opinion, to what extent are the spatial data made available thanks to INSPIRE used by: marine, transport, agriculture, and other sectors?

Public consultation

In the public consultation (***Figure 5-11***), respondents were asked to indicate in what ways they you use geospatial data. Data are used for different purposes by the different types of users: all academic/research institutions use data for research purposes and for 60% of respondents for reporting purposes. NGOs all indicated that they use data for planning purposes while 80% also use data for research purposes and three out of five for reporting purposes. All in all, reporting purposes and planning purposes are the two first usages of data (59% and 58% of respondents respectively). Research purposes was chosen by almost 50% of respondents.

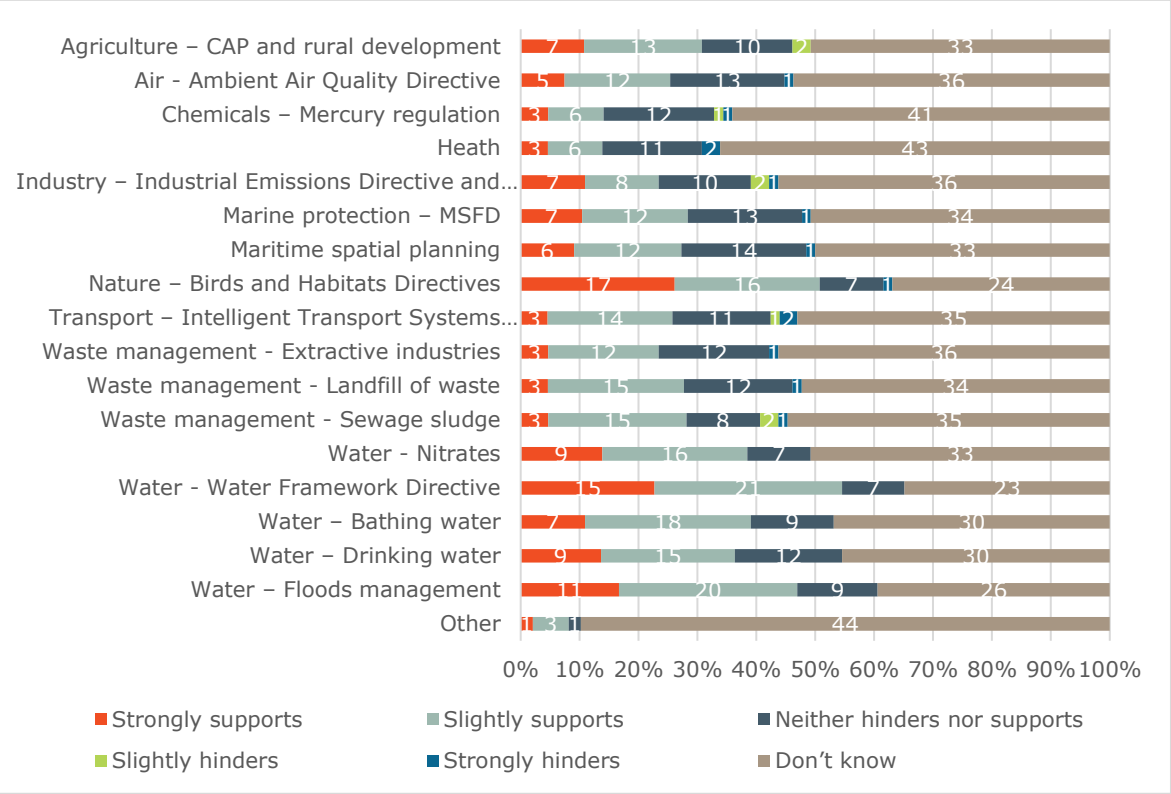
Figure 5-11 Ways in which respondents use geospatial data, breakdown by type of stakeholder (N=91)



Source: EU/EEA respondents, public consultation May-July 2021, Question 3: In what ways do you use geospatial data? – please check all that apply.

At sector level (***Figure 5-12***), as regards how INSPIRE can support process of planning and assessing impacts (either slightly or strongly), the better results are related to the Water Framework Directive (55% of respondents) and the Nature – Birds and Habitats Directives (51). One respondent out of four (26%) indicated that INSPIRE supports process of planning and assessing impacts as far as Transport / the Intelligent Transport Systems Directive are concerned. They were slightly more to consider that INSPIRE does provide support for Marine protection / Marine Strategy Framework Directive (28%).

Figure 5-12 Support of INSPIRE to the process of planning and assessing impacts in different policy areas – responses from the public authorities - responses from all respondents (N=49-67)



Source: All respondents, public consultation May-July 2021, Question 18: To what extent does the INSPIRE Directive support the process of planning and assessing impacts in the following policy areas?

5.2.6. EQ 2.9 What are the effects of INSPIRE on small businesses using spatial data?

This question is about the benefits for businesses using spatial data, e.g. for SMEs and IT service and technology providers. One aspect is related to the business models of those companies. The assumption is that the more spatial data is available, the more products and services are sold by businesses using these data, the higher the level of employment of these companies should be and the higher the total turnover of these companies should be as well.

A preliminary assessment is that there is no information available to test an increase in the number of companies selling products and services based on spatial data, the total turnover of these companies and the level of employment. It is not possible to assess the use of spatial data by small businesses and to evaluate the effects of INSPIRE on these actors, but one can reasonably argue that such effects are limited and not at all at the level that was thought (or hoped) years ago when the Directive was drafted.

This evaluation study thus tries to collect information on companies identified as users of INSPIRE data and to analyse the information from the targeted surveys on the users and their use of data.

Text box 5-11 Key/summary findings EQ 2.9: effects on small businesses

The main findings illustrate that there is a lack of information on the users of spatial data in the private sector. Because of this lack of data to assess the use of spatial data by SMEs, this evaluation attempted to identify the main users of data from the private sector. Apart from few interviewees, the knowledge by INSPIRE implementers (Member States) of companies that use spatial data is very limited. The conclusion is that the use of INSPIRE data for commercial purposes or by the private sector more generally is rather limited. Further, companies using the data are not necessarily small businesses.

The **desk review** did not allow to measure the effects of the use of spatial data on small businesses. No data or analysis is available on the actual use of data by companies.

The **Focus Group interviews** showed a lack of information on the use of data by companies in general and by SMEs in particular. Member States do not monitor such users but indicated that the number of SMEs using spatial data is most likely limited anyway.

The **targeted survey** showed that respondents believe that spatial data made available thanks to INSPIRE are barely used by companies selling data products or services. Besides, the knowledge of companies using the data is rather limited since only nine respondents provided names of companies using environmental spatial data in their products or services sold on the market.

The **public consultation** revealed the limited use of data for commercial purposes and more generally by companies themselves.

Desk review

No recent information is available on the use of data by small businesses using spatial data. A 7th FP project (SMESPIRE) aimed at encouraging and enabling the participation of SMEs in the mechanisms of harmonising and making large scale environmental content available. The final report (2013) underlined that '*the involvement of private sector companies in national INSPIRE/SDI policies is rather low.*[63] *In most Member States, little effort is made to involve the Geo-ICT sector in the INSPIRE/SDI policy process. In some Member States, participation of companies in this process happens in a rather informal and unstructured manner*'. The report highlighted that expectations towards INSPIRE were high as regards economic impacts due to a high level of new products or services put on the market.

Consultation activities

Scoping interview

During the scoping interviews with the different European Commission services, interviewees provided types or names of actors that use spatial data for their business or business development. In the transport sector, actors involved in navigation for vehicles or in traffic engineering are such users. The former use data for the devices

[63] Piergiorgio Cipriano, Cameron Easton, Elena Roglia, Glenn Vancauwenberghe (2013), A European Community of SMEs built on Environmental Digital Content and Languages, Final report.

they sell on the market while the later are the final users of the data. However, use of spatial data does not necessarily mean use of data from the INSPIRE framework in the sense that the data they need or use, do not necessarily come from INSPIRE geoportal. The data they need/use might not be INSPIRE compliant and therefore not available on the INSPIRE geoportal. Or the available datasets are not timely and therefore of no interest for the service providers. It was mentioned that for instance that INSPIRE data updated once a year are useless for monitoring real-time traffic (interview with DG MOVE).

Focus Group interviews

During one Focus Group with a Member State that is categorized as among the most-advanced as regards the implementation of INSPIRE, it was said that "datasets and services are not used so much in the private sector". During the Focus Group with Italy, it was said that '*INSPIRE services are not easy to use, in particular for SMEs. SMEs ask for data, but they use INSPIRE data rarely*'.

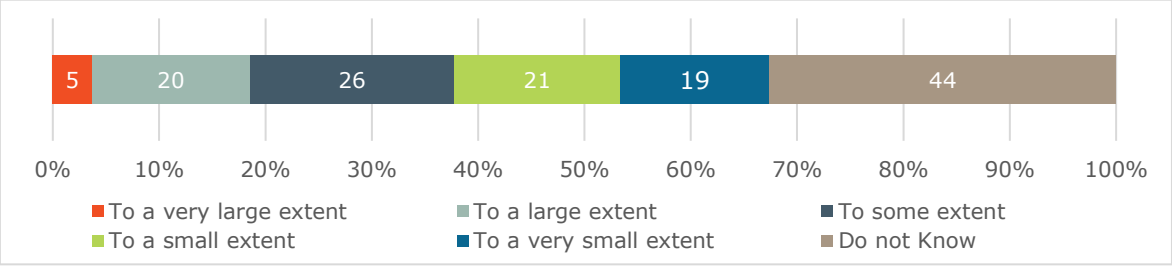
No Member State provided evidence either on the effects of INSPIRE on small businesses using spatial data.

Targeted survey

In the targeted surveys (***Figure 5-13***, respondents were asked to indicate to what extent is the spatial data made available thanks to INSPIRE used by companies selling data products or services. For 19% of respondents, the spatial data made available thanks to INSPIRE are used to a very large extent or a large extent by companies selling data products or services. 30% of respondents have the opinion that they use spatial data to a very small extent or small extent.

Nine respondents provided names of companies that use environmental spatial data in their products or services sold on the market[64]. 25 companies are mentioned, some providing GPS applications or mobility information more generally.

Figure 5-13 Use of data by companies selling data products or services in the Member States (N=135)



Source: All respondents, Targeted surveys (combined) April-May 2021, Question 12: In your opinion, to what extent is the spatial data made available thanks to INSPIRE used by different stakeholder groups in your Member State?

Public consultation

In the public consultation, respondents were asked to indicate in what ways they you use geospatial data. Data are barely used for commercial purposes: 13% of respondents indicated that they use data for such purposes. 20% of NGOs, 13% of EU

[64] Question 14 : If you are aware of any outstanding examples of companies using environmental spatial data in their products or services sold on the market, please describe them below.

citizen and 8% of public authorities stated to use data for commercial purposes Notably, 36% of company/business organisation/association stated a use of data for commercial purposes. Most likely, the use does not follow the same purposes for companies or business organisations on the one hand and for associations on the other hand. But still, the level is very low.

5.3. Relevance

The relevance assessment considers the extent to which the INSPIRE Directive continues to respond to the needs and problems that it is intended to address, i.e. supporting knowledge-based policy needs for spatial data. It therefore looks at the rationale for establishing the Directive and whether that rationale is still valid. It revisits the concerns and problems identified at the time of establishing the Directive and determines key developments since then and whether the initial concerns and problems remain valid. Key developments of the evaluation period relate to the rapid evolution of digital technologies, the EU digital market policy, the recent European Green Deal, and greater expectations from citizens about environmental information.

5.3.1. EQ 3.1 To what extent does INSPIRE still match current needs and do they continue to require action at EU level?

The question is aimed at assessing the extent to which the objectives of the INSPIRE Directive match the needs of European Commission, of Member State authorities and of the general public, and whether there is evidence for a continued need for EU action.

The Intervention Logic identified the following two needs:

- to improve the availability, quality, organisation, accessibility and sharing of spatial information that are common to a large number of policy and information themes and are experienced across the various levels of public authority and across different sectors;
- to decrease the costs to public sector in searching for data that already exist and in duplication of efforts at different levels of administration.

In this study, we assess how the different stakeholders consider the needs for spatial data and how they assess the capacity of INSPIRE to match them. As far as public authorities, evidence was collected during the scoping interviews and Focus Group interviews.

Dedicated efforts were made to assess the needs of private sector on the one hand and the extent to which INSPIRE match them on the other hand. During scoping interviews and Focus Group interviews, interviewees were asked to indicate whether they had list of companies using INSPIRE / spatial data. Very few names were mentioned. Further, the Targeted Surveys were also used to collect names of companies which would have been contacted in a second step to question their needs and the extent to which INSPIRE match them.[65] 25 names were collected in total which was too low for a dedicated targeted survey.

[65] Question 14 of the public consultation: If you are aware of any outstanding examples of companies using environmental spatial data in their products or services sold on the market, please describe them below

Text box 5-12 Key/summary findings EQ 3.1: current needs

The main findings related to the match between INSPIRE and the current needs are manyfold. First, as mentioned several times already (see questions related to current status (EQ 1.1 and 1.2) or effectiveness (EQ 2.1 and EQ2.2)), the implementation of INSPIRE not fully delivered on what was expected in 2007. This suggests that the initial needs have not been fully addressed yet. In the Intervention logic produced for this study (see section 2.2), needs are identified as follows: i) improving availability, quality, organisation, accessibility and sharing of spatial data; and ii) decreasing costs for public sector in searching for data.

Secondly, the evaluation demonstrates that the national and public authorities have a need for spatial data for the different phases of their policymaking (design of policy, monitoring of policy and assessment of results and effects). INSPIRE addresses these needs and justifies an action at EU level.

Thirdly, for other actors (companies, NGOs, researchers, citizens), there is limited information on their actual needs. Our attempt to make a list of SMEs using INSPIRE spatial data did not prove effective because the information on the SMEs that use INSPIRE spatial data is very fragmented and very partial.

The **desk review** shows that the need of data from the public sector is demonstrated, and further, that INSPIRE is relevant to address this need. The 2016 REFIT evaluation reaffirmed the relevance of INSPIRE to address the current needs. Regarding the needs of the other actors and in particular those of the private sectors, they have seldom been assessed.

The **Focus Group interviews** showed that the lack of spatial data remains the main challenge and justifies the need for an action at the EU level because the public authorities need spatial data for their policymaking activities.

The **targeted surveys** showed that the INSPIRE Directive addresses the future most significant needs in terms of availability of spatial data for reporting to the European commission and planning, and to a lesser extent the availability of spatial data for policymaking and for monitoring of policies.

The **public consultations** showed that making geospatial data available to citizens and organisations is considered as very important. Companies/business organisations/associations are less inclined than the whole population of respondents to make this statement.

Desk review

The 2004 Impact Assessment of the Directive[66] concluded that ISPIRE would provide 'access to and delivery of spatial data, meeting the needs of users ranging from members of the public and academics to policy-makers and commercial users.' In particular, needs of regional and local authorities were considered as addressed by the Directive.

[66] European Commission (2004), Commission Staff Working Document: Proposal for a Directive of the European Parliament and of the Council establishing an infrastructure for spatial information in the Community (INSPIRE): Extended Impact Assessment

Assessment of the needs of the private sector was roughly carried out in the 2004 Impact Assessment. The report stated that *'(…) the benefits for these organisations [citizens, private sector data users, research institutes] arise from having (potential) access to existing data'*. The only benefit that is put forward is the reduction in cost for searching and collecting data. As regards an increase in the search, collection, reuse of data resulting from the sharing of data thanks to INSPIRE, the report stated that 'p*rivate added value resellers will find it easier to develop new services, to the benefit of the society as a whole'*. However, the demonstration that there are such actors keen on developing these services is not made. In conclusion, needs of the private actors were not assessed.

Overall, the needs of the different users were not precisely defined in the Directive. More generally, users are barely taken into perspective. Users are mentioned few times in the Directive and first appear in Article 7 (on interoperability) and then in Article 18 (on governance).

The 2014 Mid-term evaluation report on INSPIRE implementation indicated that the initial problem of the availability of spatial data in the context of INSPIRE was that data was not visible or accessible to users.[67] According to the report, as a result of INSPIRE, documentation on existing data has improved as well as on who is responsible and how to access it. From that perspective, the needs were addressed by INSPIRE. The question at stake is therefore whether or not INSPIRE is still relevant to meet current needs.

The 2016 REFIT evaluation report indicated that *'from a policy perspective, the INSPIRE Directive remains or is even increasingly relevant. This is most clearly shown through the Commission priorities relating to the 2015 EU Digital Single Market strategy. It identified the need to increase cross-sector interoperability in the public sector (with the revision of the European Interoperability Framework) where INSPIRE is of major relevance.'*[68] The report has a strong focus on the public actors and did not provide evidence regarding the needs to be addressed by INSPIRE from the perspective of the private sector.

The use-cases in the JRC studies (on mobility[69] in 2019 and on energy[70] in 2015) put the needs of data as the starting point of the analysis. The first issues that were addressed were why users need data (the overarching objective) and for what (the primary goal). Once these needs were clearly defined, the second question to be answered was how can available data help users in reaching their goal? As far as the maritime sector and the study carried out for DG MARE in 2017[71] are concerned, only the public users were taken into consideration.

[67] EEA Technical report (2014), Mid-term evaluation report on INSPIRE implementation, Joint EEA-JRC report.

[68] European Commission (2016), Report from the Commission to the Council and the European Parliament on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23 (COM/2016/0478 final/2).

[69] Bourée, K., De Vries, B., Duquesne, C., Dodson, C., Jugelt, S., Martirano, G., Minghini, M., Pignatelli, F. (2019), INSPIRE-MMTIS: overlap in standards related to the Delegated Regulation (EU) 2017/1926, EUR 29975 EN, Publications Office of the European Union, Luxembourg.

[70] Hans Bloem, Ray Boguslawski, Maria Teresa Borzacchiello, Piergiorgio Cipriano, Albana Kona, Giacomo Martirano, Isabella Maschio, Francesco Pignatelli (2015), Location data for buildings related energy efficiency policies, European Union Location Framework (EULF) Project Feasibility Study, JRC Technical report.

[71] European Commission (2017), MSP data study: Evaluation of data and knowledge gaps to implement MSP. Written by Assistance Mechanism for the Implementation of Maritime Spatial Planning.

The JRC studies mentioned above have defined the need for spatial data. The lesson learnt is that when the need is precisely defined, it is possible to define the datasets that are needed for these needs. The ideal starting point is thus to define the needs for setting-up a data model fitted to these needs. The starting point for the INSPIRE Directive was the question of availability of data and is mostly oriented towards sharing of data, making data available.

Consultation activities

Focus Group interviews

In the Focus Group interviews and the scoping interviews, it was mentioned that there is a need for spatial data for policymaking, monitoring and reporting. It was indicated that INSPIRE is needed to address that need, in spite of costs supported by the Member States to provide the datasets and of the insufficient level of datasets available (see EQ 4.5 related to efficiency). Two Focus Groups, however, underlined the necessity of the European Commission to demonstrate the relevance of INSPIRE that is to say how data can be used to address needs of the different actors.

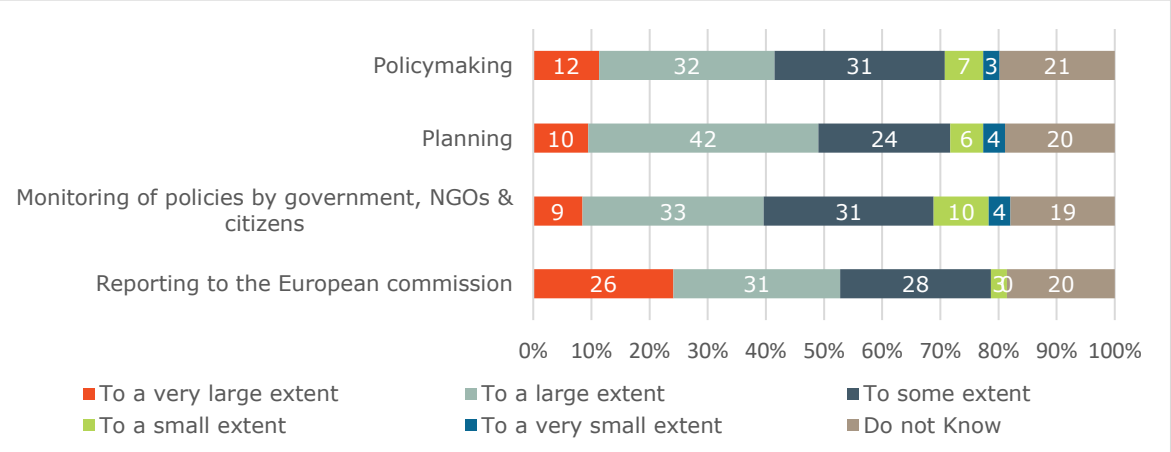
During the Focus Groups, interviewees were asked how the needs of the other actors (researchers, NGOs, private companies and citizens) are identified and addressed. While Member States know what the needs of the public authorities are regarding spatial data for policymaking, they do not work closely with the other actors to identify their needs and the solutions to address them. Instead, Member States consider that the supply of spatial data is the key for an effective use of such data and, implicitly, assume that this supply will eventually match the demand for spatial data. The assumption made by Focus Group interviewees is that private users will generate added-value, turn-over, and jobs if data are made available.

Targeted survey

In the targeted surveys (***Figure 5-14***), respondents were asked to what extent the INSPIRE Directive addresses the future most significant needs in terms of availability of spatial data for: policy making, planning, monitoring of policies by government, and reporting to the Commission.

Half of the respondents (49% and 53% respectively) considered that the INSPIRE Directive addresses to a very large extent or large extent the future most significant needs in terms of availability of spatial data for reporting to the European Commission and planning respectively. They are fewer respondents that consider that INSPIRE addresses to a very large extent or large extent the future most significant needs in terms of availability of spatial data for policymaking (41%) and for monitoring of policies (39%).

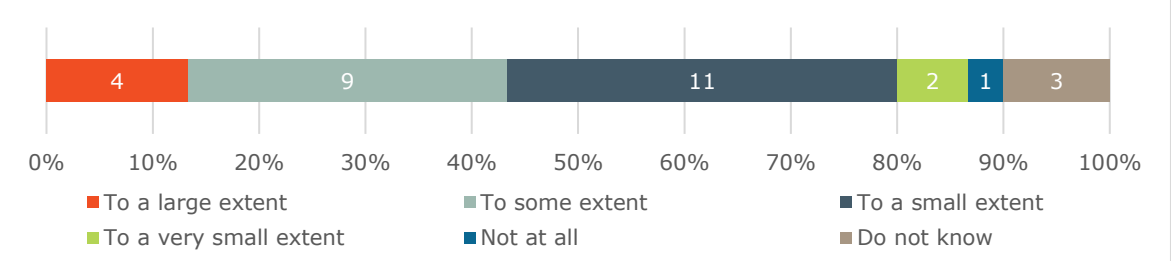
Figure 5-14 Capacity of INSPIRE to address future most significant needs (N=106-108)



Source: All respondents, Targeted surveys (combined) April-May 2021, Question 16: To what extent does the INSPIRE Directive address the future most significant needs in terms of availability of spatial data for: policy making, planning, Monitoring of policies by government, reporting to the European Commission?

In ***Figure 5-15***, 13% of respondents indicated that the INSPIRE Directive addresses to a very large extent the current and future most significant needs in terms of availability of data for the marine/agriculture sector. 30% think that INSPIRE addresses these needs to some extent. 37% of respondents indicated that INSPIRE addresses these needs to a small extent.

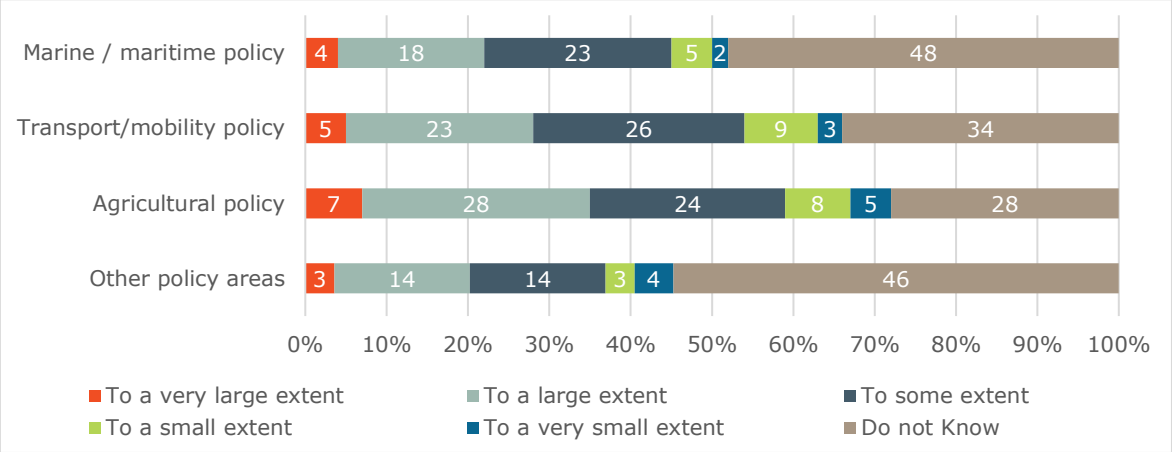
Figure 5-15 Capacity of INSPIRE to address future most significant needs in terms of availability of data for the marine/agriculture sector (N=30)



Source: All respondents, Targeted surveys (combined) April-May 2021, Question 17: To what extent does the INSPIRE Directive address the current and future most significant needs in terms of availability of data for the marine/agriculture sector?

As regards the correspondence between the needs of the sectors and INSPIRE (Figure ***Figure 5-16***), according to respondents, the Directive is most suited for the agricultural policy than for transport/mobility policy or for the marine / maritime policy. The future most significant needs in terms of availability of data for the agricultural policy are addressed to a very large extent or a large extent by INSPIRE for 35% of respondents. 28% of respondents think this for the transport/mobility policy and 22% of respondents for the marine / maritime policy.

Figure 5-16 Capacity of INSPIRE to address future most significant needs for specific sectors (N=84-100)



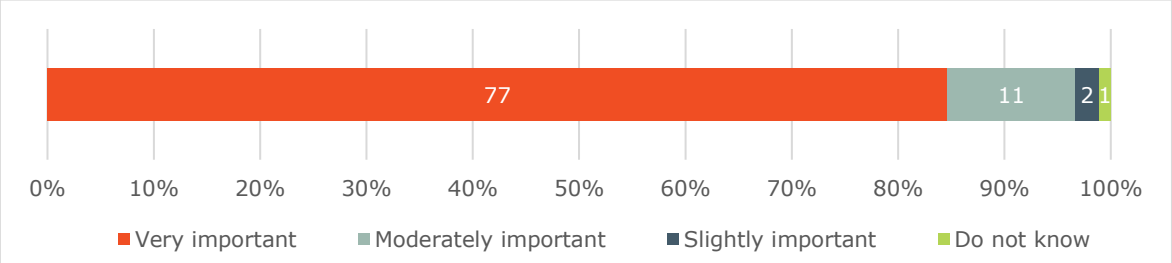
Source: All respondents, Targeted surveys (combined) April-May 2021, Question 18: To what extent does the INSPIRE Directive address the future most significant needs in terms of availability of data in the following areas: marine, transport, agriculture, and other sectors?

Public consultation

In the public consultation (***Figure 5-17***), respondents were asked how important they consider it is to make geospatial data (such as protected sites, land use, transport networks, infrastructure/facility locations, or environmental resources) available to citizens and organisations. This is very important to 85% of respondents and moderately important to 12%.

The number of companies/business organisations/associations indicating a moderate importance (50%) is higher than the number of those stating a big importance (36%).

Figure 5-17 Importance to make geospatial data available to citizens and organisations (N=91)



Source: EU/EEA respondents, public consultation May-July 2021, Question 8: In your view, how important is it to make geospatial data (such as protected sites, land use, transport networks, infrastructure/facility locations, or environmental resources) available to citizens and organisations?

5.3.2. EQ 3.2 Is INSPIRE still relevant to the issues (obstacles) it addresses?

The question aims to assess the need for action in order to overcome the obstacles for the sharing of spatial data. It also relates to the relevance of the specific objectives of the Directive and of the related actions for making spatial data and services more easily accessible. A related issue has to do with the persistence of the obstacles originally identified.

The 2004 Impact Assessment identified several obstacles justifying an EU action:

- Difficulties of access to information (insufficient metadata at all levels);
- Different projections and scales, making existing information difficult to integrate;
- Unclear status of the information as to its currency;
- Prohibitive cost of geographical data;
- Lack of interoperability between data sets, and among web-enabled services;
- Lack of harmonisation in the codes used to represent the objects described;
- Varying data quality from one country to another within the same layer of geographical information;
- Lack of long-term solutions (instead: supply of snapshots, absence of information on changes), resulting in information that becomes quickly outdated and hence the need for duplication of data collection efforts.

As demonstrated already (see EQ 1.1, EQ 1.2, EQ 2.1 and EQ 2.2), the Directive has not permitted to fully overcome all of these obstacles which therefore remain (at least partially) valid.

The point is therefore to assess the extent to which INSPIRE is relevant to address these obstacles.

Text box 5-13 Key/summary findings EQ 3.2: relevance of INSPIRE to still address the issues (obstacles)

The main findings are that obstacles considered when the Directive was drafted continue to remain valid and that INSPIRE is still valid to address them.

The **desk review** show that obstacles for making data available, organised, accessible and shared were originally addressed by the Directive. The 2016 REFIT evaluation reiterated the relevance of the Directive to address the obstacles that were still persistent.

The **Focus Group interviews** show that the obstacles (mentioned above) are still valid and that INSPIRE is still considered as a good means to address them.

The **public consultation** show that stakeholders overall consider that an action is required at the EU level to address obstacles and needs related to sharing and disseminating spatial data. 77% of respondents indicated that an action is required at the EU level to address to a large extent or to a moderate extent obstacles and needs related to sharing and disseminating spatial data as addressed by the INSPIRE Directive.

Desk review

The Directive indicates in the preamble that there were problems regarding the availability, quality, organisation, accessibility and sharing of spatial information in a large number of policy and information themes. These problems, experienced across the various levels of public authority, needed to be fixed and justified the Directive.

The 2016 REFIT evaluation concluded that the general and specific objectives of the Directive remained true. It indicated that the obstacles originally identified were still persistent and that the actions identified under INSPIRE were also still valid (even if they lacked effectiveness and efficiency).

Consultation activities

Scoping interviews

There is a consensus among the European Commission services that the objectives of INSPIRE are still relevant to the issues that were initially addressed. The scoping interview with DG AGRI highlighted the importance of data for policymaking. It was suggested to have the data to be made available on IACS in an Annex of the Directive. During the scoping interview with DG MARE, it was said that in spite of a need for a revision of the technological aspect of the Directive (see EQ 3.3), the overall relevance of the Directive is strong.

Focus Group interviews

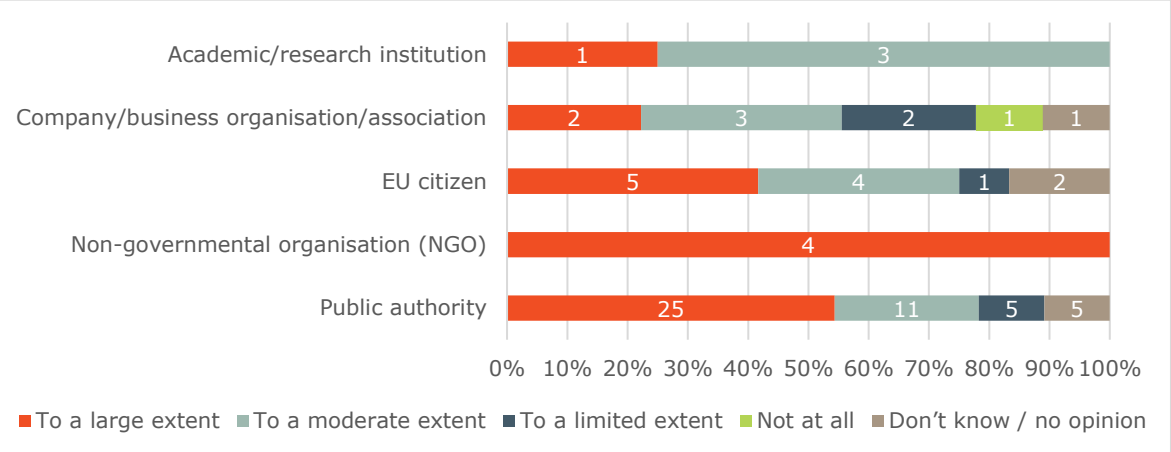
From the point of view of the Member States, INSPIRE objectives are still relevant to overcome the obstacles. None of the Member States pleaded for another solution than INSPIRE. Clearly, while Member States consider that the implementation of the Directive is complicated, takes time, has a high cost (and higher most likely to what was foreseen at the beginning) and while the level of data that is available remains limited and far from the initial or even updated (and downgraded) objectives, they consider that the Directive can provide solutions to the obstacles.

Public consultation

In the public consultation, respondents were asked to indicate to what extent do the obstacles and needs related to sharing and disseminating spatial data as addressed by the INSPIRE Directive require action at EU level.

For 49% of respondents ***Figure 5-18***), action is required at the EU level to address to a large extent obstacles and needs. They are even 77% to consider that such an action is required to a large extent (49%) or to a moderate extent (28%). Since 61% of respondents are public authorities, the average means of all respondents are strongly dependent from those of public authorities. However, this said, public authorities are more inclined to consider that, to a large extent, an action is required at EU level than the other types of respondents.

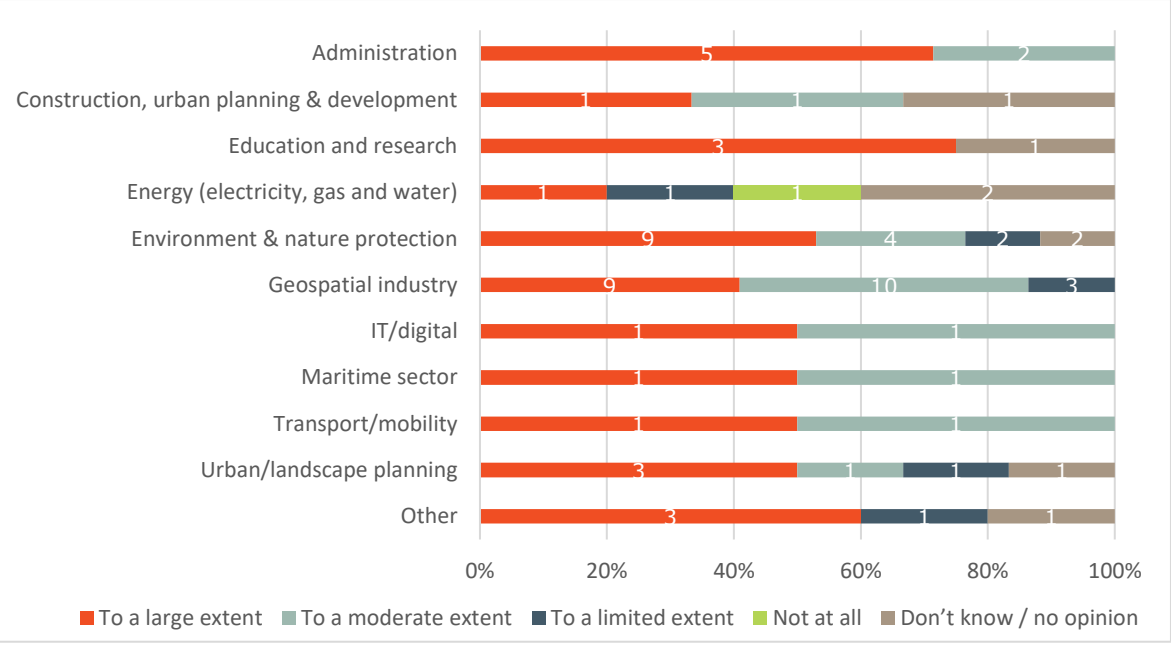
Figure 5-18 Assessment of action required at EU level, breakdown by type of stakeholder (N=75)



Source: All respondents, public consultation May-July 2021, Question 28: To what extent do the obstacles and needs related to sharing and disseminating spatial data as addressed by the INSPIRE Directive require action at EU level?

However, a look (***Figure 5-19***) at the distribution of respondents into the main sectors they are active in shows that the geospatial industry is a sector for which we collected the highest number of responses and for which the modality "to a large extent" is noticeably low (41%) and the modality "to a moderate extent" among the highest ones (45%).

Figure 5-19 Assessment of action required at EU level, breakdown by sector of activity of respondents (N=75)



Source: All respondents, public consultation May-July 2021, Question 28: To what extent do the obstacles and needs related to sharing and disseminating spatial data as addressed by the INSPIRE Directive require action at EU level?

5.3.3. EQ 3.3 To what extent is INSPIRE future-proof?

After assessing whether the INSPIRE Directive was relevant in 2021 (see previous EQ 2.1 and 2.2), EQ 3.3 seeks to assess the extent to which INSPIRE Directive will still be relevant in the future.

This question mainly reflects the considerations made by the various stakeholders consulted during the evaluation about INSPIRE technological practicalities i) in the implementation but also ii) in the use of spatial information. The implementing rules and associated technical guidelines specify common data models, code lists, map layers and additional metadata on the interoperability to be used when exchanging spatial datasets[72]. These Implementing rules and technical guidelines have been developed to support the development of interoperable datasets in the scope of the INSPIRE framework. The evaluation collected information on the impact of these for future deployment and use of the INSPIRE framework.

The following text is based on the combination of scoping interviews and Focus Group interviews. The targeted survey and public consultation did not provide evidence on the topic. The answer to this question is also based on the results for EQ 2.5 dealing with technological barriers in the implementation and use of INSPIRE.

Text box 5-14 Key/summary findings EQ 2.1: future proof

The main finding is that the technical specifications for the INSPIRE framework is a barrier to current and future implementation as well as use.

The **Focus Groups** and **scoping interviews** point at some technical rigidities in the implementation and use of INSPIRE mainly brought by the ambition of interoperability.

Consultation activities

Scoping interview

As described in EQ 2.5, the scoping interviews with JRC pointed that the Directive was technologically over-specified and that the implementing rules were rigid. One solution to move on from this issue was to work on communities of best practices instead of over-specifying the implementing rules.

Focus Group interviews

One of the main barriers to implementation identified by the Member States (see previous EQ 2.5) relates to the complexity of implementing INSPIRE in the light of various technical issues. The technical over-specification of the Directive was identified as a burden for its full implementation as i) it impacts on the resources and competences needed for implementation in Member States, ii) questions the relevance of the Directive for potential users (outside of EU authorities and data providers) that would need more flexibility in the use (see EQ 2.5), and in particular in the standards and formats.

[72] INSPIRE geoportal

In that sense, even though the ambition of accessibility and interoperability of environmental data remain and continue to be relevant for the Member States, the technical provisions and practicalities of the Directive do not seem to be future-proof.

5.3.4. EQ 3.4 Are the Articles 7 and 8 of Directive 2003/4/EC on public access to environmental information still relevant in view of the current state of the INSPIRE infrastructures?

As analysed in EQ 5.4 on the coherence of the INSPIRE Directive compared to Articles 7 and 8 of Directive 2003/4/EC on public access to environmental information, there are no inconsistencies between the two Directives.

The scope of Articles 7 and 8 of Directive 2003/4/EC on public access to environmental information is much broader than the INSPIRE Directive. The INSPIRE Directive has been designed to be consistent with the EU legal framework on data sharing and dissemination – Public Access to Environmental Information Directive and the Open Data Directive (see EQ 5.4). If not effectively assessed in this evaluation, INSPIRE could support the implementation of PAEI. As a consequence it should not be judged as irrelevant.

5.4. Efficiency

The efficiency assessment analyses whether the costs of the Directive can be justified by the benefits it generates. As such, for the efficiency analysis we focus on the effects/benefits of the implementation of INSPIRE Directive, as well as on the costs of the implementation of the Directive. Attention is paid to experienced costs, impacts and benefits to different types of stakeholders (e.g. national authorities, regional/local authorities, businesses, and NGOs). The evaluation also identifies areas/processes where there is scope for reducing inefficiencies, such as burdensome regulatory and administrative costs incurred by stakeholders, or cases where the Directive's provisions could be streamlined.

The assessment of efficiency is based on desk research of studies and on the past evaluations (REFIT and the midterm evaluation)[73] as well as on the analysis of the 31 country forms, the scoping interviews and the Focus Group interviews, the targeted surveys and the public consultations. For the purpose of the analysis, we have developed costs and benefits categories. These are used throughout the efficiency analysis and have been used to identify costs types for the analysis of the country forms, the focus group interviews as well as the targeted surveys. The benefit and cost categories are presented in tables 5-11 and 5-12.

Specific data considerations are included under the individual evaluation questions.

5.4.1. EQ 4.1 To what extent, and how has the intervention lead to improvements in the quality or efficiency of work of concerned stakeholders?

The direct benefits (or effects) of INSPIRE identified under effectiveness criterion are those related to improved data accessibility, availability, quality, data sharing, and interoperability. As assessed under effectiveness (EQ 2.6-2.9), the effects and impacts of INSPIRE arise when data is being shared between Member State authorities and access is being provided to the public to spatial (environmental) information. This also includes benefits for the private sector as new products and solutions can be developed based on INSPIRE data sets. INSPIRE is intended to support an improved geospatial data infrastructure thus leading to improved cost-effectiveness in the production/processing of geospatial data thereby generating cost savings (economic impact). A number of indirect benefits are also analysed. Some of these indirect benefits relate to improvements in the quality and efficiency of stakeholders when conducting their work. Another benefit is that INSPIRE might have been inspirational and beneficial to other policy areas beyond the SDI and the environment as assessed under effectiveness EQ 2.7-2.9.

[73]

Text box 5-15 Key/summary findings EQ 4.1: improvements in the quality or efficiency of work

With regard to the improvements of the quality and/or efficiency of the of the work of involved stakeholders, the main **direct benefits** of the directive has been: *Better overview, discoverability, availability, and accessibility of data.* The main benefits are followed by *Harmonisation and interoperability,* and *Innovation, technologies, and technical knowledge*. These benefits were identified in the analysis of the country forms reports. The Focus Group interviews with seven Member States confirmed that especially *harmonisation and interoperability* is a key benefit. In Member States where data is stored in many different formats and some of these formats are not readable using the most common GIS systems, creating services and formats that can be used by all users is one of the most important benefits. In the targeted surveys the *Better overview, discoverability, availability, accessibility of data* was the only types of benefit identified by 30% of the respondents as very significant. Also, the public consultations confirm that *Better comparability and interoperability* are the main benefits. 67% of the respondents marked this option.

In terms of **indirect benefits** *Increased openness to share data by data providers and national infrastructure* and development of *national geoportals* are mentioned by Focus Groups as the most significant and these two benefits also receive the highest score in the targeted and public consultations. Actually, this points to that INSPIRE has been instrumental in furthering the development of the national geoportals as well as in promoting increased sharing of data.

Desk review

In the REFIT evaluation,[74] Member States reported benefits mostly in qualitative terms. At that time of the implementation of the INSPIRE Directive (2016), benefits were yet to be fully realised. However, the REFIT report found that benefits were starting to emerge in terms of improved data access, better cooperation across the public sector, skills and capacity building, less duplication of work, improved information for supporting environmental policy, and better e-government services to citizens and business.

EQ 2.7-2.9 analyse the effects of INSPIRE on the access to data for different user groups in particular in relation to access to environmental data. A number of use-cases are analysed in EQ 2.9 to assess the effect on small businesses using spatial data. The findings of this analysis point to that data has been made available but that it is difficult to assess the effects of the available data on the users in those economic sectors that influence the environment such as transport (see section 5.2.5). The analysis of the effect on small businesses using spatial data (See section 5.2.6) shows a similar finding, namely that although the spatial data is available, the research conducted on SME involvement does not point to that SMEs are benefitting to a large extent.

We have established an overview of the benefits types identified by the Member States in the 31 country forms. The results presented in ***Table 5-11*****Error!**

[74] European Commission (2016), Report from the Commission to the Council and the European Parliament on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23 (COM/2016/0478 final/2).

Reference source not found., shows that 18 Member States (58%) identify *Better overview, discoverability, availability, accessibility of data* as a main benefit of INSPIRE. This is followed by *Harmonisation and interoperability* and *Innovation, technologies, and technical knowledge*, which are identified by 11 Members States as benefits of the implementation of INSPIRE. The remaining benefit categories are identified by 3-9 Member States of the INSPIRE implementation. For the indirect benefits, the main benefit identified in the country forms by Member states was the *National infrastructure and data strategy development* (19%). EU wide collaboration was identified by 16% whereas Increased openness to share data by data providers was only identified by 13% of the Member States.

Table 5-11 Benefits deriving from INSPIRE listed by Member States in the country forms

Direct benefits		**Number of MS in the country forms**
Type of benefit	***Benefit identified by stakeholders:***	
Benefits from the production/processing geospatial data	Improved quality and reliability of data	4 (13%)
	Harmonisation and interoperability	11 (35%)
	Improved cooperation among stakeholders	7 (23%)
Benefits from products (public/private) based on geospatial data	Reduction of time/ costs (efficiency)	10 (32%)
	Share and reuse of data	9 (29%)
	Economic profit and new business opportunities	4 (13%)
	Innovation, technologies, and technical knowledge	11 (35%)
	Better overview, discoverability, availability, accessibility of data	18 (58%)
	Improved quality and reliability of data	7 (23%)
Indirect benefits		**Number of MS in the country forms**
Type of benefit	***Benefit identified by stakeholders:***	
Transparency and improved policy making	Contribution to policy making in various areas	4 (13%)
	Increased openness to share data by data providers	3 (10%)
Benefits at national and EU level	Socio-economic benefits	5 (16%)
	National infrastructure and data strategy development	6 (19%)
	EU-wide collaboration	4 (13%)

Source: Current status country forms (N=31).

Consultation activities

Scoping interviews

As mentioned in the effectiveness analysis, in interviews with the JRC it was underlined that INSPIRE remains largely provider driven and thus the main effects will accrue to this stakeholder group (providers). These data providers (government institutions and ministries) are however also users. There is little knowledge of the type of data needed (by the users) and whether the data provided (format and granularity) is used (there is no evidence). The existing evidence comes from specific projects focusing on INSPIRE. Nevertheless, the interviewee assessed that INSPIRE create societal value albeit mainly at Government level.

Focus Group interviews

The following main direct and indirect benefits were discussed and identified in the focus group interviews. It should be noted that some Focus Groups underlined that all the benefits listed in ***Table 5-11*** are important.

Direct benefits

Three Focus Groups pointed to that the main benefits are about *harmonisation and interoperability*. The INSPIRE data catalogue serves as an example on how to harmonise and increase interoperability of data. This is in particular important in the Member States where data is stored in many different formats and some of these formats are not readable using the most common GIS systems. It was added that creating services and formats that can be used by all users is one of the most important benefits. The availability and interoperability/ harmonisation of data already feeds into platforms like SeaDataNet and EMODnet.

A key benefit for one Focus Group is the *standardization* of data provisions for reporting. It is important to promote the use of INSPIRE standards for new and existing Directives in order to ensure that are no parallel ways of reporting data under the various EU legal frameworks. With the future e-reporting, INSPIRE data services should be at the centre of the process and it will more cost-efficient setting-up of the INSPIRE infrastructure.

The *sharing/reuse of data* is identified by two Focus Groups as a key benefit as this leads to a *reduction of costs* and time spent on a number of activities. The tools developed in the context of INSPIRE can in principle also (see analysis in EQ 2.8) be reused in other contexts. One Focus Group pointed to that it takes time to make everything conformant, so that the benefits are only achieved with a time lag.

Better overview, discoverability, availability, accessibility of data is in particular regarded as a benefit for business and the private sector which can use these to develop new business opportunities through innovative products. Two Focus Groups mentioned that initially some of their institutional stakeholders did not fully understand the potential of INSPIRE and this led to a reluctance to share (for free) spatial data. Improvements of overview, discoverability, availability and accessibility of data through portals, has been accelerated through the implementation of INSPIRE. There are, however, still discussions in two Member States on what and how much data is to be made available for free.

One Focus Group mentioned that INSPIRE had led to more *efficiency and better data quality*.

Indirect benefits

Increased openness to share data by data providers was mentioned by two Member States as an indirect benefit. As mention above, several Member States underlined the importance of open spatial data for innovation and economic development.

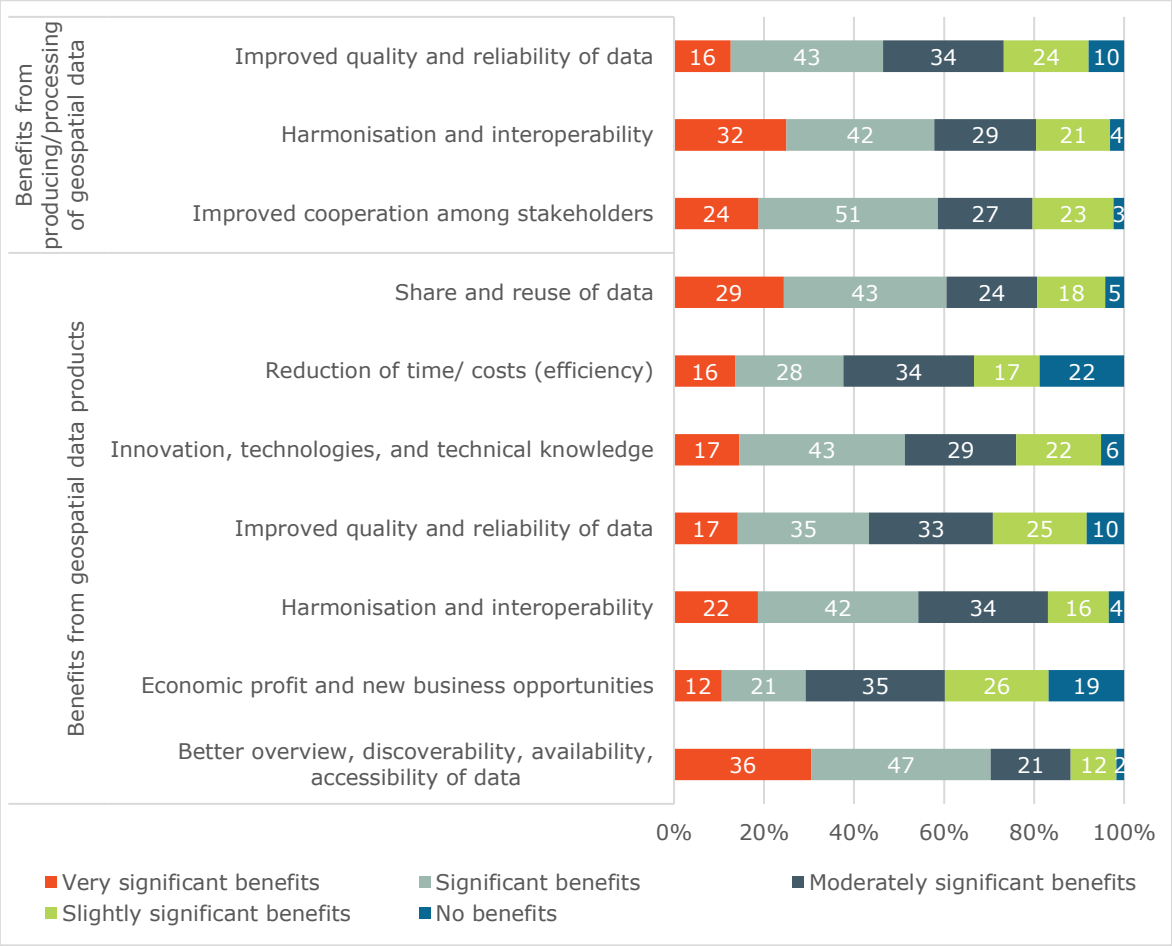
Two Focus groups mentioned that INSPIRE has supported the developed of a *national infrastructure and national geoportal*s which was much needed. INSIPRE has highlighted the requirement for updating of data to be made available through the national geoportals.

Only one Focus group mentioned the *EU wide cooperation* as a key to establishing contact with other Member States and the exchange of experience and approaches as an interesting benefit.

Targeted surveys

In the targeted survey respondents were asked to rank different benefit types in terms of significance. For the direct benefits most of the benefit types were judged by 25-40% of the respondent as significant, but only Better overview Harmonisation and Share and Reuse of Data score very significant from more than 20% of the respondents.

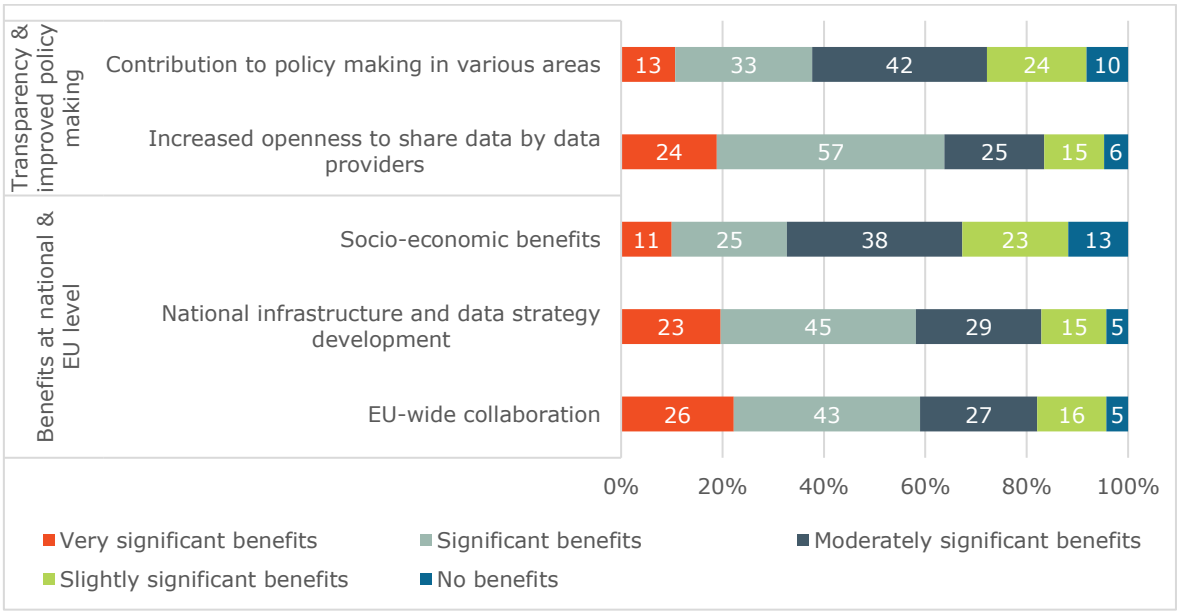
Figure 5-20 Direct benefits of INSPIRE (N=113-128)



Source: All respondents, Targeted surveys (combined) April-May 2021, Question 23.A: How significant are the direct benefits stemming from the INSPIRE implementation?

With regard to indirect benefits especially EU wide collaboration is rated as having very significant benefits by more than 20% of respondents. In the case of Increased openness and the development of national infrastructure more than 30% of the respondent rating this a significant benefit.

Figure 5-21 Indirect benefits of INSPIRE (N=110-117)

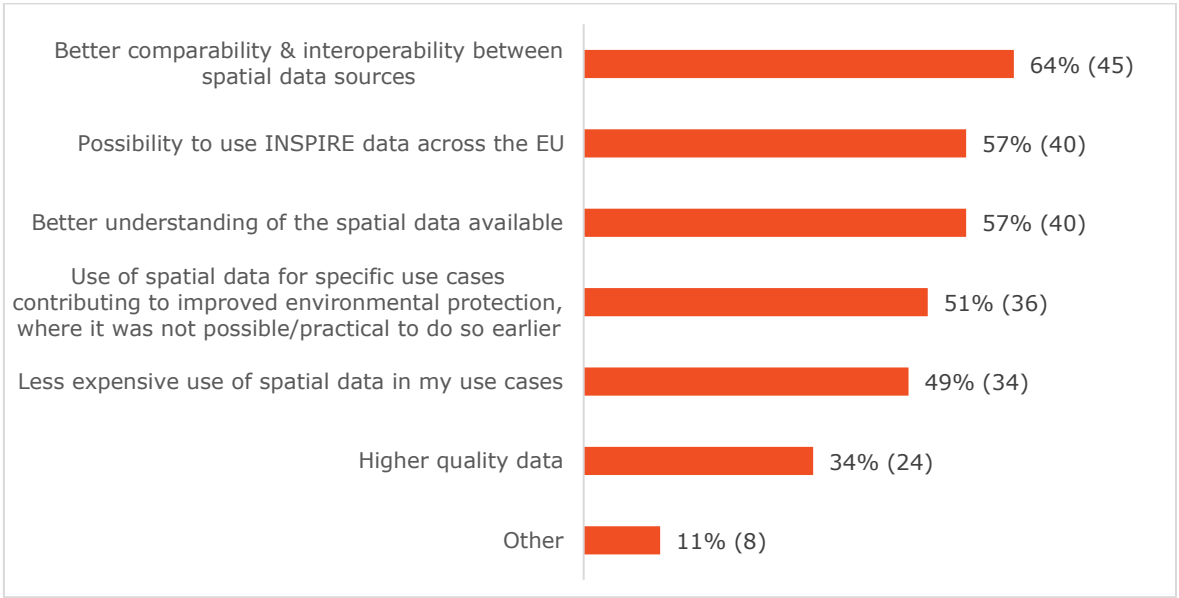


Source: All respondents, Targeted surveys (combined) April-May 2021, Question 23.B: How significant are the indirect benefits stemming from the INSPIRE implementation?

Public consultation

The responses to the public consultation show that Better comparability and interoperability are the main benefits. 45 respondents (64%) marked this as a benefit. Also use of data across the EU and better availability of spatial data were selected by 40 respondents respectively (57%).

Figure 5-22 Benefits of spatial data sharing as facilitated by INSPIRE (N=70)



Source: All respondents, public consultation May-July 2021, Question 23: What are the benefits of spatial data sharing as facilitated by the rules laid down in the INSPIRE Directive?

5.4.2. EQ 4.2 Can any specific provisions in INSPIRE be identified that make cost-efficient implementation more difficult?

The REFIT evaluation (2016) pointed to five main factors which have influenced the cost-effective implementation of INSPIRE:[75] 1) Data policy of sharing issues, 2) skills gap for dealing technical complexity, 3) capacity building resources, 4) coordination and communication mechanism, and 5) flexible spatial data harmonisation provision (these are described in more detail in Section 2.1.2). In this evaluation, we investigate whether these are still factors that influence implementation or whether, in the latter phase of implementation other factors play a role. We do so by identifying the costs and the significance of these costs as assessed by Member States.

However, and as experienced also in the REFIT exercise[76], it is difficult to assess in quantitative terms what the costs of INSPIRE are. INSPIRE implementation costs are in many Member States (but not all) considered and treated as an integral part of national SDI operations. In these cases, implementing INSPIRE is not considered as a separate process to the general process of establishing an SDI. Nevertheless, some Member States could identify categories or types of costs that they assess the implementation of INSPIRE has resulted in.

Text box 5-16 Key/summary findings EQ 4.2: provision that make implementation difficult

It is difficult to point to specific provisions which would make INSPIRE implementation more cost-efficient as this often depends on organisation in the Member States at the different administrative levels. Nevertheless, a key issue of concern relates to the provisions on harmonisation and interoperability of spatial data and the costs (resources) related hereto. Also, the approach taken by Member States to implement INSPIRE differs: I.e. is INSPIRE implemented as an integral part of the national SDI or as a separate system with disjoined data foundation and/or separate IT-infrastructure. These factors influence the cost (and perceived value) of INSPIRE.

The **desk review** found that 29% of Member States reported that the main costs relate to *Data harmonisation, IT Infrastructure, geodata services and interoperability* and staff resources. Some Member States provide estimates of actual costs either as totals or as yearly costs.

There **focus group** interviews show different assessments within the Member States as to the main cost drivers. They also show that different assessments can be found among stakeholders at the same administrative level but from different institutions (i.e. organisations/institutions at national level). Large providers of data such as cadastre or mapping agencies do not have infrastructure costs. Such institutions experience costs in relation to processing and harmonising of data instead.

The **targeted survey** and the public consultations show that key costs are related to harmonisation and interoperability. Almost 50% of the respondents in the target survey point to that these activities carry significant costs. Also in the public consultation especially

[75] European Commission (2016), Report from the Commission to the Council and the European Parliament on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23 (COM/2016/0478 final/2).

[76]

harmonisation is identified as a key cost driver for the implementers. Notably the users do not perceive that there are additional costs, and if any these would relate to purchasing additional or new software to access/use the data.

Desk review

As observed in various studies and earlier evaluations, data on costs of implementation of INSPIRE are difficult to obtain. A key reason is the fact that INSPIRE is mostly one element among others in setting up the SDI infrastructure in general. The costs of INSPIRE are in many Member States included in the overall costs of the SDI and are thus difficult to extract/separate. A discussion on the costs of implementing of INSPIRE is included under EQ 4.3. as part of the assessment of the costs and benefits of INSPIRE.

Table 5-12 shows the identification of costs provided by Member States in the country forms (note that not all Member States indicated cost categories or provided cost estimates). The costs have been sorted according to the categories developed by the evaluation team. 29% of MS indicate that the main costs are in: a) *Data harmonisation*, b) *IT Infrastructure*, c) *geodata services and d) interoperability* and e) *staff resources*. Some Member States include actual costs either as totals or as yearly costs. These estimates are however difficult to compare as the calculations use different methods and periods (some examples are included under EQ 4.4).

Table 5-12 Costs of implementing INSPIRE listed in the country forms

Type of cost	Cost types identified by stakeholders	Number of Member States in country forms
Costs related to acquiring and processing of geospatial data	Data production and maintenance	5 (16%)
	Data harmonization and interoperability	9 (29%)
	Provision of metadata	7 (23%)
Costs related to storing and distributing geospatial data	IT infrastructure	9 (29%)
	Centralized systems and data centres	2 (6%)
	System maintenance	5 (16)
	Network security	1 (3%)
	Geodata services and interoperability	9 (29%)
	Staff resources	9 (29%)
	Consultancy/INSPIRE expertise	3 (10%)
Costs related to improving use of geospatial data	Development of other related systems and projects	2 (6%)
	Training of stakeholders/users	-
	Staff resources	-
	Consultancy/INSPIRE expertise	1 (3%)
INSPIRE reporting	Staff resources	-
	Meetings/coordination	2 (6%)
	INSPIRE indicators	1 (3%)

Consultation activities

Focus Group interviews

There are different assessments within the Focus Groups as to the main cost drivers. It is thus difficult to point to specific provisions that cause inefficiencies in INSPIRE implementation as this position often depends on the institution and/or administrative level in question. The interviews also show that different assessments can even be found from stakeholders at the same administrative level but from different institutions (i.e. organisations/institutions at national level). Large providers of data such as cadastre or mapping agencies do not have infrastructure costs. Such institutions experience costs in relation to processing and harmonising of data instead. In two Focus Groups, institutions interviewed have assessed the costs of specific parts of the process i.e. the part that they are responsible for or even at the level of a specific procedure.

Two Focus Groups out of the seven identify the *Costs related to acquiring and processing of geospatial data* as the more significant costs. Several Focus Groups concluded that the production and maintenance of data (Ensuring datasets are complete and accurate) require considerable staff time: Either from existing staff or from experts hired from outside (expert consultants). Three Focus Groups found that the main costs related to INSPIRE are data conversion and harmonisation costs. These Focus Groups also mentioned that allocating resources towards data harmonisation was an issue, especially as considerable human resources were required. Many of the institutions responsible for harmonisation do not have experience and expertise related to data harmonisation. The type of expertise required was relatively broad: preparing data, metadata checks, and transformation services. Therefore, a larger training effort has been needed and delivered by external provides. Hiring external training capacity for internal staff to upscale the expertise in this area as well as the use of external staff to do part of the actual work has been a substantial part of the costs of the INSPIRE implementation.

In terms of *Costs related to storing and distributing geospatial data* two Member States mentioned that they had considerable costs related to the development and maintenance of the IT infrastructure, data centres, and network security. The assessments however differed between the Focus Groups and two Focus Groups underlined that they had already established the infrastructure independently of INSPIRE, so this was not a key costs driver to them. Again, the assessment is also differs between type institutions (at national level) depending on their role. Organisations responsible for providing environmental data find that there were quite some investments in infrastructure (licenses in particular for the software through which the data are transferred into INSPIRE format). One Member State mentioned the setting up of a centralized system as the most significant cost item in terms of infrastructure. Maintenance costs were not regarded as that significant, but a constant cost linked to procurement of consultancy/expertise needed for system upgrades was. Staff cost and external consultancy costs were for some Member States (and institutions) a particular cost driver, especially cost linked to staff training specifically for implementing the INSPIRE infrastructure, data centres, and network security.

Costs related to improving use of geospatial data were not identified by any of the Member State Focus Groups as a particular cost driver.

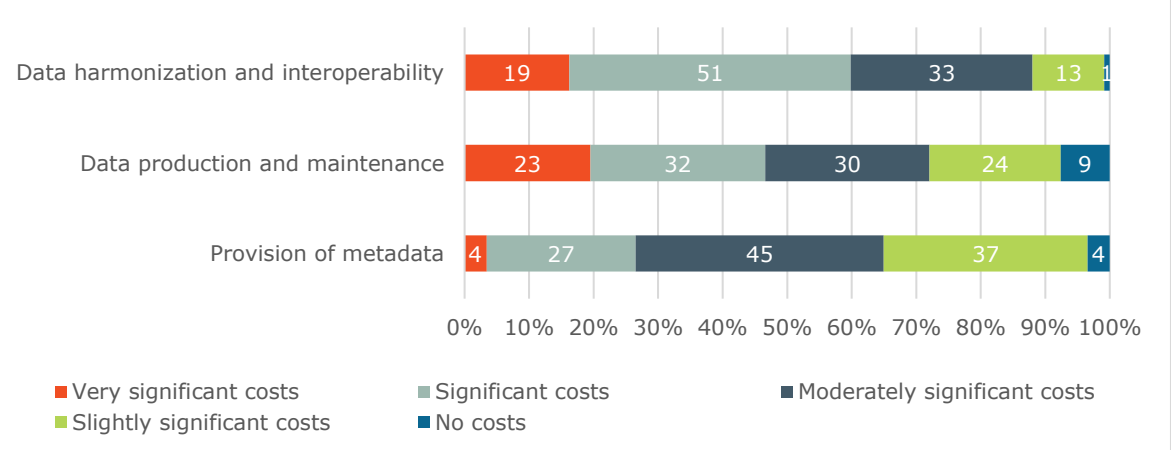
According to one interviewed Member State the annual *INSPIRE reporting is an effort that* costs a lot of 'mental' effort. The monitoring and other tools that the Commission has developed to implement INSPIRE play an important role in the reporting. However, several Member States underlined that it is important to minimise the costs related to the reference validator. The reference validator used of for the INSPIRE

infrastructure is not optimal, and Member States (one) have experienced that when the reporting deadline approaches the INSPIRE website is down, because too many users are trying to access it at the same time. Some Member States found that there are considerable costs linked to internal INSPIRE coordination and working groups. This, one the other hand, may have a positive effect as well (for the federally structured Member States), as INSPIRE supports the internal coordination (and harmonisation) between many agencies at different administrative levels.

Targeted surveys

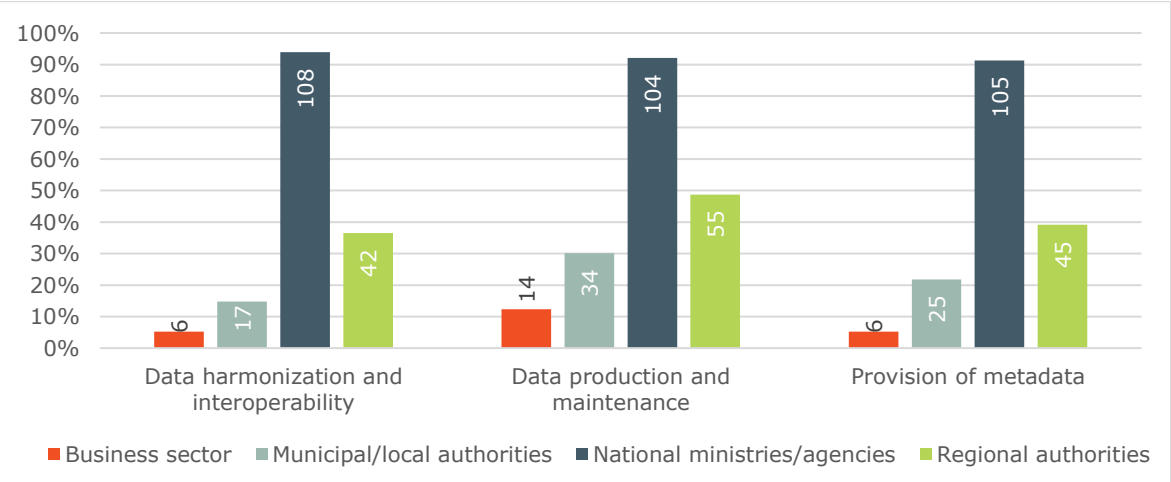
The result of the targeted surveys on marine, spatial data, agriculture and environment show benefits occurring at different stakeholder levels and show that data harmonization and interoperability are regarded as the most costly parts of the implementation of INSPIRE. Almost 50% of the respondents point to that these activities carry significant costs.

Figure 5-23 Cost of INSPIRE (N=117-118)



Source: All respondents, Targeted surveys (combined) April-May 2021, Question 19.A: If your organisation is responsible for the creation and maintenance of INSPIRE datasets: how significant are the costs stemming from the INSPIRE implementation? A. Costs related to acquiring and processing of geospatial data

Figure 5-24 Stakeholders that bear the cost of INSPIRE (N=113-115)

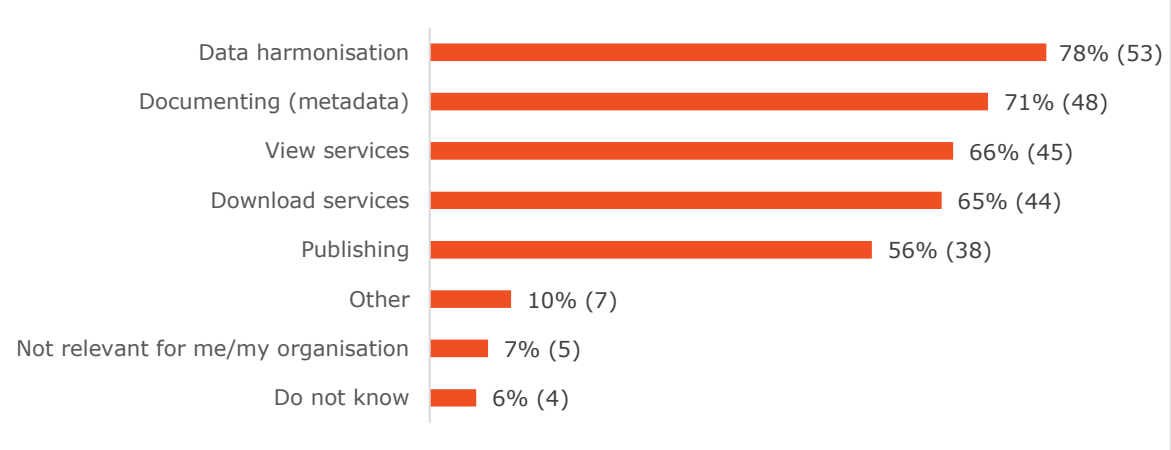


Source: All respondents, Targeted surveys (combined) April-May 2021, Question 21.A: Please indicate at what level INSPIRE related costs occur and which stakeholders bear the costs. Please tick all that apply. A. Costs related to acquiring and processing of geospatial data

Public consultation

The question of costs was also part of the public consultation although in less detail than in the targeted survey (see ***Figure 5-25***). The results of the Public consultation show that data harmonisation is perceived as a key cost driver in relation to the implementation of INSPIRE, 53 respondents (78%) identified data harmonisation as area where additional costs had been found.

Figure 5-25 Cost of implementing INSPIRE (N=68)



Source: Spatial data providers, public consultation May-July 2021, Question 21: Have the rules for sharing spatial data covered by the INSPIRE Directive resulted in additional costs? If so, please check all cost types that apply.

41 respondents (55%) to the public consultation did not identify any additional costs resulting from INSPIRE in terms of use. 27% of the respondents stated that they had experienced some additional costs in relation to procuring new software in order to use data made available through INSPIRE.

Figure 5-26 Costs related to use (N=74)

Source: Spatial data providers, public consultation May-July 2021, Question 22: Has the use of spatial data covered by the INSPIRE Directive resulted in additional costs? If so, please check all that apply.

5.4.3. EQ 4.3 Can the INSPIRE Directive and implementing rules be made more cost-efficient? What is the simplification potential?

This evaluation question investigates the scope for improved efficiency and simplification and the possibility for reducing the implementation burden (including administrative burdens).

In relation to the question concerning the implementing rules, cost-efficiency and simplification is a complex question encompassing:

- making geospatial data available,
- utilizing the geospatial data made available, and
- monitoring the progress of the implementation.

In a multi-functional data infrastructure such as INSPIRE, many different needs are addressed to create an environment that satisfy a vast amount of hugely different types of use. This will have an effect on setting up implementing rules that makes the data infrastructure both usable and efficient for all users and for all uses: acquisition and processing of data must be manageable, and utilization must cover the entire range from simple viewing to complex analysis. Implementing rules will thus always be a compromise between different user requirements in an ever-evolving field of utilization.

The question about simplification is crucial when it comes to cost effectiveness. If data available is complex and hard to use for mainstream users, it will be underutilized; if data available is overly simple, it might not be fit for purpose for the expert user. And if the mandated data structure is overly complex, it will be very costly to maintain data. The challenge regarding implementing rules is to find the appropriate level where data is useful to both mainstream users and to expert users and at the same time is maintainable. The data models, the data views offered to the users and the conditions for use of data are the most important factors in this regard. Further, for follow-up purposes, the monitoring of the progress of implementation must be targeted and highly automated.

Text box 5-17 Key/summary findings EQ 4.2: improve cost efficiency and simplification

The overall finding with regard to making implementation more costs-efficient/and or simplifying implementations is that simplification may be relevant at two levels; 1) simplifying the implementation and thereby reducing costs and 2) making use easier (simplifying) which many not necessarily need to reduced cost but an increase in use.

Both the **desk review** and the **Focus Group** interviews pointed to that some Member States find that the reporting on INSPIRE is time intensive and not always straight forward (technically difficult). Although there has already been streamlining of the monitoring and reporting (introduced in 2019) there may be an additional need to reduce the reporting burden for MS;

The second aspect of simplification addressed both in desk review and the focus group interviews is the perception by users that the data models and the way data is presented (view) is too complicated to a number of users. Different types of users might have different needs regarding data models: advanced users might need quite complex structures to do their job - and using data models with this complexity will be a burden for other users with simpler needs. INSPIRE specifies one data model per data theme covered by INSPIRE: the data model covering the combined needs from the most advanced users. The need of simple models and standard software is also reflected in the targeted surveys. Here explicit suggestions focus on simpler data models for increased use. Notably, the analysis of the **public consultation** found that respondents were more concerned with harmonisation and interoperability than with use (downloading and viewing spatial data).

Desk review

The literature reviewed points to several simplification activities relevant for the INSPIRE Directive.

Regarding the monitoring of the progress of implementation, the REFIT evaluation indicated the need to simplify and streamline monitoring and reporting in order to support better the comparison of the implementation progress across countries. A more streamlined reporting will allow for national and EU-wide overviews while reducing administrative monitoring and reporting burden. In the EQ 1.2 (see section 5.1.2), the analysis shows that the first recommendation regarding the simplification was addressed by Regulation (EU) 2019/1010. This regulation aligned and streamlined monitoring and reporting processes, improved the alignment of legal provisions and amended the related Implementing Decision. Since December 2019, Member States report according to the new regime with a reduced and simplified set of INSPIRE indicators. A reporting tool developed by JRC supports a more automated and efficient reporting.

The mid-term evaluation of the INSPIRE implementation in 2014 identified that technical complexity was the number one obstacle for the INSPIRE implementation according to the respondents in the public consultation.[77] Furthermore, the respondents listed the simplification of the technical specifications as the second most important proposed change to achieve the INSPIRE objectives.[78] A similar conclusion was reached during the group discussions as part of the What if…? sessions at the 2017 INSPIRE conference, where it was felt that in general, simple APIs by providing user-friendly access to datasets for common ICT professionals, would likely have the higher impact on creating value-added services on top of INSPIRE data and services.[79] JRC started in 2018 defining alternative encodings to simplify the complex data models related to the INSPIRE Directive. Relaxation of some semantic requirements would help improve the usability of the INSPIRE framework.[80] When considering changes to the current INSPIRE infrastructure, it is important to not only consider the data but also to consider relevant technological developments and the role of new actors, including the private sector and citizen science initiatives.[81]

Consultation activities

Scoping interviews

During the scoping interview with JRC, it was mentioned that many technical aspects are regulated in the INSPIRE Directive and its Implementing Rules. As the technology develops very fast, the technical requirements quickly become outdated. There is therefore a need to simplify the legal framework (making it less technical). One example is the Implementing Rules related to network services, whose requirements are closely modelled on OGC web service standards from the early 2000's, but also added INSPIRE-specific requirements beyond the standards. Furthermore, the aim of the proposed amendment to the Implementing Rules on interoperability of spatial data

[77] EEA & JRC (2014), Mid-term evaluation report on INSPIRE implementation, EEA Technical report No 17/2014, ISSN 1725-2237.
[78] Ibid.
[79] Lutz, M., Bernard, L., Portele, C., Hansen, T., Tiainen, E. & Lucchi, R., INSPIRE – What if...? Summary report from the What if…? sessions at the 2017 INSPIRE Conference, Publications Office of the European Union, Luxembourg.
[80] Minghini, M, V. Cetl, A. Kotsev, R. Tomas, and M. Lutz (n.d.), INSPIRE: The Entry Point to Europe's Big Geospatial Data Infrastructure. Draft chapter 24 to be pulished in in Springer Handbook of Big Geospatial Data in March 2021.
[81] Kotsev, A., Minghini, M., Tomas, R., Cetl, V., Lutz, M. (2020), From Spatial Data Infrastructures to Data Spaces—A Technological Perspective on the Evolution of European SDIs. ISPRS International Journal of Geo-Information: 9(3), 176.

sets and services was to address the simplification needs specified in the REFIT evaluation. However, the amendment process has been slow due to legal barriers and other procedural developments (e.g. entry of a new Commission). In the respondent's view, this strict level of technical specification is not necessary in the legislation.

In the scoping interview with Eurogeographics, the existing initiatives by the European Commission related to simplification of the INSPIRE framework were appreciated. The mapping agencies consider data sets and services that are meeting the INSPIRE requirements but not used in other contexts as a burden from a technical and organisational perspective. Furthermore, INSPIRE should form the basis for geospatial High Value Datasets and hence be re-used in many sectors, not only in the environmental domain. Simplifying the implementation procedures and providing software support to implementers was recommended during the scoping interview with Eurogeosurveys.

Focus Group interviews

The Focus Group interview with Member States show that simplification is discussed both at the level of the data models being used for data provision and at the level of the data services being offered for data use. However, not all Member States specifically addressed these issues in the interviews. In terms of data provision most of the Focus Group participants of four Member States who provided an assessment in the interview, reflected that there is a need to simplify the implementation at the technical level. Due to the complexity in the data models the use of software is limited (not all software can be used). One participant mentioned that INSPIRE has to evolve with the new developments and to be quicker at adopting new technologies, to be able to keep up with the new types of services that (private and public) users are going to request. Additionally, technical specifications are not easy to understand. New legislation should be simplified and easier to implement for public authorities and the focus should be on an easy access to data for mainstream users and for the general public.

Text box 5-18 INSPIRE Data models

Logical data models (as in the INSPIRE specifications) help to define the detailed structure of the data elements in a system and the relationships between data elements. Logical data models (in the following just 'data models') can be seen as views into an underlying data repository. INSPIRE data models define one view per data-theme into the NSDI data repositories for the data-themes covered by INSPIRE.

In one Focus Group, the discussion called for more focus on ease of data use rather than simplification of data models. In view of one respondent, data models should not be simpler *per se*, but there should be more emphasis on the client-support. When data is easier to use (view), there will be less need for simplification of data models. A participant in another Focus Group indicated that costs might become excessive if potential simplifications are taken too far. Significant efforts have been made to establish the INSPIRE infrastructure, and these efforts might be annihilated in case of significant changes with the aim of simplification. Gradually, the results become visible, and the European Commission started to use the INSPIRE data. If the data is not used, then all the efforts made so far would bring little value.

Targeted surveys

The targeted surveys stakeholders from marine, spatial data, agriculture and environment sectors were asked to assess the potential for improving cost efficiency

and/or introducing simplifications[82]. A number of answers (63) were provided of which we have listed examples of the main types of answers. Most of these answers point to a need or potential for simplifying the INSPIRE data models and increased use of international standards.

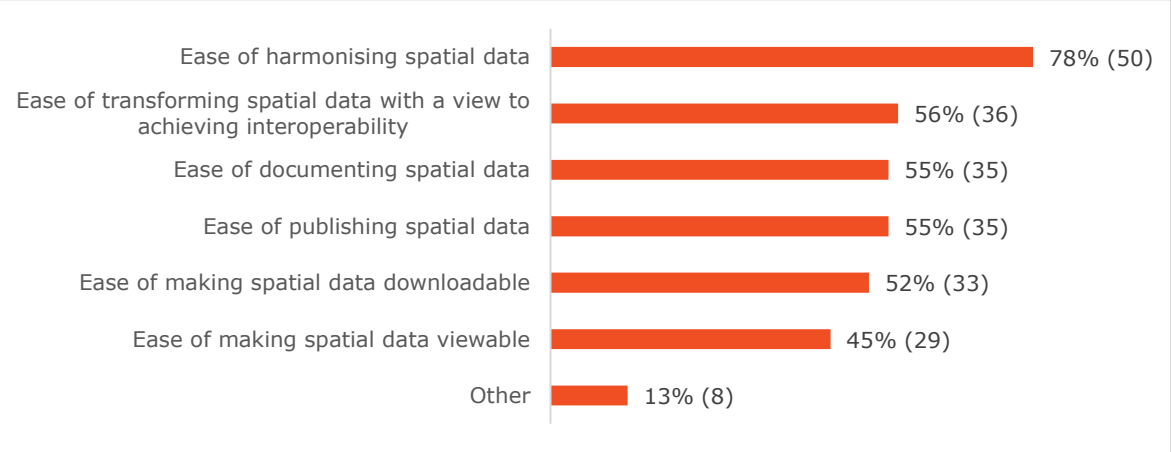
- Minimum requirements that would not harm the "fit for purpose" interoperability and the use of metadata, services and datasets should be defined.
- Harmonisation of data sets is actually a *very* good idea. The focus should be on interoperability. But the technical guidelines should be modernized and simplified, there is a huge potential if that is done in a clever way.
- Provision of "as is data" is in itself a high benefit with appropriate costs.
- Simpler technical specification and implementation rules - aligned with standard open APIs
- Do not deviate from international standards (OGC, ISO, W3C …)
- Simplify and align the approaches for the technological evolution of INSPIRE (e.g. new OGC standards) but also to integrate the infrastructure in the European Green Deal data space. (i.e. good practices, common tools & reference validators).

Public consultation

The public consultations show that respondents found that there was in particular was a need to simplify how data is harmonised and made interoperable. 50 respondents (78%) found that there is a need for making it easier to harmonise data and 36 respondents (36%) that simplifying interoperability is needed. A considerable number of respondents (55%) also found that documenting and publishing must be made more straight-forward. Respectively 33 and 29 respondents found that it was important to simplify spatial data download end view provisions.

[82] Question 26: Is there any potential for the INSPIRE Directive and implementing rules be made more costefficient and/or simplified? If yes, please specify. (N=63)

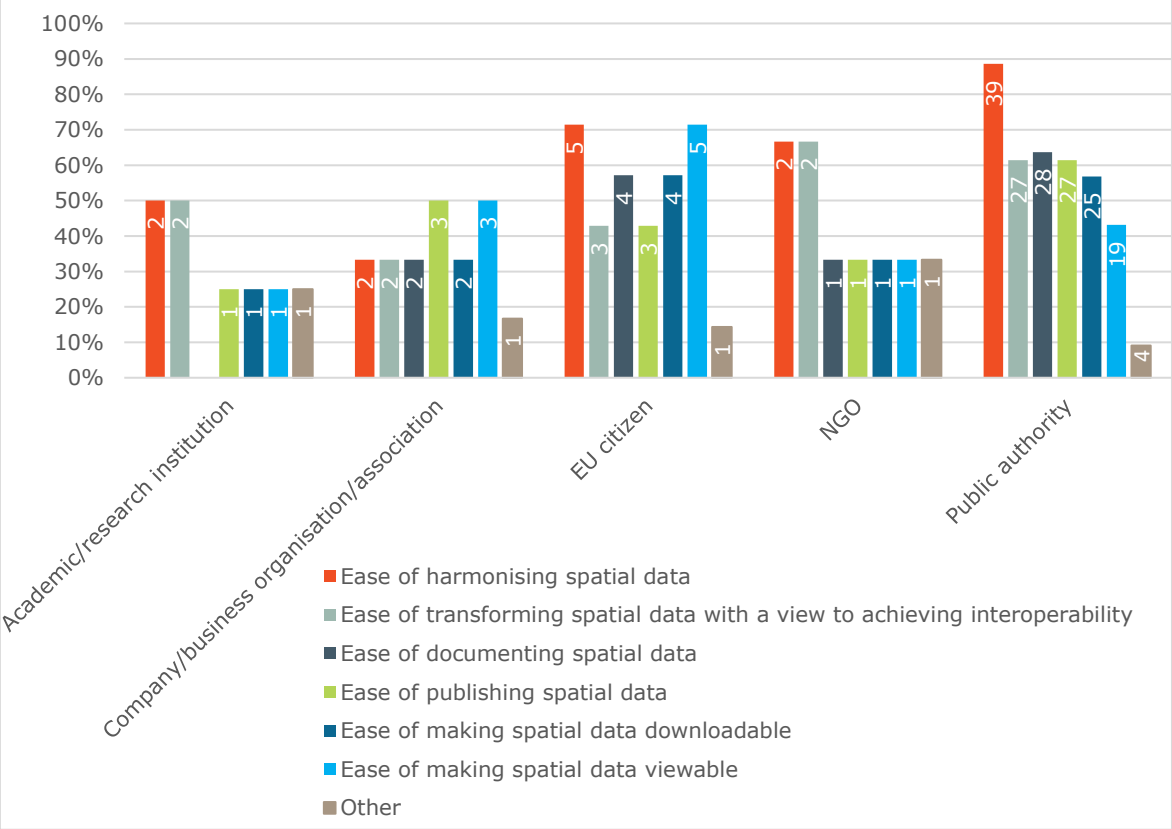
Figure 5-27 Need for simplifying implementation (N=64)



Source: Spatial data providers, public consultation May-July 2021, Question 25: Is there scope for simplifying processes related to sharing of spatial data? Please check all that apply.

When looking at the answers of different kind of stakeholders (see ***Figure 5-28***) in terms of simplification or ease, most of the groups identify harmonisation and interoperability as key concerns. However, especially for business and citizens the issue of downloading and viewing spatial data are relatively more important, most probably reflecting the less sophisticated user point view. It is notable that also among public authorities the issue of downloadable data is prominent.

Figure 5-28 The view on simplification from different stakeholder groups (N=64)



Source: Spatial data providers, public consultation May-July 2021, Question 25: Is there scope for simplifying processes related to sharing of spatial data? Please check all that apply.

5.4.4. EQ 4.4 Are results achieved so far commensurate with the resources put forward and in line with the ones expected from the ex-ante evaluation of INSPIRE?

As already noted in the REFIT evaluation of 2016,[83] the costs and benefits to Member States from INSPIRE are difficult to assess as these have not been collected and calculated in a uniform manner, if at all. The impact assessment/ex ante evaluation of 2007/2004[84] sets out a methodology for Member States to record and calculate the costs and benefits. As far as known (REFIT 2016), only a few Member States have complied with the request to apply the methodology.

For this analysis, a review into recent studies on the cost-benefit and the effectiveness of INSPIRE is provided. Also, the assessments by Member States as part of the Focus groups interviews is included: the latter primarily included a qualitative assessment of cost vs. benefits.

It is recalled that impact assessment of 2004 estimated that the benefits of implementing INSPIRE would be manyfold compared to the investment needed.[85] The benefits were estimated in the range of MEUR 680-1660 against costs of MEUR 77-161.

Text box 5-19 Key/summary findings EQ 4.4: results vs. resources

The key findings here are that relatively few assessments of costs and benefits have been made of the implementation of INSPIRE. And even in the cases where these have been conducted, it is clear that it is not possible to separate the cost of implementing INSPIRE from the costs to the national SDI.

All cost-benefit assessments focus mainly on the benefits of implementing SDI in general. Overall, all the reviewed Cost Benefit Analyses find that when SDI is implemented this has a large positive impact/benefit for both the public (cost savings) and private sector (costs savings and business opportunities). Nevertheless, a number of Member States found that it is too early to really assess the Cost Benefits ratio of INSPIRE, INSPIRE is not yet fully implemented and the results are thus not there yet and therefore it is not possible to do a full assess at this moment.

It is notable that the responses of the **public consultation** show that 37% of the respondents overall found that there were some benefits of INSPIRE, but that the costs prevail in terms of sharing and using spatial data. Only 25% of the respondents found that benefits outweigh the costs.

Desk review

[83] European Commission (2016), Report from the Commission to the Council and the European Parliament on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23 (COM/2016/0478 final/2).

[84] European Commission (2004), Commission Staff Working Document, Proposal for a Directive of the European Parliament and of the Council establishing an infrastructure for spatial information in the Community (INSPIRE). Extended Impact Assessment, SEC(2004) 980.

[85] Ibid.

Cost Benefit Analyses (CBA) have not systematically been conducted by MS on INSPIRE. Those Member States that have conducted CBA, have generally done this for the SDI system as such and not for INSPIRE alone. There are very few CBAs on the implementation INSPIRE as such.

In Table ***Table 5-13*** we present three more recent cost-benefits analysis conducted by individual Member States. CBA studies for NL, DK, UK were included in the REFIT. The three studies (ES, SE and LT) show that different approaches have been taken to measure the costs and benefits. In the case of Spain, the value of the web services and data are estimated. In the case of Lithuania, the costs of saved working hours resulting from the sharing of data are assessed. In the last study on Sweden, the benefits and costs of physical planning of digitalisation and geodata has been analysed. The three studies all find that the benefits outweigh the costs.

A study conducted in Finland in 2017[86] (and used as basis for the cost-benefit analysis (utility analysis) conducted by Sweden) shows that harmonised digital physical planning can save up 60% of the time used for inquiries and investigations. The Swedish study[87] estimates cost savings for the municipalities at MEUR 17, for regional authorities it is MEUR 3,5, for the court system the saving amounts to MEUR 0.8 and for the Swedish Transport Administration to MEUR 3.5. The estimated total savings are thus MEUR 25. The same study estimates that the total savings regarding labour costs for house construction in Sweden can be estimated at EUR 1.8–3.7 billion and corresponding cost savings for infrastructure construction at between MEUR 39 and MEUR 88 MEUR when using geodata, BIM models and a common picture and information. The total savings are thus estimated to be between EUR 1.8 billion and EUR 3.8 billion per year.

The example from Lithuania[88] included in Table 5-13 shows the benefits and costs of INSPIRE implementation (it is noted that this is an assessment as it is difficult to extract the INSPIRE data for SDI). The costs of INSPIRE is estimated to amount to Euro 3 million whereas the benefits are estimated to Euro 6-7 million.

In the report which assesses the costs and benefit for Spain, although concluding that the benefits outweigh the costs, the main purpose is to set up a methodology to estimate the economic benefits generated by the central SDI-node.

Table 5-13 Examples of cost-benefits analysis conducted in Member States

MS	Description of **study**	Description of key findings
ES	The study developed and tested a methodology to estimate the economic benefits generated by the central SDI-node of Spain. Benefits estimation is understood as an approximate calculation - as accurate as possible - in monetary terms of the value of the web services and data in the central SDI-node based on a set of objective considerations and criteria. The central SDI node comprises all the SDI resources published on the web by the same organization, IGN-ES, as coordinator of the Spanish SDI[89]. The authors note that this is a model based on	The factor that has the biggest impact on the benefits or value is the number of service requests. When these numbers are rising, then the benefits are rising as well. The richer the central-node is, i.e. the more WMTS and WMS there are, the more requests this will generate, and thus also more value. However, it should be noted that this depends on whether the services are 'used', this means are embedded in

[86] Ministry of Environment Finland, 2017

[87] Ekonomisk nytta av ett samlat nationellt tillgängliggörande av geodata i samhällsbyggnadsprocessen. 2019. Lantmäteriet

[88] Data provided by Lithuania as part of the Focus Group interview.

[89] Vandenbroucke, D. and G. Vancauwenberghe (2021), The benefits and value of the Central SDI-node of Spain, Final Report.

	estimates and not hard mathematics – but this provides a possibility for an estimate and a comparison between Member States.	(new) applications.
SE	In 2019, in a report to the Swedish government Lantmäteriet estimated the potential benefits (utility) from national governed access to geodata to be in-between 22.3 and 42.4 billion Swedish kronor in the area of societal development only. https://www.lantmateriet.se/contentassets/50c7b8feec4744e5a0fa2ffaf0ea07ec/519-2018_2889-bilaga-2-ekonomisk-nytta-rattelse-190514.pdf	Benefits: - At local government level Euro 25 million - At central government level Euro 53 million Private public construction companies Euro 2,1 million
LT	For the structural fund applications, the Lithuanian authorities did a comprehensive study based on assumptions, experiences and statistics. They calculated the working hours that were saved because of the sharing of data. For example, time was saved for users, who no longer need to drive across Lithuania to obtain some paper documents or data storage. The benefits are expressed in saved working hours rather than in monetary terms. Estimates can be then calculated based on the average wage of the employees whose working hours were reduced. Most of the benefits are linked to saving time or buying new software.	**Benefits:** - For INSPIRE Annex 3 – estimated ca 20,000 working days annually / ca MEUR 1,2 (for 2020) - For INSPIRE Annex 1 and 2 estimated MEUR 4 - Plus ca. MEUR 1 indirect benefits (better informed decisions, transparency…) - Total annual MEUR 6-7 **Costs:** - Three EU-funded SDI development projects: MEUR 8,9 (full SDI + administrative services) - INSPIRE part, explicit: about MEUR 2,5 - Annual budget 2011–2020 (full SDI); MEUR 4 INSPIRE part, explicit: ca MEUR 0,5

Consultation activities

Focus Group interviews

Two Focus Group interview with selected Member States found that it is too early to assess the cost and benefits because the benefits are only now beginning to emerge. In one Focus Group interview, a participant stated that due to the fact that the benefits have not been fully achieved yet, the costs and benefits are today balancing/neutral (50/50). In another Focus Group interview is was mentioned that the costs and burdens at all levels of government have been significant. And that these costs may not be balanced with benefits if the potential results (of the INSPIRE infrastructure) are not used. The cost-benefits are perceived differently depending on the stakeholder group (provider or user) and some interviewed representatives found that the benefits are more on the user side (public and private). The data providers have to pay to distribute the data and thus bear most of the costs.

A key issue mentioned in the Focus group interviews were the costs of data harmonisation. There were, however, different views with regard to the cost and/or benefits of this particular aspect for the implementation. Four Focus Groups found that there are considerable costs in relation to data harmonisation. Applying the technical guidance requires a lot of efforts, and this represents substantial costs for

administrations. Member States that work with different formats such as ISO standards must convert the data into INSPIRE format. This conversion requires special technical expertise and time. The technical complexity and the time it takes to fully implement the requirement constitute the main cost elements in the implementation of INSPIRE standards. Some of these costs were due to a lack of experience and that, at the time it was difficult to get the required support from the European Commission. There are, however, benefits in terms of availability and interoperability / harmonisation of data that are feeding into platforms like SeaDataNet and EMODnet.

One Focus Group mentioned that the high value datasets coming from PSI means that the link and coherence between open data implementation and INSPIRE is very important. It is paramount that the work and results are reused and not rebuilt. Another Focus Group pointed to that although there is no real reduction of time/cost (yet) the benefits are substantial. They had experienced some excessive costs linked to reporting. But the situation has improved due to the new guidance on reporting and the automated procedure of collecting indicators.

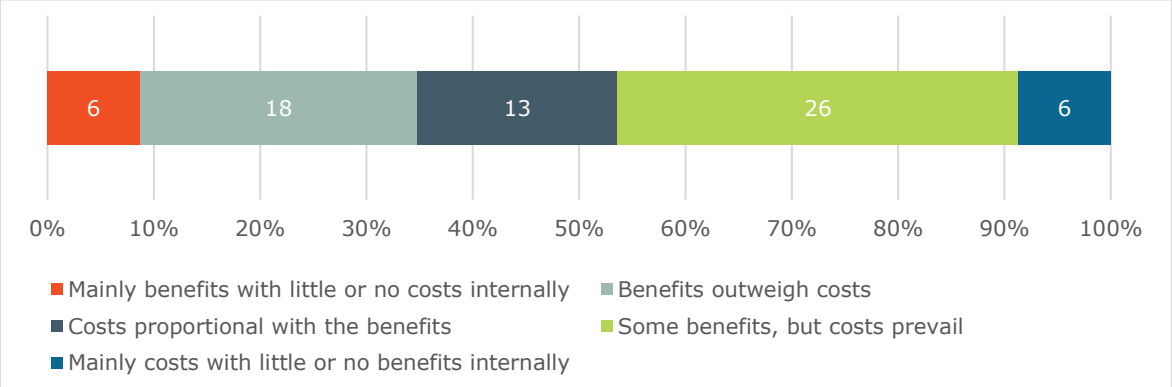
Targeted surveys

The targeted surveys on marine, spatial data, agriculture and environment did not address this question.

Public consultation

Results of the Public consultations shows that 26 respondents overall (37%) found that there were some benefits of INSPIRE, but that the costs prevail in terms of sharing and using spatial data. 18 respondents (25%) found that benefits outweigh the costs.

Figure 5-29 roportionality of costs and benefits (N=69)



Source: All respondents, public consultation May-July 2021, Question 24: Have the costs of sharing/using spatial data been proportional to the current and expected future benefits in your organisation?

5.4.5. EQ 4.5 How proportionate were the costs of the intervention for different stakeholder groups (enterprises including SMEs, private citizens …)?

This assessment focus on identifying the proportionality of the costs for different stakeholders. As mentioned above under EQ 4.4, the costs and benefits are not symmetrical in so far as the stakeholders who bear the distribution of costs are not necessarily those that have the benefits (directly). The analysis looks into where (at what stakeholders/government level) the perceived costs occur, and whether those are experienced by stakeholders as proportional in relation to the benefits.

Text box 5-20 Key/summary findings EQ 4.2: Cost proportionality for different stakeholders

Overall, the analysis shows that national authorities and agencies are the stakeholders were most of the cost occur and where less of the (direct) benefits appear. The desk review is not very conclusive on this point as it probably depends on specific cases, government agencies and administrative structure of the Member States.

The **focus group interviews** with Member States show that most Focus Groups assessed that it is at the national level that the highest cost occur. The main costs relate to acquiring and processing of geospatial data i.e. the production of data. Also cost relating to harmonisation of data was identified as a cost category for both national and local level institutions.

Also, the **targeted surveys** show that the main costs are perceived at national level and that these organisations may not see all the benefits. The stakeholder group of geological survey, mapping and cadastre and national authorities are those that perceive that cost outweigh benefits. It is notable that in the **Public consultations** in addition to the national level also businesses (12) find that perceived costs are larger than benefits.

Desk review

Generally, there are no fixed or standard methods or principles for recording the costs of implementing INSPIRE. Most studies and analyses are thus based on assessed or perceived costs. Relatively few members states record the costs of implementing INSPIRE and, as mentioned earlier, it is often not possible to extract the costs of INSPIRE from overall SDI costs. In the country forms there is little recording of whether the costs and benefits occur at different levels.

The review of the cost-benefits analysis presented under EQ 4.4 included a presentation of studies of Sweden and Lithuania that assessed the cost-benefit at different government levels and to the private sector (in the case of Sweden only). In the Swedish study, the assessment of the benefits (cost savings) for the municipal level is the highest among stakeholder levels and groups included (in the example of physical planning). In another example in Sweden concerning the administration of the construction law the municipal level is estimated to have a cost saving of MEUR 20 per year. These examples do not provide information on the costs for the municipal levels as such, but only serve reflect that the benefits for the municipal level can be significant when implementing an SDI system.

The literature review shows that in some studies, costs are reported as significant in areas of acquiring spatial data. In the JRC Study[90] on access to spatial data for environmental purposes the study finds that the costs related to acquiring (accessing) spatial data in some Member States are significant. The JRC study include results from a survey of different stakeholder group including the question of costs in relation to acquiring spatial data.

Consultation activities

Focus Group interviews

[90] JRC (not yet published), Evolution of the access to spatial data for environmental purposes. JRC Technical Report.

The Focus Group interviews also show that the cost structure depends on the organisations of SDI in the country and possible also the size and structure of the country. Federally organised counties will tend to involve more institutional stakeholders and levels of government in SDI implementation, and this require harmonisation and coordination at additional levels as well.

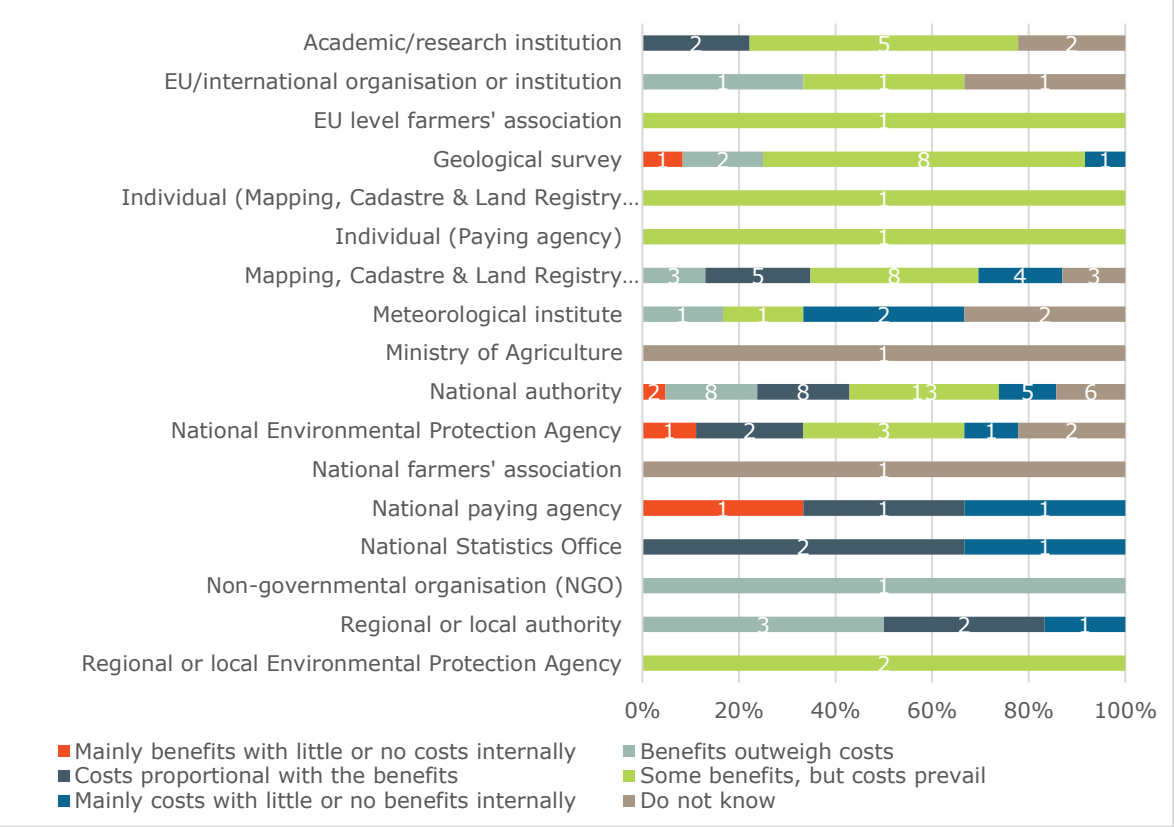
The Focus Group interviews with selected Member States show the different approaches and perception as to where (to stakeholders) the costs occur, and also the different cost types and administrative levels. Most Focus Groups assessed that it is at the national level that the highest costs occur. The main costs relate to acquiring and processing of geospatial data i.e. the production of data. Also cost relating to harmonisation of data was identified as a cost category for both national and local level institutions. Some Members State found that the cost where unproportional at certain administrative levels i.e. for local authorities as these do not see the benefits. However, this is not a generally shared view. One Focus Group found that they did have some excessive costs linked to INSPIRE reporting. But the situation has improved due to the new guidance on reporting and the automated procedure of collecting indicators.

The knowledge and perception of the user level among the interviewed members states vary considerably. Some of the Focus Group assessed that administrations are aware of the use in private sector and the needs of users. Others have little or no knowledge about the use of the INSPIRE data beyond the official use of the data for reporting.

Targeted surveys

The result of the targeted surveys show that the main costs are perceived at national level and that these organisations may not see all the benefits. The stakeholder group of geological survey, mapping and cadastre and national authorities are those that perceive that cost outweigh benefits. Generally, relatively few of the respondent groups found that the benefits are higher than the costs.

Figure 5-30 Stakeholder perception of costs and benefits (N=124)

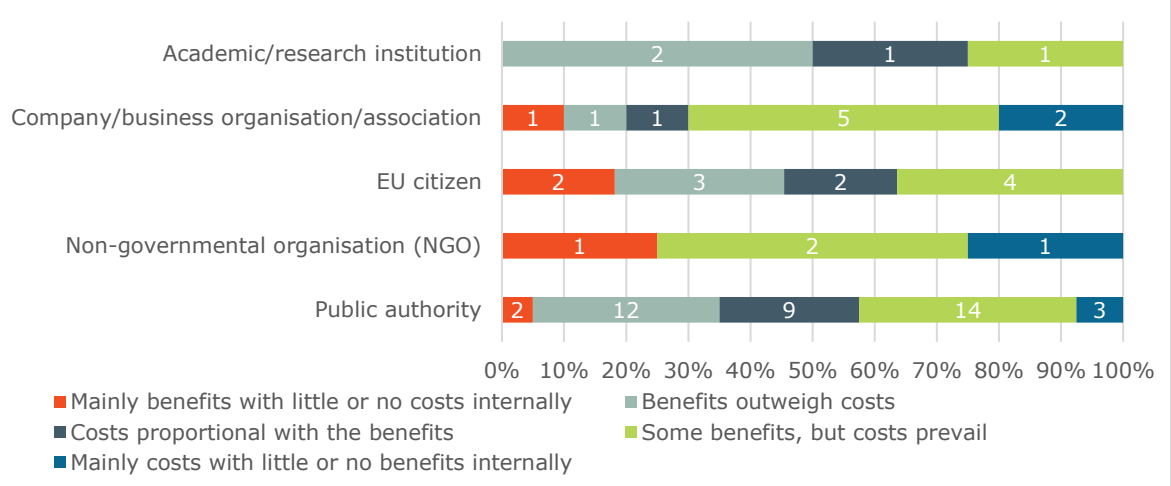


Source: All respondents, Targeted surveys (combined) April-May 2021, Question 25: Have the costs of sharing/using spatial data been proportional to the current and expected future benefits in your organisation?

Public consultation

Results of the Public consultations (***Figure 5-31***) also show that especially public authorities find that the cost outweigh the benefits. Also, businesses (10) find that perceived costs are larger than benefits.

Figure 5-31 Proportionality of costs as perceive per stakeholder group (N=69)



Source: All respondents, public consultation May-July 2021, Question 24: Have the costs of sharing/using spatial data been proportional to the current and expected future benefits in your organisation?

5.4.6. EQ 4.6 Have the resources needed to implement INSPIRE been available?

In the analyses of questions 4.2-4.5 above, an assessment was made of the costs of implementing INSPIRE and SDI in general; this analysis illustrated that one of the barriers to the implementation of INSPIRE in the past relate to costs i.e. a lack of financial and technical resources. This observation relates to the question which focuses on whether the resource both in terms of financing as well as in terms of staff (expert technical staff) have been available for the implementation of INSPIRE. The question also investigates how Member States have funded the implementation of INSPIRE. This analysis is based on monitoring data, desk review of literature and the stakeholder consultations.

According to the INSPIRE directive, "*INSPIRE should be based on the infrastructures for spatial information that are created by the Member States and that are made compatible with common implementing rules and are supplemented with measures at Community level. These measures should ensure that the infrastructures for spatial information created by the Member States are compatible and usable in a Community and transboundary context*." This suggests that synergy can and should be achieved between the NSDIs and INSPIRE, minimizing the need for additional financial and technical resources for the INSPIRE implementation. The analysis looks into if such synergy has occurred and benefitted the resources needed to implement INSPIRE.

Text box 5-21 Key/summary findings EQ 4.6: Available resources for implementation

Member States have identified different ways of funding the implementation of INSPIRE. Mostly, INSPIRE implementation has been funded as part of the general SDI budget allocation (with some difference in terms of which costs are carried at different government levels. Mostly the funding is provided by the national level government (state budget)). Some Member States have also used funding via European Structural Investment Funds (ESIF).

Furthermore, a number of **Focus Groups** found that the key problem was not the available resources, but that the required expertise was not present (which may in turn be a resource issue). It was mentioned that experience and expertise for INSPIRE data harmonisation was missing. In some Focus Groups, it was relayed that many different institutions are involved in the implementation of INSPIRE. Administrations often have to outsource the development of INSPIRE software and harmonisation, and the main costs related to procuring software companies to develop the SDI. The available budget therefore has to be spread across a number of institutions (and over a number of years) and is thus often not sufficient. Some Focus Groups mentioned that ESI funding has been used for the implementation.

Desk review

The REFIT evaluation (2016) pointed to five main factors which have influenced the cost-effective implementation of INSPIRE:[91] policy of data sharing, skills gap for

[91] European Commission (2016), Report from the Commission to the Council and the European Parliament on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23 (COM/2016/0478 final/2).

dealing with technical complexity, capacity building resources, coordination and communication mechanism, and flexible spatial data harmonisation provision.

One of the REFIT recommendations (see EQ 1.2) relate to the opportunities arising from the use of existing EU-level funding programmes to help capacity building and close the INSPIRE implementation gaps. Technical cooperation and coordination (MIG, the Interoperability Solutions for public Administrations, etc.) is supported on a continuous basis by the European Commission. In addition, initiatives in the context of the Digital Single Market and other actions are also expected to contribute to the implementation of the INSPIRE Directive (e.g. the European Interoperability Framework, European Data Strategy, revised Open Data and PSI Directive introducing the concept of High Value Data Sets).

Member States have identified different ways of funding the implementation of INSPIRE. Mostly, INSPIRE implementation has been funded as part of the budget (with some difference in terms of which costs are carried by the different government levels, mostly the funding is provided by the national level government (state budget)). Some Member States have also used funding via European Structural Investment Funds (ESIF). In the example of Poland, INSPIRE was thus implemented using the Regional Development Fund (under the objectives competitiveness). Also, in the case of Lithuania ESI Funding has been used for implementation of INSPIRE[92].

Consultation activities

Focus Group interviews

With regard to assessing the financial and human/technical resources and costs, the Focus Group interviews as well as individual participants presented different views.

Four Focus Groups did not regard the funding issue as a real problem and two of those specifically mentioned that there they had been allocated sufficient resources. Within this group there were participants who mentioned that there had been issues with regards to prioritising the resource between the different tasks of INSPIRE. Also, within this group there was a difference in opinion between representatives at national/central level and regional/local level. In general, representatives at national level found that there had been sufficient resources allocated for the implementation of INPSPIRE, whereas regional/local levels found that they had not always had the required time (resources) for the implementation. One participant mentioned that within their Member States there are regional difference and that some regions allocate the budget to implement INSPIRE, whereas others do not have the resources to implement INSPIRE and thus lag behind.

Furthermore, a number of participants in the Focus Groups covering three other Member States found that the key problem was not the available resources, but that the required expertise was not present (which may in turn be a resource issue). Several countries mentioned that they had experienced a lack of human resources for INSPIRE data harmonisation. There are more resources for open data in public administrations (which only require data sharing and not the harmonisation of data in common format); it is more difficult to mobilise human resources and expertise for the harmonisation of data according to INSPIRE. Within some of the Member States the lack of interest in (or recognition of the necessity) INSPIRE resulted in that the implementation initially was not prioritized and the tasks of harmonising and developing metadata was underestimated. According to a participant, many

[92] Country form for Lithuania.

stakeholders did not see the direct benefit of implementing INSPIRE. The development of the metadata and the changes to the technical documentation led to reworking of the same metadata many times. There were certainly costs for the portal itself and the help required to created it (external consultancies). Staff retention is an issue in the public administration of several member states and the fact that it takes a long time to train people.

Another group of Focus Groups found that there had not been allocated sufficient resources initially but that eventually resources had been provided to the implementation (after infringement proceedings). In some Member States, many different institutions are involved in the implementation of INSPIRE. The available budget therefore has to be spread across a number of institutions (and over a number of years) and is thus often not sufficient. One Focus Group mentioned that they had used ESI funding for the implementation. Administrations often have to outsource the development of INSPIRE software and harmonisation, and the main costs related to procuring software companies to develop the SDI. As the expertise is not developed internally, a dependency is created on external consultants which will require additional budget on a continuous basis: '*We are now linked to external companies to implement the directive, as we did not build internal competences'*.

Targeted surveys

Not directly covered in the Public consultations as this mainly is an issue for national/regional governments.

Public consultation

Not directly covered in the Public consultations as this mainly is an issue for national/regional governments.

5.4.7. EQ 4.7 How has the use of INSPIRE for environmental reporting affected the reporting burden?

As a response to the REFIT recommendations (See EQ 1.2) the European Commission has selected monitoring and reporting under the environmental acquis as a priority use-case for the development of a first set of pan-European information products. Based on the evaluation of reporting obligations under the environmental legislation, a preliminary list of common datasets that the Member States are obliged to report under the EU environment acquis was prepared by the Commission in collaboration with the Member States. This question looks into whether using INSPIRE has reduced the burden of environmental reporting for the Member States. Aspects of this evaluation question are also analysed under EQ 1.2, 2.6 and 5.2. Especially the Action Plan to Streamline Environmental Reporting[93] analysed under EQ 5.2 is relevant in relation to the reporting burden.

[93] European Commission (2017) Report from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Actions to Streamline Environmental Reporting, COM(2017) 312 final.

Text box 5-22 Key/summary findings EQ 47.: INSPIRE effect on the environmental reporting burden

The main findings on the use of spatial data made available through INSPIRE for reporting and whether this has reduced the administrative burden of reporting is that environmental authorities find that they to some extend use the spatial data made available through INSPIRE. It is noted that this does not necessarily reflect on the reporting burden, and no Focus Group interview confirmed that the burden had been reduced. However, the target survey shows that 50% of regional and national environmental agencies state that they to a large extent use INSPIRE for reporting.

Findings under effectiveness (EQ 2.6) and under coherence (EQ 5.2) point to that although there is an increase in the alignment of the use of INSPIRE for reporting, an increased effort in terms of making it technically more efficient will be needed before INSPIRE fully supports the reduction of the administrative burden.

Desk review

As analysed under EQ 1.2 on REFIT recommendation C on assisting the Member States in applying and implementing the INSPIRE Directive, the European Commission identified monitoring and reporting under the environmental acquis as a priority use case for the development of a first set of pan-European information products. Based on the evaluation of reporting obligations under the environmental legislation, a preliminary list of common datasets related to environmental reporting obligations was prepared by the European Commission in collaboration with the Member States. The number of priority data sets has been slowly but gradually increasing.

With reference to EQ 2.6 and the desk review conducted here analysed the evolution of the access to spatial data for environmental reporting and found that accessing and using spatial data has somewhat improved since the study was conducted the first time in 2009 (JRC study[94]). However, the main improvement is in the quality of spatial data, whereas the accessibility (finding, accessing and using) as not improved and the problems are too some extent more widespread than in 2009. But, importantly, it is underlined that this does, according to stakeholders surveyed in the study, not lead to higher costs of accessing and using spatial data as such. The study differentiates between the community involved in environmental assessment and environment practitioners outside the EIA/SEA community and identified difference in how these two groups perceive the access and quality of spatial data. It is thus difficult to derive a clear finding in this regard.

Consultation activities

Focus group interview

As already mentioned under EQ 2.6, Focus Groups stated that although there are the challenges in reporting under the environmental acquis, this is one the main added values of INSPIRE. Focus Groups were overall positive about the alignment process of INSPIRE with EU reporting requirements in area such as: air quality directive, water framework directive, the industrial emissions directive and the bathing water directive.

[94] JRC Report. Evolution of the access to spatial data for environmental purposes

These are examples where it has been achieved and works now. One Focus Group expressed that the use of INSPIRE for environmental reporting is progressing and that the Directive has had an influence on many platforms. However, no Focus Group explicitly mentioned that INSPIRE till now has reduced the reporting burden as such.

Target surveys

The issues relating to use of INSPIRE for environmental reporting is addressed under EQ 2.6.

Public consultation

The findings of public consultations on environmental reporting are further addressed under EQ 5.2.

5.4.8. EQ 4.8 How would further streamlining of the provisions in Articles 7 and 8 of Directive 2003/4/EC on public access to environmental information with the active dissemination provisions of the INSPIRE Directive impact the administrative burden on the Member States.

This question is closely linked to, and is to a large extent analysed under EQ 2.4 on effectiveness(which investigates the extent to which INSPIRE has supported Member States to carry out their obligations in dissemination of environmental information) and relevance (which will consider the current state of technology) EQ 3.4 and 2.4 and 5.4 on relevance and coherence.

Further, EQ 5.4 reviews the interactions between the INSPIRE Directive with Directive 2003/4/EC on public access to environmental information and larger initiatives around the Common European Green Deal data space. In effectiveness EQ 3.4, the effects are analysed. In this criterion, we only look at whether a possible streamlining of the directive would reduce the administrative burden for Member States in terms of disseminating environmental information to the public.

Text box 5-23 Key/summary findings EQ 4.8.: Key/summary findings regarding administrative burden in relation to dissemination environmental information

According to the findings under effectiveness EQ 2.4 and 5.4, there are no inconsistencies between the INSPIRE Directive and Directive 2003/4 on Public Access to Environmental Information. The two Directives serve different purposes (transparency vs interoperability and data accessibility through view and download services) and have different scopes (despite some overlap). INSPIRE can however support the implementation of Directive 2003/4 as it provides a technical framework for electronic data sharing.

In terms of the administrative burden, the **targeted surveys** show that stakeholders perceive that INSPIRE supports the implementation of Directive 2003/4/EC, at least to some extent, by improving the capacity. An improvement in the capacity of public authorities to disseminate environmental information to the public in an easily accessible electronic format should have an effect on the administrative burden. However, this was not directly confirmed in any of the Focus group interviews with Member States.

Desk review

The main desk analysis in relation to streamlining of the provisions in Articles 7 and 8 of Directive 2003/4/EC on public access to environmental information with the active dissemination provisions of the INSPIRE is conducted under the criteria effectiveness and coherence (see sections 5.2.1 and 5.5.2)

Consultation activities

Scoping interview

The main analysis in relation to streamlining of the provisions on public access to environmental information with the active dissemination provisions of the INSPIRE, of the scoping interview is included under the criteria effectiveness and coherence (see sections 5.2.1 and 5.5.2).

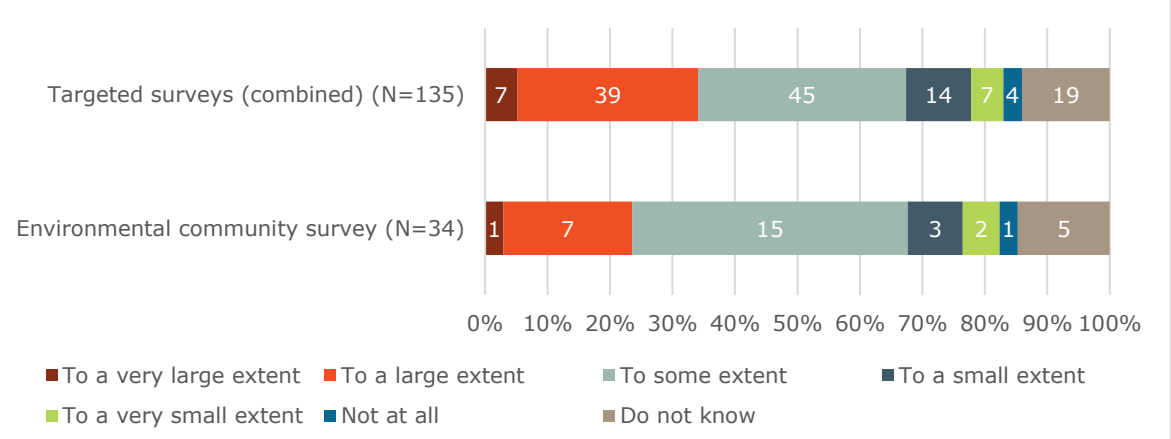
Focus group interview

The main analysis of the Focus group interviews in relation to streamlining of the provisions on public access to environmental information with the active dissemination provisions of the INSPIRE is included under the criteria effectiveness and coherence (see sections 5.2.1 and 5.5.2).

Targeted surveys

The majority of respondents to the four targeted surveys considered that INSPIRE has contributed to the capacity of public authorities to disseminate environmental information to the public in an easily accessible electronic format in compliance with Directive 2003/4/EC, to a large or very large extent (34%) or at least to some extent (33%). This proportion is slightly less significant in the targeted survey of the environmental community (where 24% responded 'to a large extent' or 'to very large extent' and 44% 'to some extent'). The finding from the surveys that INSPIRE supports the implementation of Directive 2003/4/EC at least to some extent partially contrasts with the findings from the literature that authorities are implementing both Directives in silos.

Figure 5-32 Extent to which INSPIRE contributes to the capacity of public authorities to disseminate environmental information to the public in compliance with Directive 2003/4/EC



Source: All respondents, First row: Targeted surveys (combined) April-May 2021, Question: To what extent does INSPIRE contribute to the capacity of public authorities to disseminate environmental information to the public in an easily accessible electronic format (in compliance with Directive 2003/4/EC on public access to environmental information)?; Second row: Targeted survey of the environmental community only April-May 2021, Question 41.

Public consultation

The main analysis of the public consultations in relation to streamlining of the provisions on public access to environmental information with the active dissemination provisions of the INSPIRE is included under the criteria effectiveness (see section 5.2.1).

5.5. Coherence

The coherence assessment considers whether the INSPIRE Directive and its provisions are logical and consistent internally and with other relevant legislation, policies and strategies. This includes determining whether there are significant contradictions or conflicts that stand in the way of their effective implementation or which prevent the achievement of their objectives. It also looks for interactions, gaps and synergies that facilitate the Directive's objectives in implementation practice.

Five evaluation questions have been formulated to assess the coherence of the INSPIRE directive, internally and with other environmental legislation, and with other policies and legislation outside the environmental acquis with a spatial dimension, as well as EU Directives on public data sharing. EQ 5.1 looks at internal coherence of the INSPIRE Directive. EQ 5.2 and 5.3 look at the external coherence of the INSPIRE Directive with EU legislation with a spatial dimension, including environmental legislation and legislation outside the environmental acquis. The last two questions will look at the relations between the INSPIRE Directive and relevant EU initiatives aimed at ensuring that data and digital technologies are available to all and can empower European society towards better decision-making in all sectors of activity, Directive 2003/4/EC on public access to environmental information, the Common European Green Deal data space (EQ 5.4) and Directive 2003/98/EC on the re-use of public sector information (EQ 5.5).

5.5.1. EQ 5.1 To what extent is INSPIRE coherent internally?

According to the Better Regulation Toolbox, assessing internal coherence means 'looking at how the various components of the same EU intervention operate together to achieve its objectives e.g., the different articles of a piece of legislation, different actions under an action plan' (Better Regulation Toolbox, Tool 47). The analysis in this question thus aims to provide evidence of the consistencies or inconsistencies of INSPIREs general objective and between the general objective and the specific and operational objectives of the Directive and the measures derived from them.

Text box 5-24 Key/summary findings EQ 5.1: internal coherence

The **desk review** has shown that there are no major inconsistencies between INSPIRE Directive itself and Implementing Rules and Technical Guidance. Having to go through comitology procedure to amend technical elements contained in Implementing Rules might however be considered burdensome.

The Directive refers to outdated comitology procedures and, if revised, should be aligned with Article 290 and 291 of the Lisbon Treaty. Aligning the comitology procedures referred to in the INSPIRE Directive to the Lisbon treaty might lead to more flexible revision procedures.

Focus Group interviews and targeted surveys have indicated that there are some overlaps between data themes, leading to the possibility to report the same data under different themes. Stakeholders called for clarifications to resolve those overlaps.

Desk review

The requirements of the INSPIRE Directive are contained in several layers of regulations and guidance, which have different statuses. The general requirements, are contained in the INSPIRE Directive itself, together with the list of spatial data

themes, listed in the Annexes to the Directive. These are complemented by a series of Implementing Rules for metadata, network services, and interoperability of spatial data sets and services, which are binding in their entirety, and by non-binding Technical Guidance, which specifies data models and implementation requirements for each spatial data theme. No evidence was found in the literature review that having several layers of regulations and guidance creates any inconsistencies per se. However, a number of the technical elements included in the Implementing Rules may require modification to account for technological developments, such as certain code lists and their values, or coordinate reference systems. Such modifications can currently only be made by amending the Implementing Rules. Because the INSPIRE Directive still refers to repealed Decision 1999/468[95] and still makes use of the regulatory procedure with scrutiny, the revision of such technical elements may be more cumbersome than necessary.

As previously mentioned, the INSPIRE Directive is outdated with regards to its references to comitology procedures. According to Article 4(7) of the INSPIRE Directive, 'the description of the existing data themes referred to in Annexes I, II and III may be adapted in accordance with the regulatory procedure with scrutiny'; Article 7(1) also provides that 'Implementing Rules […] shall be adopted in accordance with the regulatory procedure with scrutiny'. Rules on metadata (Article 5(4)) and monitoring (Article 21(4)), which refer to the regulatory procedure (Article 5 of Decision 1999/468) have, on the other hand, been automatically shifted to the examination procedure laid down in Regulation (EU) 182/2011.[96] If the INSPIRE Directive were to be revised through legislative procedure, it would have to be aligned with the provisions of Article 290 and 291 of the Lisbon Treaty regarding Delegated and Implementing Acts, and with the comitology procedures laid down in Regulation (EU) 182/2011.

Regarding its implementation, the INSPIRE Directive takes a stepwise approach according to the 2010-2020 Implementation Roadmap. The 2016 evaluation of the INSPIRE Directive concluded that the INSPIRE was internally coherent as Member States largely follow the implementation steps as defined in the Roadmap.[97]

Consultation activities

Scoping interviews

Internal coherence was not discussed in scoping interviews.

Focus Group interviews

Only a few comments were made in the seven Focus Group Interviews regarding the internal coherence of the INSPIRE Directive. Although several comments were made on the complexity of the data specifications, only one Focus Group participant commented on the relationship between the Directive, the Implementing Rules and the Technical Guidelines. The participant indicated that having several levels of

[95] Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission (no longer in force).

[96] Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission's exercise of implementing powers. OJ L 55, 28.2.2011, p. 13–18.

[97] European Commission (2016) Commission Staff Working Document, Evaluation, accompanying the document 'Report from the European Commission to the Council and the European Parliament on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23. SWD(2016) 273 final.

regulations, some of which are legally binding while others are recommendations, creates confusion among data providers. This is particularly problematic for those authorities and organisations that are less heavily involved in the implementation of INSPIRE.

Participants from another Focus Group Interview commented on the overlaps between INSPIRE data themes. They mentioned in particular overlaps between the themes 'Environmental monitoring Facilities' and 'Soil', because 'soil monitoring plots' could fall under both themes, which can lead to confusion within authorities regarding where this data should be reported. Participants to this Focus Group Interview indicated that these overlaps might come from the fact that data specifications of the different INSPIRE themes have been developed in silos at the beginning, with each thematic working group developing the specifications focusing on its own data theme. They concluded that where overlaps between themes occur, there should be more guidance as to where the data should be reported.

Targeted surveys

Respondents to the four targeted surveys were asked to identify overlaps, inconsistencies or gaps between existing INSPIRE themes. [98] Roughly the same proportion of respondents did or did not find such overlaps, gaps and inconsistencies between themes.[99] As in the Focus Group interviews, eight respondents to the targeted surveys indicated that some data could fall under various data themes, which may lead to differences between Member States in implementation – i.e. Member States choosing to report the same information under different themes. Examples of such overlaps identified by respondents include for instance between Oceanographic Geographical Features and Sea Regions; Hydrography and Sea Regions; Land use and Land cover; and Energy resources and hydrography (regarding hydropower). Another comment made by four respondents was that links between interrelated themes are sometimes missing. Two respondents indicated that the fact that each model is made in its own style creates difficulties for data providers, in particular when two models are interrelated, such as Administrative Units and Statistical Units. One respondent suggested the use of more extensive models, allowing the reuse of layers between themes. Two respondents also mentioned dependencies between different themes that are not adequately addressed, such as the link between addresses and parcels or addresses and buildings.

Public consultation

The public consultation did not address the internal coherence of INSPIRE and no comments were made by respondents on this issue.

5.5.2. EQ 5.2 To what extent is INSPIRE coherent with environmental legislation with geospatial reporting obligations?

Building on the findings from Effectiveness – EQ 2.6 and Efficiency – EQ 4.8, EQ 5.2 assesses the interaction between the INSPIRE Directive and several key pieces of EU environmental legislation which, due to their spatial dimension, both depend upon

[98] Survey of spatial data community, Question 16, survey of the environmental community Question 19, survey of marine community, Question 14, survey of agricultural community, Question 12: 'Are you aware of overlaps, inconsistencies or gaps between existing INSPIRE themes? If yes, please describe them below.'

[99] The questions received 57 comments in total, including 19 responses reporting overlaps, gaps and inconsistencies, 21 indicating that no such overlaps, gaps and inconsistencies exist, and 17 providing information and opinions not directly answering the question.

effective infrastructure for spatial data for carrying out required monitoring and reporting activities and contribute to the development of such datasets through these activities. Streamlined spatial data might also contribute to the effective implementation of environmental legislation, enabling effective planning and design of activities and dissemination to the public. Judgement criteria for this evaluation question consider potential synergies between the INSPIRE Directive and environmental reporting, including the extent to which environmental legislation refers to INSPIRE or whether relevant guidance exist supporting the use of INSPIRE for environmental reporting. They also reflect on the extent to which mechanisms in place to collect and report data under relevant pieces of environmental legislation are consistent with the framework created under INSPIRE, and the extent to which problems identified in other criteria might stem from problems linked to the coherence of the legislation.

Text box 5-25 Key/summary findings EQ 5.2: Environmental reporting

The desk review showed that there are no impediments to the application of INSPIRE contained within relevant environmental or other EU legislation; in fact many pieces of legislation do make reference to INSPIRE rules. **Focus Group interviews** and targeted surveys showed that having a reference to INSPIRE in the various pieces of environmental legislation recalling the obligation to share data according to INSPIRE rules supports compliance with INSPIRE, even though this is not necessary for the INSPIRE rules to apply.

The **desk review** and **scoping interviews** have shown that, since the Monitoring and Reporting Fitness Check and the related Action Plan, efforts have been made and are still ongoing to add references to INSPIRE in environmental legislation and to increase the alignment of data specifications between environmental reporting obligations and INSPIRE. This will be a long and complex process that might not be fully achievable given the broad scope of reporting obligations and their unique aspects. In the targeted surveys, some stakeholders called for more communication and/or guidance on the progress of initiatives to align reporting obligations with INSPIRE.

Desk review

The 2016 REFIT evaluation of the INSPIRE Directive concluded that, despite efforts to increase the coherence between INSPIRE and EU environmental legislation requiring the reporting of spatial data, both in terms of legal coherence and guidance, 'reporting systems were only partially making use of the INSPIRE rules and specifications',[100] and that more work was needed to improve coherence of INSPIRE with environmental reporting requirements. This led to the recommendation that Member States should give priority to environmental spatial datasets, in particular those linked to monitoring and reporting, when implementing the INSPIRE Directive. The Fitness Check of monitoring and reporting obligations arising from EU environmental legislation, carried out as part of the REFIT programme in 2016-2017, pointed out the lack of coherent legal obligations in the field of environmental reporting, the fragmented governance and decision-making mechanisms, and the 'insufficient coordination and collaboration

[100] European Commission (2016) Commission Staff Working Document, Evaluation, accompanying the document 'Report from the European Commission to the Council and the European Parliament on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23. SWD(2016) 273 final.

between different actors, such as between experts on environment reporting and geospatial data linked to the INSPIRE Directive'. The Reporting Fitness Check therefore recommended improving the coherence of reporting obligations and streamlining reporting obligations, including by better using the tools and specifications set out by the INSPIRE Directive.[101]

Following the Reporting Fitness Check, the European Commission adopted an Action Plan to Streamline Environmental Reporting,[102] which included several actions addressing the findings of the 2016 evaluation of the INSPIRE Directive and of the Reporting Fitness Check that are relevant to INSPIRE:

- Action 1 proposed to adopt 'Legislative amendments to reporting obligations defined in selected pieces of legislation' to increase coherence and streamline reporting obligations. A number of those amendments addressed the alignment of environmental reporting obligations with INSPIRE.

- Action 2 'Assess and change reporting obligations in more detail as part of a rolling programme', included a review of environmental reporting obligations to make sure that they are in line with INSPIRE data specifications.

- Action 3 aimed to 'Modernise eReporting including through a more advanced Reportnet and by making best use of the existing infrastructure'; in this context the European Commission would promote the application of INSPIRE rules to environmental reporting obligations and ensure that environmental spatial datasets are given priority in the implementation of the Directive.

- Action 5 'Develop guidance and promote best practices for European and national environmental information systems including better access to data in easy-to-understand ways' also refers to INSPIRE as a key legislation to improve seamless access to data in a cross-border context.

- Action 6 aimed to 'Promote full implementation of the INSPIRE Directive, giving priority to datasets most relevant for the implementation and reporting of EU environmental legislation' by identifying spatial datasets, falling under the INSPIRE Directive, linked to environmental reporting obligations and monitoring their implementation.

According to the Staff Working Document of the 2016 evaluation of the INSPIRE Directive, a number EU environmental legislative acts and implementation guidelines were already making references to the INSPIRE Directive in relation to spatial data reporting requirements. The Staff Working Document indicated that such references in legal acts or guidance make the legal obligation to use INSPIRE 'more visible' and encourage coordination between organisations responsible for environmental reporting and for INSPIRE at national level, even if they are not strictly necessary and the INSPIRE requirements apply regardless. The legislation shown in the table below were

[101] European Commission (2017) Commission Staff Working Document, Fitness Check of Reporting and Monitoring of EU Environment Policy? accompanying the document 'Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Actions to Streamline Environmental Reporting', SWD(2017) 230 final.

[102] European Commission (2017) Report from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Actions to Streamline Environmental Reporting, COM(2017) 312 final.

already providing an explicit reference to the use of INSPIRE specifications for reporting environmental spatial data at the time of the previous REFIT evaluation.[103]

Table 5-14 : Legislation already aligned with INSPIRE at the time of the 2016 evaluation

Legislation	Relevant provisions
Nature legislation	
• **Directive 92/43/EEC (Habitats Directive)** • **Directive 2009/147/EC (Birds Directive)** • **Commission Implementing Decision 2011/484/EU**	According to Commission Implementing Decision 2011/484/EU, for each Natura 2000 site, the NATURA 2000 Standard Data Form must provide among other information a map of the site. 'The GIS data must include metadata according to the INSPIRE Metadata Regulation in its latest approved version'. Each site must be attributed an INSPIRE ID.
Water and marine legislation	
Directive 2000/60/EC (WFD) **Directive 2007/60/EC (Floods)**	Reporting Guidance for the WFD[104] and the Floods Directive[105] provide instructions to report according to INSPIRE standards.
Directive 2008/56/EC (MSFD)	'In accordance with Directive 2007/2/EC, Member States shall provide the Commission […] with access and use rights in respect of data and information resulting from the initial assessments made pursuant to Article 8 and from the monitoring programmes established pursuant to Article 11' (Article 19(3))
• **Directive 2008/50/EC (Ambient Air Quality Directive)** • **Decision 2011/850/EU (reciprocal exchange of information and reporting on ambient air - IPR)**	• Public information to be made available as per Article 26 of the AAQD (ambient concentrations of pollutants, actual or predicted exceedances of alert thresholds, exemptions, and air quality plans) 'shall be made available free of charge by means of any easily accessible media including the Internet or any other appropriate means of telecommunication, and shall take into account the provisions laid down in Directive 2007/2/EC.' (Article 26(1)). • Reporting obligations are further specified in the IPR decision, which refers to definitions contained in the INSPIRE Directive: 'For the purposes of this Decision, and in addition to the definitions laid down in Article 2 of Directive 2004/107/EC, Article 3 of Directive 2007/2/EC, and Article 2 of and Annex VII to Directive 2008/50/EC, the following definitions shall apply' (Article 2). • Technical Guidelines from the JRC[106] supports INSPIRE compliant transmission of air quality plans.
Industrial emissions and accidents legislation	
• **Directive 2010/75/EU (industrial emissions Directive)** • **IED reporting decision (2012/795/EU) – no longer in force**	The IED reporting decision requires that the location and addresses of IED installations are provided 'in accordance with Directive 2007/2/EC'.
Directive 2012/18/EU (Seveso III Directive)	'The way information is managed should be in line with the Shared Environmental Information System (SEIS) initiative […]. It should also be in line with Directive 2007/2/EC […] and its implementing rules' (Recital 20)

With the ongoing implementation of Action 1 and Action 2 of the Action Plan, some additional pieces of environmental legislation now contain a reference to using

[103] Based on the list in SWD(2016) 273 final, p. 59.

[104] European Commission (2016) WFD Reporting Guidance 2016. Annex 5. Final – Version 6.0.6: https://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm

[105] European Commission (2013) Guidance for Reporting under the Floods Directive (2007/60/EC). Technical Report - 2013 – 071: https://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm (Last accessed on 19.05.21).

[106] Kotsev A, Smits P, Cyra L, Epure A, Francioli D, Belis C. (2014) Reporting of Air Quality Plans and Programs in Europe. Guidelines for INSPIRE compliant data transmission. EUR 26862. Luxembourg: Publications Office of the European Union; JRC92045: https://publications.jrc.ec.europa.eu/repository/handle/JRC92045 (Last accessed on 19.05.21).

INSPIRE standards for spatial data reporting,[107] compared to the situation at the time of the 2016 evaluation of the INSPIRE Directive:

Table 5-15 : Legislation aligned with INSPIRE since the 2016 evaluation

Legislation	Relevant provisions
Nature legislation	
• **Regulation (EU) 1143/2014 (Invasive Alien Species)** • **Commission Implementing Regulation (EU) 2017/1454 specifying the technical formats for reporting under the IAS Regulation**	'Directive 2007/2/EC requires that public authorities in the Member States make spatial data sets available in conformity with the implementing rules on metadata, network services and interoperability of spatial data sets and services set out in Commission Regulation (EU) No 1089/2010 (7), including the provisions in Section 18 of Annex IV ('Species Distribution') of that Regulation.' (Recital 3 of Regulation (EU) 2017/1454)
Water legislation	
Directive (EU) 2020/2184 (Drinking Water)	• The recast Drinking Water Directive introduced references to INSPIRE in Article 17 on Information to the public: Member States must provide information on the quality, price and consumption of drinking water 'without prejudice to Directives 2003/4/EC and 2007/2/EC.' (Article 17(3)). • The recast Directive sets new reporting requirements in Article 18: Member States, assisted by the EEA, must set up datasets containing information on access to drinking water, information on catchment areas for abstraction points, monitoring results, information on incidents, and information on all derogations granted. 'Where possible, spatial data services as defined in point (4) of Article 3 of Directive 2007/2/EC shall be used to present the data sets' (Article 18(1)).
Soil legislation	
Directive 86/278/EEC (Protection of soil when sewage sludge is used in agriculture)	• Article 1 of Regulation (EU) 2019/1010 on the alignment of reporting obligations in the field of legislation related to the environment, amended Article 2 to refer to INSPIRE definitions of spatial data sets and spatial data services. • Regulation (EU) 2019/1010 also amended Article 10 of the Directive on the requirement to keep up-to-date records of the quantities and composition of sludge produced and the quantities supplied for use in agriculture, the type of treatment, and the contact details of the recipients to include 'Spatial data services shall be used to present the spatial data sets included in the information registered in those records.'
Noise legislation	
Directive 2002/49/EC (Environmental Noise Directive)	Article 2 of Regulation (EU) 2019/1010 on the alignment of reporting obligations in the field of legislation related to the environment, amended Article 9(1) of the Noise Directive on Information to the public to add a reference to INSPIRE: 'Member States shall ensure that the strategic noise maps they have made, and where appropriate adopted, and the action plans they have drawn up are made available and disseminated to the public in accordance with relevant Union legislative acts, in particular Directives 2003/4/EC and 2007/2/EC of the European Parliament and of the Council, and in conformity with Annexes IV and V to this Directive, including by means of available information technologies.'
Industrial emissions legislation	

• **Directive 2010/75/EU (industrial emissions Directive)**
• **Decision (EU) 2018/1135 (IED reporting Decision)**
• **Regulation (EC) No 166/2006 (European Pollutant Release and Transfer Register - E-PRTR)**
	• Reporting obligations under IED and E-PRTR Regulation are aligned by Decision (EU) 2018/1135 and integrated into the EU Registry on Industrial Sites, which collects identification and administrative data for:
	  • European Pollutant Release and Transfer Register Regulation(EC) No 166/2006 -(E-PRTR) facilities,
	  • Installations under the scope of the Industrial Emissions Directive (IED),
	  • Large combustion plants (Chapter III of the IED),
	  • Waste incineration and co-incineration plants (Chapter IV of

[107] European Commission (2019) Progress on Actions to Streamline Environmental Reporting. Report by actions: https://ec.europa.eu/environment/legal/reporting/pdf/ENV%20reporting%20-%20progress%20report%20-%20June%202019.pdf (Last accessed on 26.05.2021).

	the IED). • The Registry EU will contain all relevant permit and geospatial information, without duplication between the two regulations. The Registry is managed by the EEA. [108] • The data model used for the Registry is an extension of the INSPIRE Production Facilities data model. It will allow 'Member States and the Commission to link 'installations', large combustion plants and waste incineration plants with 'facilities' within the meaning of Article 2(4) of Regulation (EC) No 166/2006 (Recital 9 of Decision (EU) 2018/1135). • According to the new IED Reporting Decision, installations and large combustion plants covered by IED and facilities under the E-PRTR Regulation should receive a unique identifier following the requirements of Directive 2007/2/EC (Annex I).
Chemicals legislation	
Regulation (EU) 2019/1021 (POPs Regulation)	The recast POPs Regulation introduced Article 17 on Formats and software for publication or notification of information, referring to INSPIRE: 'The Agency shall, in cooperation with the Member States, specify formats and software for the publication or notification of data by Member States pursuant to this Regulation and shall make them available free of charge on its website. In relation to spatial data sets and spatial data services, Member States and the Agency shall design the formats in accordance with the requirements of Directive 2007/2/EC. Member States and other parties subject to this Regulation shall use those formats and software in their data management or data exchange with the Agency.'
• **Regulation (EU) 2017/852 (Mercury)** • **Commission Implementing Decision (EU) 2019/1752**	• Commission Implementing Decision (EU) 2019/1752 establishing questionnaires, as well as the format and frequency of reports to be prepared by the Member States in accordance with the Mercury Regulation introduced that 'Where information to be reported is related to geographically located entities, such as industrial installations and sites, the information should be reported in accordance with Directive 2007/2/EC' (Recital 5). • Each installation must receive a unique identifier that follows the requirements of Directive 2007/2/EC.

There are pieces of legislation that require the reporting of priority environmental datasets and which do not contain any specific reference to the INSPIRE Directive. These include among others the legal acts below.

Table 5-16 : Legislation not referencing the INSPIRE Directive

Legislation	Spatial data covered
Bathing Water Directive (Directive 2006/7/EC)	• Member States are required to draft bathing water profiles, including maps showing physical, geographical and hydrological characteristics as well as potential sources of pollution (Annex III)
Nitrates Directive (Directive 91/676/EEC)	• Member states need to submit a map to the European Commission showing the locationof Nitrate Vulnerable Zones and relevant water bodies (Art. 10)
Urban waste water treatment Directive (91/271/EEC)	• Data on UWWT appear within the 'Utility and governmental services' theme in the Annex III of the INSPIRE Directive
Landfill Directive (Directive 1999/31/EC)	• Data on waste installations appear within the 'Utility and governmental services' theme in the Annex III of the INSPIRE Directive
Directive on Management of waste from extractive industries (Directive 2006/21/EC	• Data on waste installations appear within the 'Utility and governmental services' theme in the Annex III of the INSPIRE Directive
Shale gas Recommendation (Recommendation	• Reporting the number of wells completed and planned projects involving high-volume hydraulic fracturing.

[108] European Environment Agency (2018) EU Registry on Industrial Sites. Data model documentation. Version 4.1–13/11/2018 : https://www.thru.de/fileadmin/SITE_MASTER/content/Dokumente/Downloads/IED-Linkliste_aus_EU-Registry_2018/EU_Registry_Manual_Datamodel_CID_Nov2018_Final.pdf (Last accessed on 10.05.21).

2014/70/EU)	• Informing the public about any incidents and accidents

References to INSPIRE in the legal acts are not sufficient to ensure that in practice environmental reporting and the implementation of the INSPIRE become consistent processes. The alignment of data models of the different pieces of legislation containing reporting obligations with INSPIRE is also necessary. The extent of the necessary alignment might vary across environmental legislation and be easier for some legislation than others. For example, Abramic et al (2018) compared MSFD spatial data requirements with INSPIRE data models to identify whether they fulfil MSFD spatial data requirements or whether they need extension. The article concluded that most MSFD spatial data requirements are covered by INSPIRE data models and that only some details included in MSFD spatial data requirements (e.g. species mortality, age…) would require minor extension of INSPIRE data models. [109]

Good collaboration between competent authorities responsible for environmental reporting and authorities building and maintaining the national SDI. Abramic et al (2018) mentioned for instance that in the case of MSFD, metadata created by authorities responsible for implementing the MSFD in Member States were not always included in national metadata catalogues (but only in Reportnet), limiting the benefits in terms of data discoverability. [110]

Consultation activities

Scoping interviews

The alignment between environmental reporting obligations and INSPIRE datasets was in particular discussed in a scoping interview with the EEA. Based on the conclusions of the 2016 REFIT evaluation of the INSPIRE Directive, the European Commission put a strong focus on identifying and harmonising a priority list of datasets for e-Reporting with INSPIRE. According to the EEA, this has indeed contributed to the alignment of data models. Such achievements are observed for instance for protected sites and nationally designated protected areas (CDDA), the EU registry of industrial facilities, and the water legislation. [111] However, developing harmonised data specifications fulfilling both reporting obligations and INSPIRE requirement (which might involve incorporating specific thematic requirements into INSPIRE data models) is a long process, which requires cooperation between the European Commission, the EEA and Member States. It is also a complex process as INSPIRE might not always be perfectly suited for catering the requirements of thematic pieces of legislation. Harmonisation of environmental reporting obligations and INSPIRE data models is still an ongoing process. [112]

To facilitate the alignment of reporting obligations and INSPIRE, a new reporting platform has been established by the EEA under Action 3 of the Action Plan 'Modernise eReporting including through a more advanced Reportnet and by making best use of the existing infrastructure'. The platform is a new version of Reportnet, namely Reportnet 3.0[113]. Reportnet is Eionet's infrastructure used for environmental reporting, which has been operational since 2002. [114] A first version of Reportnet 3.0 has been

[109] Abramic, A., Gonzalez Fernandez, D., Bigagli, E., Che-Bohnenstengel, A. and Smits, P. (2018) INSPIRE: support for and requirement of the Marine Strategy Framework Directive, Marine Policy, 92, p. 86-100.
[110] Ibid.
[111] Scoping Interview with EEA.
[112] Scoping Interview with EEA.
[113] Reportnet: https://reportnet.europa.eu/ (Last accessed on 19.05.21).
[114] About Reportnet : https://www.eionet.europa.eu/reportnet (Last accessed on 19.05.21).

launched; however, the transition of reporting obligations from Reportnet 2 to Reportnet 3 will take several years. [115] One of the functions of Reportnet 3.0 will allow for the intake of INSPIRE datasets. According to the EEA, this process might however not be automatic (i.e. Reportnet harvesting INSPIRE datasets available on national SDIs), as there is significant heterogeneity across the INSPIRE datasets and services made available by Member States. The completion of this process would require complete harmonisation of the data models and harmonisation of the INSPIRE data services provided by Member States in their respective national SDIs. Member States will however progressively have the possibility to connect their reporting processes to INSPIRE services through Reportnet 3.0. [116]

Focus Group interviews

Three Focus Group interviews (out of the seven carried out) confirmed that references to INSPIRE in the text of environmental legislation are helpful as they provide more clarity that INSPIRE standards should be used for reporting. Without such references, one participant to one Focus Group Interview mentioned that INSPIRE compliance could be seen as voluntary. It was however mentioned by another participant to the same Focus Group Interview that the link should be made explicit in the legislation, and that it was not sufficient to simply add, as it was done for the Birds and Habitats Directive, a new attribute 'INSPIRE ID' in the Standard Data Form. The same participant mentioned the Alien Species Regulation as a good example of integration between an environmental legislation and INSPIRE.

In six Focus Group Interviews, participants commented about the differences in data models used for reporting under environmental legislation and INSPIRE data models, which might lead to duplication in reporting processes, as authorities responsible for environmental reporting have to report data twice with different models – the thematic reporting data model and the INSPIRE data model. Four Focus Group Interviews acknowledged that there have been improvements in harmonisation of data models and two commented that the ongoing initiative coming from the Reporting Fitness Check is positive and will lead to better harmonisation. The Ambient Air Quality Directive, the Water Framework Directive, the Industrial Emissions Directive and the Bathing Water Directives were quoted as examples of legislation for which harmonisation of data models has been achieved. One participant however reported compatibility issues regarding the Industrial Emissions Directive, the Floods Directive and the MSFD. The two Focus Group Interviews, welcoming the ongoing alignment initiative, however both recognised that harmonising data models is a lengthy and complex process, in particular due to the coordination and approval processes needed between a broad range of institutions at EU and national level. One Focus Group Interview considered that these efforts will be beneficial in the long term in terms of reduction of burden linked to reporting, while the other would see such benefits if automated data harvesting can be achieved.

Targeted surveys

Several respondents to the survey of the environmental community confirmed that a link to INSPIRE in the environmental legislation is useful to increase environmental authorities' awareness of their obligation to use INSPIRE. [117] One national authority

[115] Reportnet 3.0: https://www.eionet.europa.eu/reportnet/reportnet-3.0 (Last accessed on 19.05.21).

[116] Scoping Interview with EEA.

[117] Question 16: 'Have you encountered cases where fulfilling reporting obligations under EU environmental legislation requiring the reporting of spatial data (at least partially) covered by INSPIRE was made difficult because of the absence of a clear link in the legal text (or alternatively the absence

mentioned that in their Member State, many reporting authorities do not consider the use of INSPIRE standards as mandatory, and do not consider the publication of reporting spatial data to INSPIRE as part of their mandate. Specifying the obligation in the relevant EU legislation might support better compliance in that respect. However, three respondents indicated that it has to be complemented with guidance for environmental authorities on specific reporting rules and data models.

Respondents to the survey of the environmental community commented that environmental reporting through Reportnet, following reporting guidelines of the various environmental Directives, and the provision of INSPIRE datasets are still often two distinct processes, resulting in two different datasets produced, because of differences in data specifications and standards. Examples of differences in data specifications were provided in relation to the Nature Directives (e.g. differences in species codes), E-PRTR, marine or soil data. Differences in standards (often pre-existing before INSPIRE) and software used to process data were also mentioned by a number of stakeholders (e.g. for marine data, ODV format is used for Chemical Oceanography, and netCDF Climate and Forecast (CF) metadata standards are used for physical/chemical oceanography). [118] Some respondents acknowledged recent progress made for certain legislation, with new data specifications being based on INSPIRE requirements (IED, Environmental Noise Directive) and indicated that alignment efforts are being made or will be made soon for other environmental Directives (e.g. Floods, Nitrates, Drinking water, or Seveso Directives). One respondent however indicated that keeping track of changing guidelines and progressive alignment with INSPIRE was not easy and would benefit from the creation of a general overview (European Commission webpage) for e-reporting priority datasets. [119]

Public consultation

None of the questions in the public consultation directly addressed the coherence between INSPIRE and environmental reporting obligations. However, five respondents addressed this issue in the last question of the public consultation.[120] Those respondents (public authorities and representatives of utilities service providers) argued that reporting under environmental Directives and reporting under INSPIRE should become more coherent processes in practice, both in terms of data content and data models. One respondent mentioned in particular inconsistencies between INSPIRE and Natura 2000 reporting obligations, both in data content and models. Increased coherence would avoid duplication of reporting processes, leading to

of EU guidance) clarifying that INSPIRE standard should be used? Please tick all that apply'. Question 16b: If you have ticked any of the above listed legislation, or if you have ticked 'other' please explain what are the issues.'

[118] Survey of the marine community, Question 13: 'Are there cases where the description of INSPIRE datasets could benefit from modifications/extensions to better align with data to be reported under the MSFD? If yes, please refer to the specific INSPIRE dataset(s) and explain why.'

[119] Survey of the environmental community, Question 15: 'Have you identified any overlaps or gaps existing among the relevant standards to be used for the sharing of data under the following environmental legislation requiring the reporting of geospatial data and INSPIRE (e.g. things that would require reporting the same data in different formats and models for different purposes)? Please tick all that apply'. Question 15b: 'If you have ticked any of the above legislation, or if you have ticked 'other' please explain the gaps and overlaps you are referring to.' Question 19: 19. 'Are you aware of overlaps, inconsistencies or gaps between existing INSPIRE themes? If yes, please describe them below.' Question 20: 'Have you encountered cases where the description of INSPIRE datasets could benefit from modifications/extensions to better align with data to be reported under other pieces of legislation?' Question 20b: 'If you ticked any of the datasets above, please explain what changes are needed.'

[120] Public consultation, Question 29: 'If you wish to add further comments, within the scope of this questionnaire, please feel free to do so here.'

additional burden for authorities. One of these respondents mentioned data scrapping as a possibility to ensure that authorities report only once.

5.5.3. EQ 5.3 To what extent is INSPIRE coherent with other relevant areas of EU policy with geospatial reporting obligations (transport, agriculture, maritime, space, health, disaster management, research)?

EQ 5.3 assesses the interaction between the INSPIRE Directive and several key pieces of legislation falling outside the environmental acquis, but which result in policies or activities which may have an impact on the environment, and the implementation of which can be supported by the availability of consistent and interoperable spatial data across the EU. Judgement criteria for this question consider potential synergies between the INSPIRE Directive and sectoral legislation outside the environmental acquis, including the extent to which sectoral legislation refers to INSPIRE or whether relevant guidance exist supporting interactions with INSPIRE, the extent to which mechanisms in place to collect and report data under relevant pieces of legislation are consistent with the framework created under INSPIRE, and the extent to which problems identified in other criteria might stem from problems linked to the coherence of the legislation.

Text box 5-26 Key/summary findings EQ 5.3:Coherence with sectoral legislation other than environment

Scoping interviews have revealed synergies between INSPIRE and sectoral objectives. INSPIRE is considered as an opportunity in several sectors to have a centralised entry point to access and share data, and to avoid duplication of data collection and reporting processes (IACS, Copernicus in situ component, climate adaptation data, TEN-T).

The **desk review** and **scoping interviews** also indicated that links with INSPIRE are being developed (legal references, technical guidance) and alignment of various data sharing instruments is ongoing (IACS, EMODnet, Copernicus). The pace of implementation (or varying degrees of implementation) of INSPIRE across the Member States is however slowing down the process and, in some cases, impedes successful interactions (e.g., the Copernicus in situ component).

In some sectors, scoping interviews have shown that relations with INSPIRE and how INSPIRE might support those policy areas is still largely to be defined (MSP, TEN-T, climate adaptation). Collaboration with sectoral DGs at EU level and through committees could be further developed, where relevant (e.g., representation of INSPIRE groups in sectoral committees, formalising cooperation).

Based on evidence from scoping interviews, and limited inputs from **Focus Group Interviews** and targeted surveys, the creation of a single data platform for all sorts of spatial data might however be an unachievable perspective due to varying data requirements of different sectors (e.g., the need for historical data vs most recent and accurate data only, frequency of updates, quality and level of accuracy of data).

Agriculture

Desk review

Regulation (EU) No 1306/2013 on the financing, management and monitoring of the common agricultural policy set up the Integrated Administration and Control Systems (IACS), which is the main instrument for the management of the Common Agricultural Policy (CAP) payments system. IACS allows the control of direct payments to farmers as well as others such as payments for agricultural practices beneficial for the climate and the environment and ensures the traceability of payments. The IACS system requires the establishment of several databases including: [121]

- An identification system for agricultural parcels – the land parcel identification system (LPIS)
- A system enabling farmers to graphically indicate the agricultural areas for which they apply for aid (geospatial aid application - GSAA)
- A computerised database for animals in EU countries where animal-based aid schemes apply
- An integrated control system, for systematic checks of aid applications based on computerised cross checks and physical on-farm controls.

The LPIS and the GSAA are the main spatial information elements contained in IACS. Member States are responsible for designing and operating their own IACS system at national level through their accredited paying agencies. There is a total of 40 IACS systems in Europe.

The need for spatial data sharing for the implementation of the CAP was stressed by Member States in the Declaration of cooperation on 'A smart and sustainable digital future for European agriculture and rural areas'[122] signed in April 2019 by almost all Member States. One of the proposed measures was to 'increase CAP administration efficiency, notably in sharing geospatial information among public administrations'. The new CAP, which will apply from 2023, will provide a more significant focus on data sharing, in particular with regards to the ambition to assess its environmental and climate performance, and the general objective of promoting digitalisation of agriculture. [123]

Regulation (EU) No 1306/2013 does not make reference to the INSPIRE Directive. However, a specific provision in the next CAP legislation - Art. 65 of the Horizontal Regulation (European Commission proposal not yet adopted) – will provide for the obligation to share geospatial information included in the IACS of the Member States in the context of the INSPIRE Directive. In addition, the guidance of the legal service of DG AGRI already requires that IACS geospatial data is shared according to INSPIRE[124].To support national Paying Agencies in this process, Technical Guidelines

[121] European Commission, Integrated Administration and Control System (IACS): https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/financing-cap/financial-assurance/managing-payments_en (Last accessed on 14 May 2021)

[122] Declaration - A smart and sustainable digital future for European agriculture and rural areas, April 2019: https://ec.europa.eu/newsroom/dae/items/648242 (Last accessed on 14 May 2021)

[123] Mohamed El Aydam, European Commission – DG AGRI D3, Integrated Administration Control System : which data for sharing? Presentation at INSPIRE Conference, 3 June 2020: https://inspire.ec.europa.eu/sites/default/files/inspire2020_greendataspace_iacs_land_use_data.pdf (Last accessed on 14 May 2021)

[124] Toth, K. and Milenov, P. Technical guidelines on IACS spatial data sharing. Part 1 - Data discovery, EUR 30330 EN, Publications Office of the European Union, Luxembourg, 2020: https://publications.jrc.ec.europa.eu/repository/handle/JRC121450 (Last accessed on 14 May 2021)

on IACS spatial data sharing[125] through INSPIRE, focusing on data discovery, have been prepared by the JRC in 2020. As reflected in the Technical Guidelines, the sharing of IACS data through INSPIRE will be done in two steps – discovery services will be implemented first; view and download services and data harmonisation will be dealt with in a second stage.[126]

According to EU institutions and national authorities, the main barriers are that LPIS is not a specific INSPIRE theme but that LPIS data may fit in a range of INSPIRE themes (Cadastral parcels, Land Use, Land Cover, Area management zones and reporting units, Agricultural facilities); that IACS contains sensitive or personal data, which, however, is generally not spatial data (farmers' registers, entitlements, payments, applications for certain payment schemes). [127]

Consultation activities

Scoping interviews

During the Scoping interview, DG AGRI explained that in the context of the New CAP, the INSPIRE infrastructure has been considered as an opportunity to have one single entry point for accessing IACS data, which is scattered across 40 national and regional systems. Using INSPIRE will facilitate the implementation of the new CAP provisions, as well as data sharing across administrations, and to some extent to the public. In addition, some of the IACS datasets have also been identified as High Value Datasets. In this perspective, IACS data sharing through INSPIRE is regarded as valuable. [128]

According to DG AGRI, the second part of the Technical Guidelines will be published in 2021[129]. At present, nine Member States have implemented the first part of the Technical Guidelines (Belgium, Croatia, Denmark, Estonia, Germany, Latvia, Luxembourg, Slovakia and Slovenia). DG AGRI is anticipating that all Member States will have done so by the end of 2021. [130]

As the Technical Guidelines are being implemented, it is too early to draw conclusions on the integration between national IACS systems and national INSPIRE SDIs. However, DG AGRI confirmed that the main obstacles to IACS data sharing through INSPIRE are the inclusion of sensitive or personal data in IACS data and the resources to carry out the alignment of the IACS system with INSPIRE[131].Regarding personal data included in IACS data DG AGRI highlighted that it is currently not addressed in INSPIRE at all. Clarifying how to proceed with personal data in INSPIRE and bringing the Directive more in line with EU personal data protection law could improve the integration of IACS data into INSPIRE. [132]

Focus Group interviews

Three Focus Group Interviews out of seven mentioned the use of INSPIRE for LPIS data. None of them specifically mentioned problems with sharing IACS data through INSPIRE or specifically mentioned the implementation of the Technical Guidelines. Two Focus Group Interviews however mentioned the coexistence of several standards. For

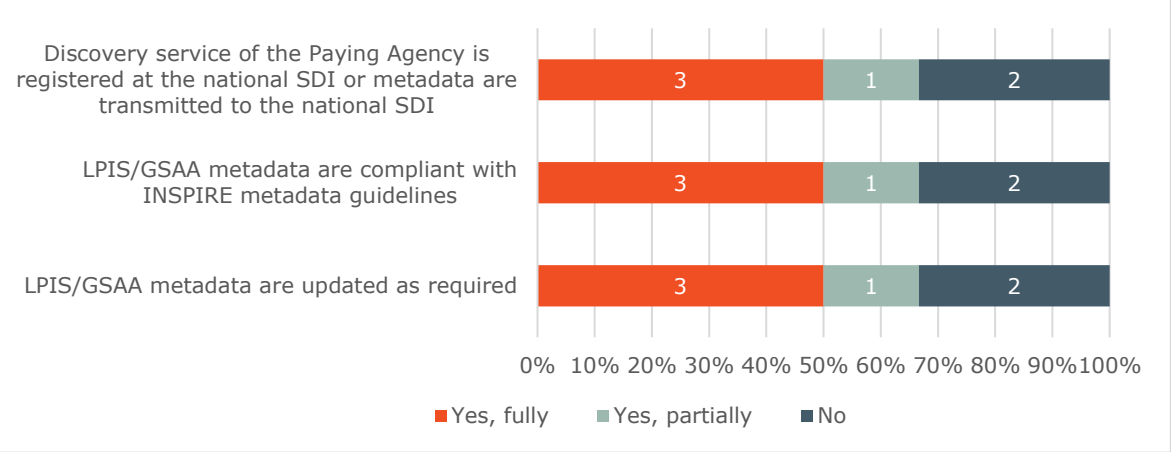
[125] Ibid.
[126] Ibid.
[127] Tóth, K. (Joint Research Centre), CAP and INSPIRE: history, perspectives and challenges. Presentation at Eurogeographics INSPIRE extension workshop, Marne la Vallée, 20-21 June, 2017.
[128] Scoping interview with DG AGRI.
[129] Ibid.
[130] Ibid.
[131] Ibid.
[132] Ibid.

example, in one participant to a Focus Group Interview mentioned that INSPIRE GML is the standard format for the cadastre to exchange information with the land register with a view to coordinate the identification of the different land parcels, in particular for CAP management, while the Cadastre shares its data with national authorities in another format than GML.

Targeted surveys

The targeted survey of the agricultural community gathered only very few responses,[133] which are not sufficient to provide an accurate picture of national IACS systems. Results from the survey however showed various levels of implementation of the Technical Guidance, as shown below, reflecting that the process of sharing IACS data through INSPIRE is ongoing.

Figure 5-33 Status of the implementation of the Technical Guidance on IACS spatial data sharing (N=6)



Source: Responses from paying agencies and ministries of agriculture, Targeted survey of the agriculture community April-May 2021, Question 8: What is the status of the implementation of the Technical Guidance on IACS spatial data sharing in your country?

When asked about the main difficulties in sharing IACS spatial data through INSPIRE, national paying agencies / ministries of agriculture most commonly referred to the fact that IACS spatial data does not always fit well with INSPIRE data themes as well as to issues linked to the sensitivity of information and personal data protection and then to technical / compatibility issues. Three paying agencies commented that increased alignment between IACS and INSPIRE data themes (primarily 'Land use' and 'Land cover') would be useful and provided the following examples:

- One agency suggested that the breakdown of crop types in IACS should be integrated to INSPIRE data themes for GSAA.
- Another one mentioned that for good inclusion of Ecological Focus Areas (EFA) in INSPIRE, code lists could be created for EFA elements in order to use either the INSPIRE dataset 'Land cover' or 'Land use'.

One Ministry of agriculture commented that there are also some doubts with regards to which data themes should be used, as LPIS data could either be included in 'Land cover' or in 'Agricultural and aquaculture facilities'. Regarding personal data

[133] Nine in total, including five paying agencies (three national and two regional, four responding as organisation, one as an individual), and one ministry of agriculture.

protection, two paying agencies mentioned that this is preventing the agency from sharing all IACS data through INSPIRE. An additional obstacle mentioned by one paying agency is the current lack of thorough understanding of INSPIRE and of the technical guidance in the paying agencies (e.g. how to transform IACS data into INSPIRE data models).

Public consultation

Coherence with IACS reporting was not addressed in the Public consultation and no comments were made by respondents on this issue.

Maritime Spatial Planning

Desk review

Directive 2014/89/EU establishing a framework for maritime spatial planning (MSP Directive) introduced the concept of maritime spatial planning into EU legislation, with the aim to coordinate the different activities and uses of the sea (energy, transport, fisheries, aquaculture) while ensuring the protection of the environment, including resilience to climate change impacts. The MSP Directive requires all Member States to establish a maritime spatial plan. It leaves a large margin to national authorities to design it according to national governance structure, with the requirement to coordinate with other Member States bordering their marine waters in order to ensure that maritime spatial plans are coherent and coordinated in a shared basin (Article 11 of the MSP Directive). As the maritime spatial plans address industrial and commercial uses of the sea, which are activities impacting the marine environment, and their coexistence with the protection of marine ecosystems, the MSP Directive is relevant in the context of INSPIRE.

The MSP Directive requirements on data use and sharing explicitly refer to INSPIRE as a source of data for the establishment of maritime spatial plans and as a possible data sharing tool. Article 10 of the MSP Directive states that Member States should 'organise the use of the best available data, and decide how to organise the sharing of information, necessary for maritime spatial plans', including environmental, social and economic data, collected as per other EU legislation, and marine physical data about marine waters. For this purpose, Member States should make use of relevant instruments and tools already available under the Integrated Maritime Policy (e.g. EMODnet) and other relevant EU policies, 'such as those mentioned in Directive 2007/2/EC'. Data gathering is an important part of the establishment of the maritime spatial plans. Given the nature of the plans, they require the gathering of a wide range of diverse data – environmental data, data related to different sectors – and, in many cases, this data should be gathered in the cross-border context.[134] According to Abramic et all (2018), maritime uses and activities that must be considered in the MSP process[135] are largely covered by the INSPIRE 34 data themes and, as a result, a lot of the data needed for the MSP could potentially be available through INSPIRE, in particular in themes 'Land use', 'Transport networks', 'Protected sites', 'Agricultural

[134] Abramic, A., Bigagli, E., Barale, V., Assouline, M., Lorenzo Alonso, A. and Norton, C. (2018) Maritime Spatial Planning supported by Infrastructure for Spatial Information in Europe (INSPIRE), Ocean and Coastal Management, 152, p. 23-36.

[135] Activities listed in Article 8 of the MSP Directive: aquaculture and fishing areas, installations and infrastructures for the exploration, exploitation and extraction of oil, of gas and other energy resources, of minerals and aggregates, and for the production of energy from renewable sources, maritime transport routes and traffic flows, military training areas, nature and species conservation sites and protected areas, raw material extraction areas, scientific research, submarine cable and pipeline routes, tourism, underwater cultural heritage.

and Aquaculture Facilities', 'Energy resources' or 'Utilities'. [136] The requirement to fulfil some MSFD reporting requirements in accordance with INSPIRE should also ensure that environmental data needed for the MSP process is available in INSPIRE compliant format. In addition, interoperability across sectoral datasets could be beneficial for the establishment of the maritime spatial plan. [137]

Data sharing obligations under the MSP Directive are linked to public participation requirements (Article 9) and monitoring and reporting requirements (Article 14). Public participation requirements include 'informing all interested parties and consulting relevant stakeholders and authorities, and the public concerned, at an early stage in development of the plan', and ensuring that 'the relevant stakeholders and authorities, and the public concerned, have access to the plans once they are finalised'. Article 14 requires Member States to 'send copies of the maritime spatial plans', and 'all subsequent updates', to the European Commission and other Member States concerned. According to Abramic et al (2018), national SDIs should be used for sharing the maritime spatial plans with stakeholders, the European Commission and other Member States and therefore fulfil the requirements from Article 9 and 14. The article concluded in this respect that the Planned Land Use data model in INSPIRE is appropriate for sharing maritime spatial plans. This is however not explicitly required by the MSP Directive, which also does not require that maritime spatial plans are developed in digital formats,[138] but leaves Member States the choice of the format in which the plan should be established and published.

As mentioned above, cooperation between Member States sharing sea basins is required for consistency of planning (Article 11), and cooperation with third countries should be sought to the extent possible using existing international forums or regional institutional cooperation (Article 12). According to Abramic et al (2018), INSPIRE could also support cooperation across Member States and third countries through the sharing of interoperable data by allowing the combination of datasets from various national sources, and through the possibility to integrate national plans into a spatial plan for the entire marine region or sub-region.[139] According to Abramic et all (2018), the use of INSPIRE standards could resolve the current difficulties in harmonising maritime spatial plans across countries coming from the use of different data models and standard rules for layers and styles. [140] As mentioned above, this is however not part of the requirements of the MSP Directive. Article 10 does not contain requirements regarding the form in which the plans should be submitted. The absence of such requirements might reduce the possibility for harmonisation between plans within a marine region. This might also be limited by the fact that, although some third countries (EFTA members and some accession countries) participate to the implementation of INSPIRE, they do not have the same obligations as EU Member States in terms of compliance and some neighbouring countries do not participate in INSPIRE at all.

Although there is potential for INSPIRE to support the establishment and update of maritime spatial plans, Abramic et all (2018) noted that there are still many barriers and that the INSPIRE infrastructure could not fully support the MSP process. Abramic et all (2018) mentioned in particular that the number of marine-related metadata records available in the geoportal was low, and that record distribution varied greatly across Member States and marine regions, with some coastal Member States not

[136] Abramic, et al. (2018) Maritime Spatial Planning supported by Infrastructure for Spatial Information in Europe (INSPIRE), Ocean and Coastal Management, 152, p. 23-36.
[137] Ibid.
[138] Ibid.
[139] Ibid.
[140] Ibid.

sharing marine-related data through INSPIRE. [141] The authors made this analysis in 2017 and noted that implementation is ongoing and that more datasets are expected to be available in the future. Similar conclusions have been drawn in the context of regional MSP cooperation projects. The SEANSE project's Analysis of data needs and existing gaps, published in 2018, noted that important datasets for maritime spatial planning were not available in an INSPIRE compliant format (including the metadata), but that the situation was progressively evolving towards more datasets being published. [142]

The possibility to share maritime spatial plans through INSPIRE has been studied in several EU or regional projects. A pilot case has been carried out in 2019, through the Macaronesian Maritime Spatial Planning (MarSP) project, in which an MSP INSPIRE data model was developed based on the Planned Land Use data model. [143] HELCOM has developed, as part of the project Pan Baltic Scope 'Guidelines on transboundary MSP output data structure in the Baltic Sea', [144] data specifications for MSP output data (i.e. national MSP plans and planned sea uses), as well as a portal to access Baltic Sea MSP relevant data, including both input data (i.e. thematic data relevant for MSP purposes) and output data (i.e. national MSP plans and planned sea uses). The INSPIRE Data Specification on Land Use has been taken as guidance when designing the data model for output data. [145] These initiatives could be a basis for the further harmonisation of input and output MSP data with INSPIRE data models.

Another possibility to share maritime spatial plans is likely to be through the European Marine Observation and Data Network (EMODnet), the marine data portal initiated by DG MARE. [146] Work has been done since 2018 to align the EMODnet Human Activities' portal[147] data models to INSPIRE's Data Specifications. A first study published in February 2018[148] compared the EMODnet Human Activities' datasets to the INSPIRE application schemas to identify actions that needed to be taken for further harmonisation. The study concluded that the harmonisation of EMODnet Human Activities' datasets to INSPIRE application schemas could be difficult (as 17 INSPIRE application schemas could be applicable to 66 EMODnet Human Activities' datasets, with more or less direct alignment depending on the themes). Following this report, the approach taken has been to harmonise EMODnet Human Activities datasets using the INSPIRE Land Use data model, following the approach taken in the MarSP project

[141] Ibid.
[142] Strategic Environmental Assessment North Sea Energy(SEANSE) (2018) Analysis of Data Needs and Existing Gaps: https://northseaportal.eu/downloads/ (Last accessed on 14 May 2021).
[143] Abramic A, Garcia A, Tello Antón O, Agudo LM, Bruque Carmona G, Zanella A, Norton C, Haroun R. (2019) Data specification for Maritime Spatial Planning INSPIRE data model, Macaronesian Maritime Spatial Planning (MarSP) C-3PO - D.5.1, Version 1.0: http://www.marsp.eu/media/files/61/marspwp5d51mspinspiredatamodel.pdf (Last accessed on 14 May 2021).
[144] HELCOM (VASAB CSPD/BSR) (2019) Guidelines on transboundary MSP output data structure in the Baltic Sea: https://vasab.org/wp-content/uploads/2019/04/Guidelines-on-transboundary-MSP-output-data-structure-ADOPTEDbyVASAB__HELCOM.pdf (Last accessed on 14 May 2021).
[145] Andžej Miloš, Transboundary MSP output data in the Baltic Sea: https://inspire.ec.europa.eu/sites/default/files/8_andzej_m._basemaps.pdf (Last accessed on 14 May 2021).
[146] EMODnet Central Portal: https://emodnet.eu/en (Last accessed on 17 May 2021)
[147] EMODnet Human Activities: https://www.emodnet-humanactivities.eu/ (Last accessed on 17 May 2021)
[148] Sagarminaga, Y., Solaun, O. (2018) EMODNET human activities data models: towards compliance with INSPIRE DATA Specifications. EMODnet Phase III, Task Report, "Analyze compliance with INSPIRE": https://webgate.ec.europa.eu/maritimeforum/en/system/files/EMODNET_INSPIRE_data_models_comparison.pdf (Last accessed on 17 May 2021).

mentioned above. [149] Results from this harmonisation exercise with the INSPIRE Land Use data model have been presented online in a dedicated map viewer. [150] The final report from the study concluded that harmonising the EMODnet human activities datasets to the INSPIRE Land Use data model is feasible although some information from EMODnet's datasets are lost when applying the INSPIRE Land Use model, as there is no direct alignment between the two. The study came to a similar conclusion that the MarSP project mentioned above, that the HILUCS Land Use codelist, used in the INSPIRE Land Use model is too broad to characterise many maritime uses, which results in several different datasets using the same HILUCS codes and therefore not being properly identified. To ensure better coherence between INSPIRE and EMODnet human activities data, the study recommended to provide more flexibility to extend the HILUCS Land Use codelist and to extend data models with new attributes. [151]

Consultation activities

Scoping interviews

During the scoping interview, DG MARE indicated that The EMODnet portal follows INSPIRE standards for oceanography parameters. The use of INSPIRE standards for data sharing is guaranteed through contractual requirements with organisation involved in EMODnet. The technical coordinators of the EMODnet portal collaborate with the team responsible for the INSPIRE infrastructure, and according to DG MARE, the cooperation works well and ensures that there are no inconsistencies with INSPIRE. However, DG MARE indicated that INSPIRE has been primarily conceived for land data, which sometimes creates complexities with regard to the integration of oceanographic data. [152]

Focus Group interview

Two Focus Group Interviews out of seven mentioned the link between INSPIRE and MSP. One Focus Group Interview mentioned that there is strong interest in the maritime sector for INSPIRE, especially with regards to Maritime Spatial Planning, and authorities cooperate to create common infrastructure and services, taking INSPIRE into consideration. In another Focus Group Interview, INSPIRE is however not driving the data reporting or data gathering exercises for the national MSP, partly because this is not a requirement.

Efforts to harmonise data across data platforms and the role of INSPIRE in this process have also been mentioned in one of the Focus Group interviews. It was mentioned in particular that INSPIRE schemas were used to harmonise data in EMODnet, and that some parts of INSPIRE standards are used in SeaDataNet, [153] which is a pan-European infrastructure for marine data sharing – INSPIRE metadata standards are used in SeaDataNet metadata. Opinions were shared that the objective

[149] Sagarminaga, Y., EMODNET-Human activities : steps forward for INSPIRE compliance. Presentation at the Virtual Workshop "Exploring and applying INSPIRE principles within Maritime Spatial Planning", at the INSPIRE Conference 2020, 12 June 2020: https://inspire.ec.europa.eu/sites/default/files/2_yolanda_s._azti_emodnet.pdf (Last accessed on 17 May 2021).

[150] INSPIRE Land Use - EMODnet's Human Activities Locations Dataset: http://oceandata.azti.es/thredds/fileServer/EMODNET_HA/EMODNET_INSPIRE_webgis.html (Last accessed on 05 July 2021).

[151] Sagarminaga, Y., Solaun, O, Menchaca, I., Franco, J. (2020) Implementation of the INSPIRE Land Use Theme (LU) for EMODnet Human activities datasets. EMODnet Phase III, Task Report: http://oceandata.azti.es/thredds/fileServer/EMODNET_HA/INSPIRE_LAND_USE_4_EMODNET_2020.pdf (Last accessed on 05 July 2021).

[152] Scoping Interview with DG MARE.

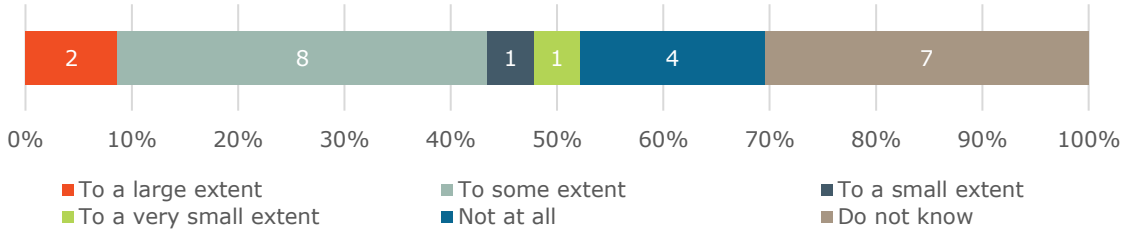
[153] SeaDataNet : https://www.seadatanet.org/ (Last accessed on 17 May).

is not to achieve full compliance with INSPIRE but to adopt some of the standards where convenient to strengthen links between different data infrastructures. Another Focus Group Interview also shared an example of bilateral use of INSPIRE standards with the national Geological survey, which might be pursued in the future.

Targeted surveys

Questions related to MSP in the targeted survey of the marine community mainly concerned the use of INSPIRE data for the preparation of national maritime spatial plans. Results from the survey (which gathered 37 responses) indicated that INSPIRE data only supported the preparation of maritime spatial plans to a limited extent (see figure below).

Figure 5-34 Extent to which INSPIRE data has been used in the development of MSPs (N=23)



Source: All respondents, Targeted survey of the marine community April-May 2021, Question 26: To what extent has the marine spatial data made available thanks to INSPIRE been used in the development of the national maritime spatial plans?

Similarly, to Focus Group interviews above, the small number of responses to the survey do not allow confident conclusions for all EU Member States. However, some of the reasons provided by stakeholders for the limited contribution of INSPIRE to the preparation of MSPs so far confirm findings from the desk research: the low level of implementation of INSPIRE might prevent the use of INSPIRE for policy making. Complementing this, one stakeholder indicated that the publication of INSPIRE datasets was made too late to contribute to the MPS; another noted that the transformation of marine data sets according to INSPIRE standards is less advanced than for terrestrial data. Two other stakeholders mentioned differences between INSPIRE datasets and the data needed for MSP (e.g., level of detail, scale, terminology, attributes), which limits the usability of INSPIRE datasets for MSP preparation. The complexity of using INSPIRE data models was also mentioned.

Public consultation

Coherence with the MSP Directive was not addressed in the public consultation. One respondent commented in the last question of the consultation[154] that data specifications on Area Management / Restriction / Regulation Zones and Reporting Units only refer to 'Management of Coastal Zones' and do not cover the maritime space, and that to increase consistency between INSPIRE and MSP obligations, data related to the maritime space should be updated in INSPIRE.

Transport

TEN-T Guidelines

[154] Public consultation, Question 29 : 'If you wish to add further comments, within the scope of this questionnaire, please feel free to do so here.'

The TEN-T policy supports the development of a Europe-wide transport networks for all modes, including railway lines, roads, inland waterways, maritime shipping routes, ports, airports, and railroad terminals. The TEN-T has a dual layer structure: the comprehensive network, which aims to ensure connectivity of all regions of the EU, and the core network, which consists of the elements of the network which are of the highest strategic importance for the EU, because they link the most important nodes and cover main cross-border connections. Regulation n°1315/2013 of 11 December 2013 on Union guidelines for the development of the trans-European transport network (the TEN-T Regulation) defines binding targets for implementation, as the core network needs to be implemented by 2030 and the comprehensive network by 2050. The TEN-T Regulation also establishes core network corridors which are operational tools for the implementation of the core network.

The TEN-T Regulation requires Member States report annually on the progress made in implementing transport projects and the investments made for that purpose (Article 49 of the TEN-T Regulation). Member States should report through the technical information system for the trans-European transport network (TENtec).[155] Similar information should also be provided by Member States through their national SDI as the TEN-T network is part of the INSPIRE 'Transport networks' data theme. [156] There is consequently some overlap between the TEN-T reporting and the creation of transport INSPIRE data sets, although the reporting under TEN-T also requires non-spatial data not covered by INSPIRE (such as financial data on transport projects).

The TEN-T Regulation currently does not refer to INSPIRE. The Regulation is however under revision and the evaluation of the TEN-T Regulation stated that the TEN-T Regulation should 'consistently build on EU data sharing policies, such as the Open Data Directive and the Inspire Directive'. [157]

Consultation activities

Scoping interviews

According to DG MOVE, the information to be reported through TENtec as per the TEN-T Regulation and the information to be provided through INSPIRE are currently not entirely harmonised. Further improvements of TENtec are planned, in particular the implementation of a linear referenced network followed by an automated data exchange solution together with Member States, which will follow INSPIRE rules and standards as much as possible. The aim is to ensure that Member States only have to provide the information only once. According to DG MOVE, synergies between TENtec and INSPIRE could be further developed and collaboration between the European Commission services on this could be formalised. The current revision of the TEN-T Regulation, which should result in the adoption of a new Regulation in 2021, addresses issues linked to monitoring and reporting and could provide a basis to discuss whether and how links to INSPIRE could be created.[158]

Focus Group interviews

[155] TENtec: https://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/site/index_en.htm
[156] D2.8.I.7Data Specification on Transport Networks–Technical Guidelines, 2014: https://inspire.ec.europa.eu/id/document/tg/tn
[157] European Commission (2021) Commission Staff Working Document. Evaluation of the Regulation (EU) N° 1315/2013 on Union Guidelines for the development of a trans-European transport network. SWD(2021) 117 final.
[158] Based on information provided in writing by DG MOVE, TENtec Team.

No comments were made during the seven Focus Group Interviews on the relations between INSPIRE and TEN-T.

Targeted surveys

There were no targeted surveys focusing on the transport sector. Questions related to transport focused on the use of INSPIRE data for transport and mobility rather than on coherence issues between INSPIRE and the transport legal and policy framework.

Public consultation

Coherence between TENtec reporting and INSPIRE reporting were not addressed in the public consultation and no comments were made on this issue.

Intelligent Transport Systems (ITS) Directive

Desk review

Directive 2010/40/EU on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport (ITS Directive) establishes general conditions to support the coordinated and coherent deployment and use of Intelligent Transport Systems (ITS) across the EU in the field of road transport and its interfaces with other modes of transport. ITS are 'systems in which information and communication technologies are applied in the field of road transport, including infrastructure, vehicles and users, and in traffic management and mobility management, as well as for interfaces with other modes of transport' (Article 4 of the ITS Directive). Specifications addressing the compatibility, interoperability, and continuity of ITS have been developed through five Delegated Regulations on safety-related traffic information; an EU eCall service; safe parking places for trucks and commercial vehicles; real-time traffic information services; and multimodal travel information services. The ITS Directive and its Delegated Regulations cover activities which may have an impact on the environment and control the access to spatial data that may be of interest for environmental policies. They are in this respect relevant in the context of INSPIRE.

Delegated Regulation (EU) 2015/962 on the provision of EU-wide real-time traffic information services aims to ensure the accessibility, exchange, re-use and update of road and traffic data by road authorities, road operators and information service providers. Delegated Regulation (EU) 2017/1926 on the provision of EU-wide multimodal travel information services controls the provision of accurate wide multimodal travel information services and their availability across borders to ITS users. Both Regulations require the establishment of National Access Points, which are single points of access for users to transport related data supplied by authorities, operators, infrastructure managers or service providers. Both Regulations cover both static data (related to the transport network, its physical attributes and data related to traffic signs, speed limits, facilities) and dynamic data (real time traffic information). Static data could potentially be shared through INSPIRE.

Both Regulations make reference to the INSPIRE Directive as a tool to share data related to the transport network. Regulation (EU) 2017/1926 on the provision of EU-wide multimodal travel information services contains a requirement that transport authorities, operators, infrastructure managers or service providers provide static travel and traffic data and historic traffic data using 'for the spatial network the requirements defined in Article 7 of Directive 2007/2/EC' (Article 4(1)(c)). A similar requirement currently does not exist in Regulation (EU) 2015/962 on the provision of EU-wide real-time traffic information services. However, Recital 6 of this Regulation

states that 'the specifications set out in this Regulation should be compatible with the specifications established by Directive 2007/2/EC'.

The gaps, overlaps and alignment potential between standards used in the transport area has been investigated in two JRC studies – a study related to the EULF transportation pilot in 2016, [159] which investigated the possibility of road safety data sharing drawing on INSPIRE specifications, and more recently, the INSPIRE-MMTIS study, carried out in 2019 on overlaps in standards related to the Delegated Regulation (EU) 2017/1926. [160] The 2019 study examined how INSPIRE related with other standards used in the transport domain (Transmodel, NeTEX, DATEX, IATA, TAP-TSI and INSPIRE) and provided recommendations to Member States on the usage of the various standards for the different data categories covered by the delegated regulation. [161]

Consultation activities

Scoping interviews

The ITS unit of DG MOVE indicated during an interview that Regulation (EU) 2015/962 is currently under revision. Article 4 of the Regulation is planned to be revised to make it explicit that INSPIRE may be used to provide data, along with other data standards used for traffic information exchange (such as Datex II).[162] As a result, Regulation (EU) 2015/962 will be aligned with Regulation (EU) 2017/1926 and the coherence with INSPIRE regarding static data will be ensured, at least legally.[163]

According to DG MOVE, the link between the ITS Regulations and INSPIRE was explicitly made in the legislation to avoid creating overlapping datasets, and to make sure that Member States could use INSPIRE data, where considered relevant by national authorities, to fulfil data requirements of ITS Regulations. As a result, if a national authority considers that the data already made available through INSPIRE is of sufficient quality to fulfil some of the requirements under the ITS Regulations, they can consider themselves compliant by making a link to the INSPIRE via the National Access Point. [164]

Although using INSPIRE data to fulfil the data requirements of the ITS Regulations is in theory possible, the experience from DG MOVE has shown that, in practice, it might not often be the case that INSPIRE is sufficiently accurate. Quality requirements for data needed for real-time travel and traffic information services are high – for instance such data must be very regularly updated to provide real time accurate information. The data available in INSPIRE, updated annually, might not be sufficiently recent for the types of services developed under ITS. Another example relates to spatial

[159] Pignatelli, F ; Boguslawski, R ; Borzacchiello, M. T (2016) Improving accuracy in road safety data exchange for navigation systems. European Union Location Framework Transportation Pilot, Publications Office of the European Union, Luxembourg, JRC104569: https://joinup.ec.europa.eu/collection/european-union-location-framework-eulf/document/report-improving-accuracy-road-safety-data-exchange-navigation-systems-european-union-location (Last accessed on 26.05.21).

[160] Bourée, K., De Vries, B., Duquesne, C., Dodson, C., Jugelt, S., Martirano, G., Minghini, M. and Pignatelli, F. (2019) INSPIRE-MMTIS: overlap in standards related to the Delegated Regulation (EU) 2017/1926, Publications Office of the European Union, Luxembourg, JRC118744: https://publications.jrc.ec.europa.eu/repository/handle/JRC118744 (Last accessed on 26.05.21).

[161] INSPIRE support to Multi-Modal Travel Information Services: https://joinup.ec.europa.eu/collection/elise-european-location-interoperability-solutions-e-government/inspire-support-multi-modal-travel-information-services (Last accessed on 26.05.21).

[162] Datex II: https://www.datex2.eu/

[163] Scoping interview with DG MOVE.

[164] Scoping interview with DG MOVE.

accuracy – the spatial accuracy in INSPIRE might not be sufficient for navigation services and automated driving. In some cases, INSPIRE data does not match ITS requirements – regarding cycling infrastructure, not all types of cycling lanes (on road and in separated lanes) are represented in INSPIRE, which is leading Member States to develop separate datasets on cycling infrastructure. [165]

Focus Group interviews

Only a few comments were made in relation to transport during the seven Focus Group Interviews. One Focus Group Interview confirmed that there is an agreement under the ITS Directive that INSPIRE compliant datasets that are already available can be used under ITS. Two Focus Group Interviews also mentioned that INSPIRE datasets might not be the most accurate to comply with the ITS Directive and Implementing Regulations and that datasets provided under other standards might be richer and more in line with ITS data requirements.

Targeted surveys

There were no targeted surveys focusing on the transport sector. Questions related to transport focused on the use of INSPIRE data for transport and mobility rather than on coherence issues between INSPIRE and the transport legal and policy framework.

Public consultation

Coherence between data sharing under the ITS Directive and INSPIRE were not addressed in the public consultation and no comments were made on this issue.

Climate adaptation (including disaster management)

Desk review

The new Strategy on adaptation to climate change, [166] adopted in February 2021, includes as one of its four main objectives to make adaptation 'smarter', by improving knowledge on climate impacts and adaptation solutions, improving data availability to inform policy decisions, and developing Climate-ADAPT as the authoritative European platform for adaptation knowledge. The Strategy in particular highlights the need to gather more and better scientific data on climate-related risks and losses to improve climate risk assessment and decision-making. In this regard, the Strategy mentions that the review of the INSPIRE Directive offers an opportunity to extend the scope of INSPIRE to cover environmental and climate-related disaster loss data, with a view to facilitate access to climate-related risk and losses data for stakeholders.

Consultation activities

Scoping interview

The rationale behind the inclusion in the Strategy on adaptation to climate change of an objective to collect 'More and better climate-related risk and losses data' (section 2.1.2. of the Strategy) came from the observation that access to climate-related risk

[165] Scoping interview with DG MOVE.

[166] European Commission (2021) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change. COM(2021) 82 final.

and loss data[167] in Europe was poor. Based on this observation, an interservice group was created, including one working group on data, which was tasked to do an inventory of the data needs and propose ways to improve the collection and sharing of climate-related disaster loss data and its quality. Including climate-related disaster loss into the scope of the INSPIRE Directive was a recommendation from this working group. [168] For the time being, the focus of the work has been mainly on data collection and recording, not yet on data sharing. To go further, discussions will be initiated with other European Commission services on how climate-related risk and loss data can be included in INSPIRE. [169]

According to DG CLIMA, although the Strategy focuses on climate related issues, there is an understanding across the European Commission that the scope of climate-related risk and losses data could, when included in INSPIRE, cover more than climate issues, such as natural disasters (e.g. volcano eruptions). [170]

As climate-related risk and loss data covers several types of climate change impacts (droughts, floods, wildfires, storms, etc.), and sectors (such as agriculture, forestry, transport, buildings and infrastructure, and human health), many INSPIRE data themes might be relevant and might already contain part of the data needed. However, according to DG CLIMA and the EEA, a full screening and comparison of INSPIRE data sets and the required climate-related risk and loss data has not yet been carried out. This would be necessary to identify possible amendments to INSPIRE data specifications and where new datasets are needed. Based on an indicative screening, it is likely that some socioeconomic data indicating the geographic distribution of assets will require the creation of new datasets. [171]

A potential barrier for the inclusion of climate-related risks and losses data into INSPIRE might be the need to collect data from both public and private data providers. Insurance and reinsurance companies are relevant private data providers in this area – currently the EEA indicator on losses from weather and climate-related is based on data from MunichRe. The INSPIRE Directive however only covers spatial data held by public authorities and there are not yet any obligations for private companies to share data. Another issue that was mentioned during the scoping interview was that climate adaptation data does not only include historical data, but also model-based data used to build scenarios, which might be difficult to include in the annexes of the INSPIRE Directive as INSPIRE data is mainly based on Member States reporting obligations, which usually do not relate to model-based data.[172]

Climate ADAPT

Climate-ADAPT[173] is the information platform on climate adaptation, created as a partnership between the European Commission and the EEA. Climate-ADAPT currently contains two different spatial data features:

[167] This data comprise direct economic losses from physical climate change impacts, including public and private (citizens and businesses) losses from buildings, infrastructure, agriculture and commercial forestry operations and from the private and public cost of emergency response and recovery.
[168] Scoping interview with DG CLIMA, Unit A.3 – Adaptation, and the EEA, 16 April 2021.
[169] Scoping interview with DG CLIMA, Unit A.3 – Adaptation, and the EEA, 16 April 2021.
[170] Scoping interview with DG CLIMA, Unit A.3 – Adaptation, and the EEA, 16 April 2021.
[171] Scoping interview with DG CLIMA, Unit A.3 – Adaptation, and the EEA, 16 April 2021.
[172] Scoping interview with DG CLIMA, Unit A.3 – Adaptation, and the EEA, 16 April 2021.
[173] Climate-ADAPT: https://climate-adapt.eea.europa.eu/

- An Urban Adaptation Map Viewer[174] which might be further developed/extended in the future. Data used in the map viewer are collated by the EEA from various sources.
- A version of this map viewer specifically for health and climate-related topics in the new European Climate and Health Observatory[175].

The EEA indicated that the map services provided on Climate-ADAPT are compatible with the INSPIRE directive. The metadata are already fully INSPIRE compliant, and although the services may still need some fine tuning, they do follow the INSPIRE main standards. The map services could be integrated into the EU/national SDI as the metadata (including the links to services) is provided via INSPIRE compliant discovery services.[176]

From June 2021, the EEA is providing access to climate related indicators provided by the Copernicus Climate Change Service. The Copernicus Climate Change Service provides data and products that are described using the ISO19115 metadata record standard and are made available through the OAI-PMH and OGC-CSW protocols for interoperability with the World Meteorological Organization Information System and the EU's INSPIRE initiative, respectively.[177]

Focus Group interviews

Climate and disaster management were not mentioned in the Focus Group Interviews.

Targeted surveys

Climate and disaster management were not addressed in the targeted surveys as climate adaptation data is currently not fully covered by INSPIRE data themes.

Public consultation

Coherence between climate and disaster management data sharing and INSPIRE was not addressed in the public consultation and no comments were made on this issue.

Space Policy / Copernicus

Desk review

The EU space policy aims to harness the potential of space technology, data and services to provide services (navigation systems, satellite TV, meteorology, transport safety etc.), and support policy development. The Space Strategy for Europe178, adopted in 2016, highlights that 'data and services derived from space systems, including satellite images, geo-positioning information and satellite communications' can strongly contribute to various public policies, including environmental protection,

[174] Urban Adaptation Map Viewer : https://climate-adapt.eea.europa.eu/knowledge/tools/urban-adaptation

[175] European Climate and Health Observatory : https://climate-adapt.eea.europa.eu/observatory/evidence/projections-and-tools/urban-adaptation-mapviewer-health-focus/

[176] Scoping interview with DG CLIMA, Unit A.3 – Adaptation, and the EEA, 16 April 2021.

[177] Scoping interview with DG CLIMA, Unit A.3 – Adaptation, and the EEA, 16 April 2021.

[178] European Commission (2016) Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions. Space Strategy for Europe. COM(2016) 705 final.

climate, disaster management, transport, agriculture or fisheries. The EU space policy is implemented through three flagship space programmes: Copernicus, the EU's Earth observation programme, which is the most relevant of the three programmes in relation to INSPIRE, Galileo, Europe's global satellite navigation system, and EGNOS, the European Geostationary Navigation Overlay Service, which provides navigation services to aviation, maritime and land-based users in Europe.[179]

Copernicus is managed by the European Commission, together with partners such as the Member States, the European Space Agency, or the European Organisation for the Exploitation of Meteorological Satellites. The programme provides data, information and services based on satellite Earth Observation data and in situ (non-space) data.[180] Copernicus offers six thematic services:[181] 1) the Copernicus Atmosphere Monitoring Service, 2) the Copernicus Marine Environment Monitoring Service, 3) the Copernicus Land Monitoring Service, 4) the Copernicus Climate Change Service, 5) the Copernicus service for Security applications (border surveillance, maritime surveillance, support to EU External Action, 6) Copernicus Emergency Management Service. with the exception of the service for Security applications, restricted to Member States' authorities, all other Copernicus services are freely and openly accessible. The Copernicus services relies on data coming from a set of dedicated satellites (the Sentinels) and contributing missions (existing commercial and public satellites)[182], as well as on in situ monitoring networks (e.g. ground based weather stations, ocean buoys and air quality monitoring networks) managed by the Member States. The EEA is coordinating the in-situ component of Copernicus at EU level.[183]

Copernicus is closely related to INSPIRE as Copernicus Services require access to harmonised geospatial information at EU level to produce and validate a number of their products. In situ data required by the Copernicus Services and the INSPIRE data themes also clearly overlap,[184] as they include geospatial reference data (e.g. transport networks, administrative boundaries, elevation models). As a result, INSPIRE can support the objectives of Copernicus as it ensures that more datasets will gradually be discoverable and accessible by the Copernicus Service. In turn, this might create demand for INSPIRE data.[185] On the other hand, the fact that many geospatial datasets and services produced by Copernicus follow INSPIRE guidelines[186] should increase their interoperability and support the objectives of INSPIRE.

The alignment between INSPIRE and Copernicus services is required in the legislation. The former Copernicus Regulation (Regulation (EU) No 377/2014[187]), no longer in force, provided that 'Copernicus data should be compliant with Member States' spatial reference data as well as with implementing rules and technical guidelines of the infrastructure for spatial information in the Union established by Directive 2007/2/EC'

[179] European Commission, Space : https://ec.europa.eu/growth/sectors/space_en
[180] Copernicus in detail : https://www.copernicus.eu/en/about-copernicus/copernicus-detail
[181] Copernicus services: https://www.copernicus.eu/en/copernicus-services
[182] Copernicus in detail : https://www.copernicus.eu/en/about-copernicus/copernicus-detail
[183] In situ component: https://www.copernicus.eu/en/about-copernicus/infrastructure/situ-component
[184] Henrik Steen Andersen (2017) Report from workshop: Has the Copernicus services' access to geospatial data been improved through the implementation of INSPIRE? at the INSPIRE Conference 2017, 4-5 September 2017: https://inspire.ec.europa.eu/conference2017/workshops#c_32_235
[185] Henrik Steen Andersen (2017) Report from workshop: Has the Copernicus services' access to geospatial data been improved through the implementation of INSPIRE? at the INSPIRE Conference 2017, 4-5 September 2017: https://inspire.ec.europa.eu/conference2017/workshops#c_32_235
[186] Minghini, M., Cetl, V., Kotsev, A., Tomas, R., Lutz, M. (2021) INSPIRE: The Entry Point to Europe's Big Geospatial Data Infrastructure, Chapter 24 in M. Werner, Y.-Y. Chiang (eds.), Handbook of Big Geospatial Data. Springer Nature Switzerland AG 2021.
[187] Regulation (EU) No 377/2014 of the European Parliament and of the Council of 3 April 2014 establishing the Copernicus Programme and repealing Regulation (EU) No 911/2010. OJ L 122, 24.4.2014, p. 44–66. This Regulation was repealed by Regulation (EU) 2021/696. See footnote 190.

(Recital 9). This obligation is also present in Article 5.2 of Commission Delegated Regulation (EU) No 1159/2013,[188] which requires that 'dedicated data and Global Monitoring for Environment and Security (GMES) service information – including Copernicus – shall comply with the requirements of Directive 2007/2/EC to the extent that the data and information fall within the scope of those provisions.' Discovery, view and download services of the various Copernicus services available follow INSPIRE standards.[189]

Regarding the contribution of INSPIRE to Copernicus in situ data, Regulation (EU) 2021/696[190] establishing the Union Space Programme states that 'Where feasible and appropriate, Copernicus should also make use of the available in-situ and ancillary data provided mainly by the Member States in accordance with Directive 2007/2/EC' and recommends that 'the Commission should work together with the Member States and the European Environment Agency to ensure an efficient access and use of the in-situ data sets for Copernicus' (Recital 72). The EEA launched a study in 2017 to assess whether Copernicus services benefit from the implementation of INSPIRE, and if known gaps in in-situ data can be closed with the continued implementation of INSPIRE.[191] The main conclusions of the study were that INSPIRE and Copernicus share key requirements, as they both aim to use spatial data harmonised across borders, and that INSPIRE is a good source of data to add to the Copernicus in-situ component and support the services, but that the current status of implementation of INSPIRE still prevents the full contribution of INSPIRE to Copernicus. As not all data is fully harmonised yet, usable data for Copernicus services is only progressively made available.[192]

Consultation activities

Focus Group interviews

Space policy and Copernicus were not discussed in the Focus Group Interviews.

Targeted surveys

Coherence between INSPIRE and Copernicus was addressed in two surveys (environmental and marine community) but gathered limited feedback from a small number of respondents, indicating that Copernicus was partially in line with INSPIRE standards.

Public consultation

Coherence between space policy and INSPIRE was not addressed in the public consultation and no comments were made on this issue.

[188] Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information. OJ L 309, 19.11.2013, p. 1–6.

[189] Facchini, M. (DG GROW, Copernicus Unit). Copernicus. Synergies between the EU Copernicus programme and INSPIRE. Presentation at the INSPIRE Conference 2016, 28/09/2016.

[190] Regulation (EU) 2021/696 of the European Parliament and of the Council of 28 April 2021 establishing the Union Space Programme and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013 and (EU) No 377/2014 and Decision No 541/2014/EU. OJ L 170, 12.5.2021, p. 69–148.

[191] Reitz, T., Roller J., Rip F., Bulens, J. (2018) INSPIRE Servicing Copernicus (INSCope). European Environmental Agency, EEA/ IDM/R0/16/010 - Annex 5.

[192] Ibid.

5.5.4. EQ 5.4 To what extent is INSPIRE coherent with Directive 2003/4/EC on public access to environmental information and the objectives of the Common European Green Deal data space?

EQ 5.4 aims to review the interactions between the INSPIRE Directive with Directive 2003/4/EC on public access to environmental information and larger initiatives around the Common European Green Deal data space. Building on the findings of the assessment of effectiveness EQ 2.4 (which investigates the extent to which INSPIRE has supported Member States to carry out their obligations in dissemination of environmental information), relevance EQ 3.4 (which considers the current state of technology), and efficiency EQ 4.8, evaluation question 5.4 analyses the extent to which the legislative obligations in the two Directives are complementary, whether there are any inconsistencies, overlaps and gaps, and contribute to conclusions on whether the legislative framework remains fit within the context of current wider EU goals.

Text box 5-27 Key/summary findings EQ 5.4: Coherence with Directive 2003/4 on Public Access to Environmental Information

The **desk review** did not reveal any inconsistencies between the INSPIRE Directive and Directive 2003/4 on Public Access to Environmental Information. The two Directives serves different purposes (transparency vs interoperability and data accessibility through view and download services) and have different scopes (despite some overlap).

INSPIRE can support the implementation of Directive 2003/4 as it provides a technical framework for electronic data sharing. However, the desk review and limited input from **Focus Group interviews** showed that, so far, Member States often tend to implement national environmental information systems and INSPIRE separately.

Directive 2003/4 does not mention the INSPIRE Directive as it was adopted before INSPIRE and has not been revised. Based on inputs from scoping interviews, it appears that the language of Directive 2003/4 with regards to data sharing is also quite outdated and the obligation to share information through 'electronic means' is not further specified with regards to environmental data. To ensure stronger coherence between the two instruments and ensure that INSPIRE supports better the implementation of Directive 2003/4, a reference to INSPIRE, indicating that data referred to in Article 7(e) should be shared in accordance with INSPIRE, could be added in Article 7 of Directive 2003/4.

Desk review

Directive 2003/4/EC on public access to environmental information and INSPIRE were adopted for different purposes. Directive 2003/4/EC has the objective of ensuring the right of access to environmental information held by public authorities to end users and more generally to promote the progressive dissemination of environmental information to the public, for transparency purposes, and for enabling public scrutiny and access to justice, as provided by the Aarhus Convention. One of the objectives of Directive 2003/4/EC was indeed also to bring EU law in line with the provisions of the Aarhus Convention on access to information. To this end, directive 2003/4/EC has adopted a dual approach by providing for access to environmental information on request under Article 3 while also requiring Member States to take a proactive approach to the dissemination of environmental information under Article 7. Although INSPIRE also requires the sharing of spatial data related to environmental policies and

policies affecting the environment, its objectives are less about transparency and more about ensuring access and interoperability.

Both directives have different, yet partially overlapping, scopes. Directive 2003/4/EC defines 'environmental information' as 'any information in written, visual, aural, electronic or any other material form on a) the state of the elements of the environment, such as air, water, soil, etc. and the interaction among these elements; b) factors, such as substances, energy, noise, radiation or waste, and other releases into the environment, which are likely to affect it; c) measures, such as policies, legislation, plans, programmes, environmental agreements, affecting or designed to protect the environment; d) reports on the implementation of environmental legislation; e) cost-benefit and other economic analyses and assumptions used in adopting measures; f) the state of human health and safety, including the contamination of the food chain, conditions of human life, cultural sites if they may be affected by the state of the environment (Article2(1) of Directive 2003/4/EC)'. This definition is the same as the definition in the Aarhus Convention.

Although there is an overlap between the scope of Directive 2003/4/EC and the INSPIRE Directive – as spatial data is critical to provide information on the state of the environment – the scope of 'environmental information' addressed by Directive 2003/4/EC is significantly broader than the scope of INSPIRE. This is also supported by the fact that the Court of Justice of the European Union interprets the definition of 'environmental information' quite broadly. In its judgment of 16 December 2010 in Case C-266/09, *Stichting Natuur en Milieu and Others v College voor de toelating van gewasbeschermingsmiddelen en biociden*, the Court considered that a procedure for authorisation of a plant protection product fell within the meaning of 'environmental information'.[193] Environmental information, in the meaning of Directive 2003/4/EC does concern a wide range of items, listed in Article 7 of the Directive, including environmental assessment, policy and planning documents, environmental permits, implementation reports, enforcement measures etc., which should be made publicly accessible. Although some of these documents might be relevant for some spatial datasets (e.g. list of permitted installations, facilities or transport networks), the aim of Directive 2003/4/EC is also that those documents are made available to the public in their entirety for transparency purposes. Among the seven types of documents, one is purely environmental data – 'data or summaries of data derived from the monitoring of activities affecting, or likely to affect, the environment' (Article 7(2)(e)). As the Directive was adopted in 2003, this paragraph does obviously not specifically mention that INSPIRE specifications should be used to make monitoring data available.

On the other hand, the scope of INSPIRE is also somewhat broader than the scope of Directive 2003/4/EC as it covers 'spatial data' defined as 'any data with a direct or indirect reference to a specific location or geographical area' (Article 3(2) of the INSPIRE Directive), in relation to 'environmental policies and policies or activities which may have an impact on the environment' (Article 1(1) of the INSPIRE Directive). Some of the INSPIRE data themes thus go beyond 'environmental information' in the meaning of Directive 2003/4.

In terms of scope, Directive 2003/4/EC and the INSPIRE Directive address information or data held by public authorities. Both directives are fully aligned in the way they define 'public authority' as:

[193] European Commission (2012) Report from the Commission to the Council and the European Parliament on the experience gained in the application of Directive 2003/4/EC on public access to environmental information, COM(2012) 774 final.

a) Any government or other public administration, including public advisory bodies, at national, regional or local level, or

b) Any natural or legal person performing public administrative functions under national law, including specific duties, activities, or services in relation to the environment, or

c) Any natural or legal person having public responsibilities or functions, or providing public services relating to the environment under the control of a body or person falling within (a) or (b). (Article 3(9) of the INSPIRE Directive / Article 2(2) of Directive 2003/4).

Among the reasons for adopting Directive 2003/4/EC (in replacement of the previous Directive 90/313/EC) was the need to incorporate provisions that would include the possibility to use electronic means as the format for making environmental information public.[194] However, Article 7 of Directive 2003/4/EC does not prescribe which types of electronic information should be used, allowing Member States to decide the best means for that purpose (which may be different depending on the type of environmental information to be published) and to adapt to developments in technology. The adoption of the INSPIRE Directive introduced an important new mechanism for sharing environmental information that has a spatial dimension through electronic means. The fact that Directive 2003/4/EC is not prescriptive in relation to data sharing specifications does not prevent any Member State to use INSPIRE specifications to fulfil its obligations to share environmental information under Directive 2003/4/EC. In this perspective, Directive 2003/4/EC and INSPIRE are largely complementary as INSPIRE has the potential to support the implementation of Directive 2003/4/EC.

Recent studies have shown however that both Directives were often implemented through separate systems that are not necessarily connected. A recent study on national environmental information systems (EIS) found that, in many Member States, there are no links between the EIS and the INSPIRE SDI. Only in 15% of the evaluated Member States and regions a link between the EIS and INSPIRE was properly provided. In 38% of the cases, a reference to INSPIRE was made within the EIS, but no links were found, and in 47% of the evaluated Member States and regions there was no reference and no links between the EIS and INSPIRE[195]. The study also found that the monitoring data provided in the EIS did not have metadata in line with INSPIRE.[196]

Consultation activities

Scoping interviews

In the Scoping interview, DG Environment confirmed that there is a partial overlap between Directive 2003/4 and INSPIRE as regards spatial information, noting however that Directive 2003/4 is less prescriptive in its obligations. Article 7 of Directive 2003/4 states that information should be progressively made available but does not provide for a very strict obligation to do so, leading to difficulties in enforcing the article. Directive 2003/4 also does not specifically define what are 'electronic means'

[194] European Commission (2012) Report from the Commission to the Council and the European Parliament on the experience gained in the application of Directive 2003/4/EC on public access to environmental information, COM(2012) 774 final.

[195]'European Commission (2019) Promotion of good practices for national environmental information systems and tools for data harvesting at EU level. Final report, p.31.

[196] Ibid, p.35.

for dissemination. According to DG Environment, Directive 2003/4 could benefit from an update in its terminology, and in that perspective, aligning some of this terminology with INSPIRE could be useful, as INSPIRE provides a technical framework for electronic data sharing. When 'electronic means' are mentioned in Directive 2003/4, it could be made explicit that this is referring to the INSPIRE Directive specifications.[197]

Focus Group interviews

Very few comments were made in relation to Directive 2003/4/EC during the Focus Group Interviews. As mentioned in EQ 2.4, participants to Focus Group Interviews generally saw minimal interactions between the two Directives, and therefore did not point to coherence issues between the two Directives.

Targeted surveys

The results from targeted surveys related to Directive 2003/4 are presented in EQ 4.8.

Public consultation

Results from the public consultation linked to active dissemination of environmental information are presented in EQ 2.4.

5.5.5. EQ 5.5 To what extent is INSPIRE coherent with Directive 2003/98/EC on the re-use of public sector information and what are the implications of Directive 2019/1024/EU?

EQ 5.5 assesses the interaction between the INSPIRE Directive and Directive 2003/98/EC on the re-use of public sector information (PSI Directive) along with potential implications brought about by the 2019 recast of the PSI Directive – i.e., Directive 2019/1024/EU (Open Data Directive). As geospatial data is a valuable type of public sector information, it is covered under the scope of both the PSI and INSPIRE directives, which both aim to facilitate access to public sector information. It is thus important to examine the synergies and potential inconsistencies between these directives. Judgement criteria for this question consider the extent to which the legal provisions in the directives complement each other and support the sharing and accessibility of data, including potential inconsistencies in terms of the charging mechanisms provided in both directives. The question then considers the extent to which the new Open Data Directive is likely to resolve existing coherence issues and/or whether new inconsistencies may arise in the future following its transposition and implementation in the Member States.

[197] Scoping interview with DG Environment.

Text box 5-28 Key/summary findings EQ 5.5: Coherence with PSI / Open Data Directive

Although they do overlap in scope, the **desk review** and **consultation activities** (focus group interviews and targeted surveys) showed that technical requirements on data sharing currently laid down in both Directives do not contradict each other. The inconsistencies between INSPIRE and the PSI Directive that were exposed by the study to support the review of the PSI Directive, have been largely resolved by Open Data Directive.

The INSPIRE Directive and the Open Data Directive serve different purposes (openness and reusability vs interoperability and data accessibility through view and download services). They are however complementary and the INSPIRE Directive can support the objectives of the Open Data Directive. Consultation activities however showed slightly different results. Focus Group interviews suggested that, in practice, many Member States seem to implement both Directives in parallel, with limited interactions. Results from the targeted surveys and public consultation however showed that stakeholders believed that INSPIRE supports the implementation of the Open Data Directive.

The **desk review** revealed that inconsistencies between the INSPIRE Directive and the Open Data Directive could arise with the adoption of the forthcoming High Value Datasets Regulation, which will specify the data to be shared as open data and is expected to include many of the geospatial datasets covered by INSPIRE. As derogations are likely to be limited in the Regulation, this might conflict with provisions in Articles 13, 14 and 17 of the INSPIRE Directive, which provide ample possibilities to limit public access to spatial data, and to license and/or require payment for spatial datasets and services. Depending on the evolution of the legal framework on open data, there might be a need to consider aligning the INSPIRE Directive with the open data legal framework in the future.

Results from the **Focus Group interviews,** and targeted surveys also emphasised the importance of ensuring that the High Value Datasets Regulation is largely aligned with INSPIRE and does not introduce new and potentially inconsistent legal obligations in terms of data formats and standards for geospatial data. Similarly, practical inconsistencies could arise with future developments of the Open Data Directive, if the INSPIRE and open data communities do not sufficiently coordinate with each other going forward (both communities currently use non-interoperable metadata standards – INSPIRE vs. CKAN standards). This calls for close cooperation in future developments.

Desk review

Directive 2003/98/EC, amended by Directive 2013/37/EU (PSI Directive)

According to the 2016 REFIT evaluation of the INSPIRE Directive, geospatial data account for an estimated 80% of public sector information.[198] The data covered under the scope of INSPIRE is therefore also covered under the scope of the PSI Directive, which could lead to potential inconsistencies. Overall, however, the INSPIRE mid-term

[198] European Commission (2016), Report from the Commission to the Council and the European Parliament on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23 (COM/2016/0478 final/2)., p.62

evaluation,[199] 2016 REFIT evaluation[200] and the evaluation of the PSI Directive,[201] find no significant inconsistency between the two directives in terms of their respective objectives and legal obligations, which are seen as complementary. This was confirmed during a scoping interview with DG CONNECT. Both directives also refer to each other in their respective recitals. Recital 8 of the INSPIRE Directive states that INSPIRE is without prejudice to the PSI Directive, as both have complementary objectives,[202] while recital 20 of the 2013 PSI Directive refers to the INSPIRE Directive as an example of how public sector information can be made available through open and machine-readable formats together with metadata.[203]

In terms of objectives, both the INSPIRE and PSI Directives aim to facilitate access to public sector information, with the PSI Directive covering all types of public sector information (irrespective of medium or format) and the INSPIRE Directive covering only a sub-section of public sector information (namely, geo-spatial data covered under the 34 INSPIRE themes). However, both directives introduce very different types of obligations for Member States. While the PSI Directive sets the basic conditions for reuse of public sector information, it does not prescribe which information should be made available, when, and how, as it is without prejudice to the existing access regimes in the Member States.[204] Overall, the PSI Directive introduces an obligation for Member States to ensure that the public sector information that can be reused at national level is made available on a non-discriminatory basis, and as far as possible, in open and machine-readable format, accompanied by metadata, which complies with formal open standards.[205] Member States are free to choose which data is made available along with the technical standards and formats. On the other hand, the INSPIRE Directive is much more prescriptive, as it defines the specific information that must be made available, its format, metadata standards, and the means of sharing such information, all within set deadlines.[206] In this sense, both directives can be seen as complementary, with the INSPIRE Directive addressing the technical standards for the accessibility and discoverability of (geo-spatial) data, which is left open in the PSI Directive. In addition, while the PSI Directive focuses on the reuse of public sector information for both commercial and non-commercial purposes, INSPIRE focuses on sharing data between public sector bodies. Previous studies have found that the INSPIRE Directive has contributed to increasing the availability of geo-spatial data, while the PSI Directive has contributed to lowering the charges for accessing such data.[207] In addition, as mentioned above, the INSPIRE formats and metadata standards are cited as best practice for opening public sector information within the recital of the PSI Directive.

[199] EEA & JRC (2014), Mid-term evaluation report on INSPIRE implementation, EEA Technical report No 17/2014, ISSN 1725-2237.

[200] European Commission (2016), Report from the Commission to the Council and the European Parliament on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23 (COM/2016/0478 final/2).

[201] European Commission (2018), Study to support the review of Directive 2003/98/EC on the re-use of public sector information, Final Report.

[202] INSPIRE Directive 2007/2/EC, Recital 8.

[203] PSI Directive 2013/37/EU, Recital 20.

[204] PSI Directive 2013/37/EU and Scoping interview with DG CONNECT - G1 Data Policy and Innovation, 6 April 2021.

[205] PSI Directive 2013/37/EU, Articles 5 and 10

[206] EEA & JRC (2014), Mid-term evaluation report on INSPIRE implementation, EEA Technical report No 17/2014, ISSN 1725-2237 and Scoping interview with DG CONNECT - G1 Data Policy and Innovation, 6 April 2021.

[207] European Commission (2018), Study to support the review of Directive 2003/98/EC on the re-use of public sector information, Final Report; and Scoping interview with DG CONNECT - G1 Data Policy and Innovation, 6 April 2021.

A few inconsistencies between the two Directives have nonetheless been highlighted within past evaluations. The 2018 evaluation of the PSI Directive concluded that the '*question of coherence between the INSPIRE Directive and the charging provisions of the PSI Directive could benefit from some clarification or formal alignment',*[208] as some stakeholders called for more guidance on what charges and licenses are permitted for accessing spatial data and services.[209] Similarly, the 2016 REFIT evaluation of the INSPIRE Directive found some inconsistencies regarding the data sharing provisions under INSPIRE (Article 17) and the PSI Directive regarding licensing and charging for the data.[210] Although both Directives allow for some type of charging mechanism for the provision of data, including the notion of recovering a reasonable return on investment, the PSI Directive is more prescriptive than the INSPIRE Directive. It provides that charges must be limited to the marginal costs incurred for the reproduction, provision and dissemination of the data, and in the case of public bodies that are required to generate revenue to cover the costs of their activities, also a reasonable return on investment.[211] On the other hand, the INSPIRE Directive uses a broader terminology, providing that charges applied for sharing data between public bodies should be kept to the minimum required to ensure the necessary quality and supply of spatial data sets and services, together with a reasonable return on investment.[212]

In addition, the evaluation of the PSI Directive found that metadata interoperability issues could arise, in practice, if the PSI and INSPIRE communities do not sufficiently coordinate with each other, as both communities use their own metadata standards (ISO vs. CKAN standards), which are not interoperable.[213] This issue may increase in the future with the practical implementation of the Open Data Directive and further developments to the EU Open Data portal, created to facilitate the discovery of the data made available by the PSI Directive. Although the PSI Directive does not set obligations in terms of standards or format it will nonetheless be crucial to ensure that supporting guidance and recommendations for both directives are compatible in practice.

Directive 2019/1024/EU (Open Data Directive):

In 2019, the PSI Directive was recast as Directive 2019/1024/EU on open data and the re-use of public sector information (Open Data Directive). The transposition period for this Directive is still ongoing, as Member States have until July 2021 to bring the directive into force and comply with its obligations. Overall, the Open Data Directive introduces the following key changes that are likely to be relevant for the implementation of INSPIRE:

- The *scope of the Directive has been extended* and now covers public undertakings and research data resulting from public funding (Article 1).

[208] European Commission (2018), Evaluation accompanying the proposal for a Directive of the European Parliament and of the Council on the re-use of public sector information (SWD/2018/145 final), p.40

[209] European Commission (2018), Evaluation accompanying the proposal for a Directive of the European Parliament and of the Council on the re-use of public sector information (SWD/2018/145 final);and Scoping interview with DG CONNECT - G1 Data Policy and Innovation, 6 April 2021.

[210] European Commission (2016), Report from the Commission to the Council and the European Parliament on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23 (COM/2016/0478 final/2)

[211] PSI Directive 2013/37/EU, Article 6

[212] INSPIRE Directive 2007/2/EC, Article 17

[213] European Commission (2018), Study to support the review of Directive 2003/98/EC on the re-use of public sector information, Final Report.

- The Directive introduces the *principle of 'open by design and by default'* for all public sector information falling under the scope of the Directive and requires public bodies to make dynamic data and high value datasets available via APIs and bulk download (Article 5).
- The Directive introduces the *concept of 'high-value datasets'* (Chapter V), meaning datasets which are associated with important benefits for society, the environment and the economy, in particular because of their potential to create value-added services and applications.[214] Annex I of the Open Data Directive sets out a list of thematic categories of high-value datasets, which includes geospatial data. The European Commission has been empowered to adopt implementing acts which lay down the list of specific high-value datasets belonging to the categories in Annex I. Public sector bodies will be required to make the high-value datasets specified within the implementing acts available free of charge via APIs, in machine readable format and where relevant as bulk download.[215] The obligation to provide such datasets free of charge has limited exceptions – only in cases where it would lead to a distortion of competition for public undertakings. In cases where providing data free of charge would have a significant impact on the budget of the public bodies concerned, these bodies may still require charges only within a limit of two years following the adoption of an implementing act.

In terms of the interplay with the INSPIRE Directive, the new Open Data Directive makes several references to INSPIRE to clarify the interactions between the Directives based on the findings of the 2018 PSI Directive evaluation.[216] Recital 4 states that the provisions of the Open Data Directive should focus on the relationship with other EU legal instruments, including INSPIRE. Recital 34 states that, where possible and appropriate, public sector information should be '*made available through an open and machine-readable format and together with their metadata at the best level of precision and granularity, in a format that ensures interoperability, for example by processing them in a way consistent with the principles governing the compatibility and usability requirements for spatial information under Directive 2007/2/EC*'. Finally, Article 1(7) specifically clarifies that the Open Data Directive '*governs the re-use of existing documents held by public sector bodies and public undertakings of the Member States, including documents to which Directive 2007/2/EC applies.'*

The main changes in the Open Data Directive that might create future conflicts with the INSPIRE Directive are related to the provisions on high-value datasets, more specifically the future implementing act currently being developed by the European Commission and the requirement to provide such datasets free of charge.

Article 14 of the Open Data Directive states that the Commission implementing act '*may specify the arrangements for the publication and re-use of high-value datasets*' and that '*the arrangements may include terms applicable to re-use, formats of data and metadata and technical arrangements for dissemination*'. In theory, this provision could result in more technical and potentially inconsistent legal obligations in terms of data formats and standards. However, Recital 68 of the Open Data Directive states that the Commission implementing acts related to high-value datasets should take into account the INSPIRE Directive to '*ensure that datasets are made available under corresponding standards and sets of metadata'*.

[214] Open Data Directive 2019/1024/EU, Article 2 (10)
[215] Open Data Directive 2019/1024/EU, Article 14
[216] European Commission (2018), Evaluation accompanying the proposal for a Directive of the European Parliament and of the Council on the re-use of public sector information (SWD/2018/145 final).

Furthermore, the requirement for public bodies to make the high-value datasets available free of charge under the new Open Data Directive might conflict with the exceptions to limit access to datasets and services provided under Article 13 of the INSPIRE Directive, the derogations for charging access to data in Article 14 and the possibility to license and require payment of spatial datasets under certain conditions set out in Article 17 of the INSPIRE Directive. Based on Article 14 of the Open Data Directive, the High Value Datasets Regulation should provide some possibilities for derogations, but more limited than what is currently provided in the INSPIRE Directive. For instance, the possibility to exempt from the requirement of providing high value datasets free of charge, public bodies that cover a substantial part of their budget by generating revenues from their data, would only be allowed for a period of two years (Article 14(5)). The entry into force of the new Open Data Directive and the High Value Datasets Regulation may lead to confusion for stakeholders who will be faced with conflicting provisions.

The purpose of the INSPIRE Directive was not initially to guarantee openness of data. Given the evolution of the legal framework on open data, there might be a need to consider the alignment of the INSPIRE Directive with the open data legal framework in the future, following the adoption of the High Value datasets Regulation.

The analysis should however be read with some caution, as the coherence of the INSPIRE and Open Data Directive cannot be fully assessed at this stage. The national transposition and implementation of the latter is still ongoing and the high-value datasets implementing act is currently being developed.

Consultation activities

Scoping interviews

No significant coherence issues emerged from the scoping interviews regarding the interactions between INSPIRE and the PSI Directive, although one stakeholder argued that the terminology used in the different directives (e.g., 'data sharing' vs. 're-use of data') should be made more consistent, as it creates confusion for stakeholders who often have different understandings of the terms.[217]

DG CONNECT commented that the inconsistencies and call for clarifications highlighted in the evaluation of the PSI Directive have been largely resolved in the 2019 recast of the PSI Directive (2019/1024/EU), which states that the data accessible under INSPIRE should be made available under the PSI conditions if the data provider fulfils the criteria of public sector body under the PSI Directive.[218] In addition, DG CONNECT also stated that they are currently working with the Member States on the interoperability of INSPIRE and Open Data metadata through recommendations on metadata standards.[219]

Regarding high-value datasets, both DG CONNECT and the EEA mentioned that they are currently working to ensure maximum alignment between INSPIRE requirements and those of the future implementing act both in terms of the technical obligations and in terms of the geospatial datasets covered – notably in terms of alignment with the

[217] Scoping interview with Eurogeographics.
[218] Scoping interview with DG CONNECT, 6 April 2021; and Open Data Directive 2019/1024/EU, Article 1(7).
[219] Scoping interview with DG CONNECT.

INSPIRE priority datasets to ensure synergies with the data already available within the INSPIRE infrastructure.[220]

Focus Group interviews

Several of the seven Focus Group Interviews mentioned difficulties in creating synergies in the practical implementation of both directives. Focus Group interviews highlighted that out of the seven Member States consulted, four implement the INSPIRE and PSI Directives in silos, using two separate data sharing systems with limited cooperation between the responsible bodies. For example, participants to one Focus Group Interview explained that they transform the geospatial data into INSPIRE standards for the INSPIRE geoportal and use different, more user-friendly standards, for open data. In this context, participants to three Focus Group Interviews called for more guidance and a better overview of how the two Directives can work together in practice and with broader EU open data initiatives. Participants to one Focus Group Interview also commented that the multiple overlapping EU legislation in this field creates confusion and is a barrier for clear implementation and argued that the different pieces of legislation should be adopted as a package. On the other hand, however, three Focus Group Interviews use the same infrastructure for the INSPIRE and open data catalogues, with one having a National Data Strategy that applies the INSPIRE technical rules for interoperability and the PSI rules on licensing and charges for access.

Furthermore, two Focus Group Interviews were concerned that the Open Data Directive, and in particular the provision on high-value datasets and future implementing act, will in practice lead to a parallel infrastructure, which may lead to a duplication of efforts and a need to transform existing INSPIRE data into open data standards.[221] In one of these Focus Group Interviews, participants argued that it is not enough to reference the INSPIRE Directive in the Open Data Directive and that it should be legally binding to follow INSPIRE technical standards to provide open data. These two Focus Group Interviews indicated that INSPIRE framework should be used to provide access to high-value (geospatial) datasets in the future Commission implementing act. According to participants to these two Focus Group Interviews, the high-value datasets should be used as an opportunity to develop synergies between INSPIRE and open data.

Regarding the obligation to provide high-value datasets free of charge introduced in the Open Data Directive, mixed positions were expressed. Three Focus Group Interviews did not foresee any difficulties, as geospatial data is already accessible free of charge at national level. Another three Focus Group Interviews however anticipated difficulties in providing certain types of data (e.g. cadastral parcels) free of charge, due to current national legislation requiring payment for such data. In addition, participants to these three Focus Group Interviews anticipate that this obligation will be met with resistance from the public bodies concerned, as they incur significant expenses for providing the data and could suffer financial losses if it were provided for free.[222]

[220] Scoping interview with DG CONNECT.

[221] It should be noted, however, that the Open Data Directive does not set out technical obligations in terms of standards.

[222] It should be noted that Article 14 of the Open Data Directive states that high-value datasets must be made available free of charge, expect those datasets held by public undertakings, in cases where it would lead to a distortion of competition in the relevant markets. For public sector bodies that are required to generate revenue to cover a substantial part of their costs relating to the performance of their public tasks, Member States can exempt these bodies from providing the datasets free of charge

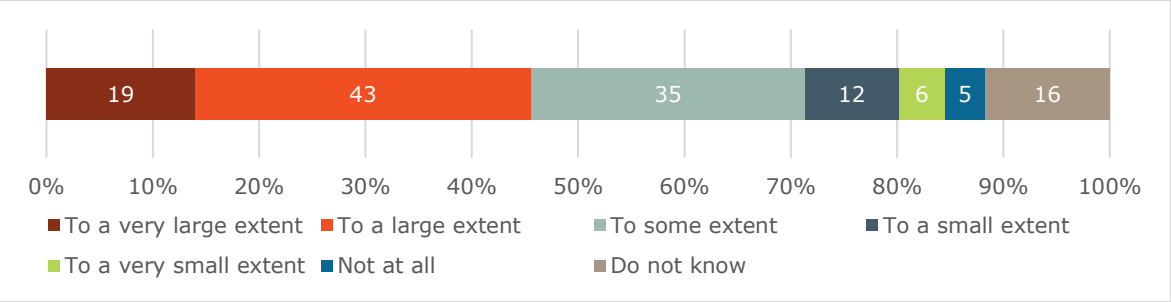
Furthermore, participants to three Focus Group Interviews also mentioned uncertainties in relation to the GDPR and personal data. They expressed concerns over how to anonymise specific types of geospatial data and call for guidelines to be developed. One participant to one Focus Group Interview also mentioned the risk of having a double request coming from the European Commission – i.e., on the one hand having the obligation to share full datasets (including personal identifiers) with the European Commission and on the other hand having to share redacted versions of the same datasets with the general public to be GDPR compliant – thus leading to excessive burden.

Targeted surveys

All four targeted surveys (spatial data, environmental, marine and agriculture community) included a question on coherence between INSPIRE and the new Open Data Directive, which gathered a total of 136 responses.

Overall, the results of the targeted surveys confirm the findings of the desk research and Focus Groups interviews, as no significant issues of coherence between INSPIRE and the PSI/Open Data Directives were highlighted by respondents. In addition, when asked to what extent INSPIRE is likely to support authorities in complying with their obligations under the new Open Data Directive, most stakeholders (46%) responded that INSPIRE would support compliance to a very large or large extent (see Figure 5-6). Only 8% of stakeholders believe that INSPIRE will not support authorities at all or only to a very limited extent in their obligations under the new Open Data Directive.

Figure 5-35 Extent to which INSPIRE is likely to support authorities in complying with their obligations under the new Open Data Directive (N=136)



Source: All respondents, Targeted surveys (combined) April-May 2021, Question: To what extent is INSPIRE likely to support authorities in complying with their obligations under Directive (EU) 2019/1024 on open data and the re-use of public sector information (replacing Directive 2003/98/EC on the re-use of public sector information)?

Three stakeholders commented that INSPIRE should prove useful for complying with the new Open Data Directive, as thanks to INSPIRE there is already a large amount of data collected and shared in a standardised way. One Mapping, Cadastre and Land Registry Authority argued that it is the Open Data Directive that will support INSPIRE rather than the other way around, as the Open Data Directive will remove different licencing and pricing policies in Europe.

Similar to the Focus Group interviews, however, four stakeholders emphasised that it is important for the implementing rules of the Open Data Directive on high-value datasets to make reference to the INSPIRE Directive for all aspects related to availability, harmonisation, standardisation and metadata in relation to geospatial data

for a period of no longer than two years after the implementing act as been adopted, in cases where substantial losses would be incurred.

and for the open access to geospatial data to be built on the INSPIRE infrastructure. These stakeholders expressed concerns about having to provide data in a new and different format than INSPIRE due to the new Open Data Directive, thus leading to a duplication of efforts.

Three Mapping, Cadastre and Land Registry authorities and one geological survey respondent mentioned inconsistencies between the two Directives. Two of the Mapping, Cadastre and Land Registry authorities commented in relation to metadata. One argued that there are contradictory requirements between the metadata provisions in INSPIRE and the rules in the PSI/Open Data Directive – without however providing further explanations. The other commented that the metadata in the Open Data Directive follows a too loose structure and that in practice the method of accessing resources may not follow a Service-oriented architecture (SOA) approach. The third Mapping, Cadastre and Land Registry authority stated that there are inconsistencies over what constitutes high-value datasets in INSPIRE and the Open Data Directive and that the mismatch of concepts and definitions will create confusion for authorities. Finally, the geological survey respondent argued that there is still insufficient alignment between INSPIRE vocabularies and better-developed ISO and national/industry standards.

Public consultation

Question 20 of the public consultation asked respondents to what extent the INSPIRE Directive supports authorities in complying with their obligations under the new Open Data Directive. Overall, the 76 respondents to this question tended to respondent positively, as more than half (39) indicated that INSPIRE is supportive to a large (19 respondents) or moderate (20 respondents) extent. 15 respondents (20%) indicated that INSPIRE is supportive only to a limited extent and only 3 respondents (4%) indicated that INSPIRE is not at all supportive (19 respondents had no opinion). Looking specifically at responses received from public authorities, the vast majority (63%, 29 respondents) indicated that INSPIRE helps them comply with their obligations under the Open Data Directive to a large (33%) or moderate (30%) extent. A detailed overview of this question is presented in the public consultation report, figures 41 and 42.

Furthermore, in the last question of the public consultation[223], two public authorities (Danish and German) echoed findings from the Focus Group interviews and targeted surveys. The respondent emphasised the importance of ensuring that the implementing rules on high-value datasets are aligned with INSPIRE rules, to avoid creating parallel systems. Similarly, a Portuguese public research institution echoed concerns expressed by several participants of the Focus Group interviews. They commented that the requirement in the Open Data Directive to provide high-value geospatial datasets free of charge will prove challenging, as the institution depends on the revenues linked to the sale of geospatial products to maintain their costly data infrastructure (both in terms of IT and human resources). Finally, three companies/business organisations that provide gas and water utilities commented that any revision of the INSPIRE Directive should maintain the possibility for data providers to limit public access to data that contains information on critical infrastructures (irrespective of ownership) on the grounds of public security (Article 13(1)). This concern, however, may prove inconsistent with the provisions on high-value datasets of the new Open Data Directive and the forthcoming implementing act, which provide very few exceptions for limiting public access to data. It should be noted, however,

[223] Public consultation, Question 29: 'If you wish to add further comments, within the scope of this questionnaire, please feel free to do so here.'

that Article 1 (e) of the Open Data Directive specifically excludes documents which contain sensitive information on critical infrastructure from the scope of the Directive.

5.6. EU Added Value

The EU added value assessment considers the added value of the INSPIRE Directive compared to what could be achieved at Member State and/or regional level (EQ 6.1) as well as the extent to which the issues addressed by INSPIRE continue to require action at EU level (EQ 6.2). Both evaluation questions are motivated in the principles of subsidiarity and proportionality (Article 5 of the Treaty on the European Union). Under the principle of subsidiarity, the EU should act only when the objectives can be better achieved by Union action rather than action by the Member States or at regional or local level. As such, the EU added value of the INSPIRE Directive needs to be operationalised and measured. In this sense, the proportionality principle is considered as well, by identifying the content and the aspects of the Directive that are necessary to meet its objectives and the objectives of the EU Treaties.

The essence of the EU added value analysis is structured around the main expected and identified benefits stemming from the EU intervention in the area of spatial data infrastructure: EU added value for policy makers versus other, less common stakeholders; EU added value in relation to cross-domain and cross-border collaboration; and EU added value in terms of broader EU data policy initiatives. The latter concerns future-oriented aspects related to emerging EU data legislation and Green Deal data space. The assessment of the EU added value concerning these different perspectives is based on an assumption that similar achievements could not have been produced in the absence of the Directive. The analysis relies on the findings in the existing literature and results from stakeholder consultations.

5.6.1. EQ 6.1 What is the EU-added value of INSPIRE in comparison to what could be achieved at Member States national and/or regional level activities?

This question provides an assessment of the EU added value of the INSPIRE Directive compared to what could be achieved at Member State and or regional level. The analysis considers the main added value resulting from the EU intervention in terms of evaluation findings related to other criteria, i.e. effectiveness, efficiency, relevance and coherence. Based on the literature review and results from the consultation activities, it aims to compare results and impacts of an EU intervention to those that could have been produced solely at national and/or regional level.

Text box 5-29 ***Key/summary findings EQ 6.1: EU-added value of INSPIRE in comparison to what could be achieved at Member States national and/or regional level activities***

The **desk review** and the analysis drawn from the other evaluation criteria show that due to the incomplete implementation of the INSPIRE Directive the full potential of the EU added value has not materialized yet. The findings from the literature review implicitly indicate that there is an EU added value potential that would likely not have been possible in the absence of the Directive. For example, there has been an EU added value relevant for policy makers in terms of environmental reporting, optimization of national data management and data policies, the gains from the improved interoperability with others and the creation of EU level expertise. There has been a limited EU added value in relation to cross-border and cross-sector data sharing and collaboration. On the other hand, the EU added value for common users has not been significant so far. Significant EU added value of the Directive could be achieved through its effective positioning in the emerging European data governance landscape and its potential to become a key driver for the Green Deal data space.

An EU added value of the INSPIRE Directive has been acknowledged also in the **Focus Group interviews** and the **targeted surveys**. The participants in the Focus Group interviews mentioned benefits of the EU intervention in terms of greater harmonisation at national and EU level. A few examples of cross-border collaborations were mentioned. Three quarters of the respondents agreed that the standardization bring additional benefits to at least some extent and a majority of respondents indicated that the Directive has led to more effective cross-border collaboration and data sharing at EU level.

Desk review

The REFIT evaluation found that the EU-added value was limited, since the implementation process was only partially completed at the time of the preparation of the report and several Member States were lagging behind the interim implementation milestones.[224] For instance, the reporting under the environmental acquis had not yet significantly benefited from the INSPIRE Directive, with a partial exception of air quality. The current evaluation on the other hand would have more possibilities to assess the EU added value, as the INSPIRE implementation deadlines are now mostly in the past. Nevertheless, the current status analysis (see EQ 1.1 and EQ 1.2) show that implementation is still only partial and very heterogenous across Europe, with several countries lagging behind. Therefore, the EU added value of the INSPIRE cannot yet reach its full potential and is limited in scope and magnitude.

Within this context, this EU added value analysis is based on the existing evidence in the literature and the overall evaluation findings under several other evaluation criteria. The analysis is structured along the following main issues related to the added value of the EU intervention:

- EU added value for different users

[224] European Commission (2016), Commission Staff Working Document: Evaluation on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23.

- EU added value in terms of cross-domain and cross-border collaboration
- EU added value when it comes to a broader legislative context in the field of data governance and Digital Single Market

Overall, when considering these different perspectives of EU added value, there is no explicit evidence provided in the literature that the same results could not have been achieved in the absence of the Directive. However, as INSPIRE is considered to be one of the most complex and extensive SDI initiatives globally and has been acknowledged for its important contributions at the UN level and the level of Global Earth Observation System of Systems (GEOSS),[225] it is unlikely that the same extent of added value would have been achieved without the INSPIRE Directive.

EU added value for different users

As provided in the relevance analysis (see EQ 3.1), the user needs are changing over time and the user landscape is broadening. The Directive itself has not put much emphasis on users and their needs, therefore this dimension is lacking in the overall implementation. This can be observed in the existing literature, which looks at benefits and added value of the INSPIRE Directive merely through the eyes of policy makers. The effectiveness analysis (see EQ 2.6) confirmed that the most prominent use case of INSPIRE is reporting under the environmental acquis.

In this context and based on the findings from the literature review, the EU added value stemming from the INSPIRE Directive is mostly linked to the optimization of national data management and data policies, the gains from the improved interoperability with others (e.g. cross-border and cross-sector data sharing) and the creation of the EU level expertise.

The REFIT evaluation lists the progress in terms of more effective sharing of information of spatial data between public authorities and across borders due to the reduction of internal obstacles, following the simplification and harmonisation of data policies, licences and establishment of technical infrastructure.[226] Thus, the discovery, access and use of data had become easier and several countries reported efficiency gains in the REFIT evaluation.[227] The optimization of internal data management in public administration is considered as an important benefit, as it has led to:[228]

- operating of resources through metadata,
- a lesser duplication of data between organisations,
- the use of services for internal purposes,
- establishing of identification patterns based on Uniform Resource Identifier (IRU),
- reinforcing the e-Government initiatives and making data available for private actors and citizens,

[225] Cetl V., Tomas R., Kotsev A., de Lima V.N., Smith R.S., Jobst M. (2019), Establishing Common Ground Through INSPIRE: The Legally-Driven European Spatial Data Infrastructure. In: Döllner J., Jobst M., Schmitz P. (eds) Service-Oriented Mapping. Lecture Notes in Geoinformation and Cartography. Springer, Cham.

[226] European Commission (2016), Commission Staff Working Document: Evaluation on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23.

[227] Belgium, Germany, Italy, the Netherlands, and United Kingdom.

[228] Cetl V., Tomas R., Kotsev A., de Lima V.N., Smith R.S., Jobst M. (2019), Establishing Common Ground Through INSPIRE: The Legally-Driven European Spatial Data Infrastructure. In: Döllner J., Jobst M., Schmitz P. (eds) Service-Oriented Mapping. Lecture Notes in Geoinformation and Cartography. Springer, Cham.

- supporting open data developments.

When considering the national level, a clear benefit is the establishment of an efficient governance structure, bringing together various stakeholders and giving them clear roles based on their existing data responsibilities. A better collaboration has been achieved between public authorities, including between different levels of government (e.g. sub-national).[229] The literature does not conclude whether the same results could have been achieved at national and/or regional level in the absence of the INSPIRE Directive, however, it is possible to interpret them as specific effects that would be more difficult to achieve without the Directive, particularly in some Member States.

Furthermore, additional EU added value as acknowledged by the REFIT evaluation relates to the EU level expertise and knowledge pool generated, by bringing together experts from the Member States through the coordinated development of the implementing provisions and the Maintenance and Implementation support work programme.[230] This and numerous other platforms of collaboration have led to a number of solutions and a development of reusable tools, sharing of good practices, an improved common understanding and the possibility to learn from each other, achievements that would likely not have been made in the absence of EU level actions.

When considering other types of users across different sectors that may reap the benefits of the INSPIRE Directive (e.g. companies, small businesses, citizens), the EU added value is difficult to determine. The effectiveness analysis (see EQ 2.7, EQ 2.8, EQ 2.9) has revealed that there is no systematic monitoring of users and it is difficult to assess the effects the Directive has on various users. Due to the lack of evidence and overview of user needs and actual use cases at national and European level, the EU added value remains limited for various users outside the domain of policy making. However, several positive examples of benefits found in this evaluation should not be ignored (see the efficiency evaluation). Furthermore, the use of the INSPIRE-related data sets by a wider community of common users is hampered due to the lack of user-friendly information products affecting the availability of end-user applications (see EQ 4.3).

EU added value in terms of cross-domain and cross-border collaboration

Interoperability is one of the biggest achievements of INSPIRE and is important because it allows cross-domain and cross-border usage of geospatial data in Europe.[231] The efficiency analysis (see EQ 4.1) confirmed that harmonisation and interoperability is one of the main benefits. Examples of combining data from multiple domains include environmental impact assessments[232], natural hazards and disaster reduction.[233] For example, as concluded in one of the JRC technical reports, the implementation of INSPIRE is crucial for environmental applications such as EIAs and SEAs.[234] According to the results of the 2009 survey presented in the report (ibid.),

[229] Ibid.

[230] European Commission (2016), Commission Staff Working Document: Evaluation on the implementation of Directive 2007/2/EC of March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) pursuant to article 23.

[231] Ibid.

[232] Vanderhaegen M, Muro E. (2005), Contribution of a European spatial infrastructure to the effectiveness of EIA and SEA studies. Environmental Impact Assessment Review 25(2): 123-142. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0195925504000782

[233] Tomas, R., Harrison M., Barredo J. I. et al. (2015), Towards a cross-domain interoperable framework for natural hazards and disaster risk reduction information. Natural Hazards 78 (2015): 1545-1563. Available at: https://link.springer.com/article/10.1007/s11069-015-1786-7

[234] Craglia, M., L. Pavanello and R.S. Smith (2010), The Use of Spatial Data for the Preparation of Environmental Reports in Europe. JRC Scientific and Technical Reports.

between 11 and 20 different INSPIRE spatial data themes were used by a large proportion of respondents (30%) to produce EIA or SEA reports. The respondents to the survey were organisations involved in EIA/SEA reports across Europe, coming from 21 different European countries. The analysis concluded that the majority of organisations involved in these activities were medium-sized companies (ibid.).

When it comes to cross-border collaboration outside the environment policy domains, the existing literature provides limited evidence on the EU added value. Due to the incomplete implementation of the INSPIRE Directive up to date, the EU added value in terms of cross-border collaboration is also limited. More evidence on this issue has been collected through stakeholder consultations, which are described further below. Some examples of cross-border collaborations are presented in ***Text box 5-30***.

EU added value stemming from a broader legislative context in the field of data governance and Digital Single Market

Another important EU-added value stemming from the INSPIRE Directive relates to the effective contribution to the creation of the Digital Single Market by unlocking public data.[235] Besides the INSPIRE Directive, there are other initiatives in the context of the Digital Single Market, forming the European data governance landscape, which are also expected to contribute to the implementation of the INSPIRE Directive (e.g. the European Interoperability Framework, European Data Strategy, revised Open Data and PSI Directive introducing the concept of High Value Data Sets, upcoming Data Governance Act). As shown in the coherence analysis (see EQ 5.5), some of these initiatives such as Open Data Directive serve different purpose than the INSPIRE Directive. Nevertheless, they are complementary and reinforcing each other. The coherence analysis also concluded that a close coordination is required to ensure coherent future developments, by further aligning the INSPIRE directive with the open data legal framework.

The upcoming Data Governance Act[236] will aim to facilitate data sharing, strengthen mechanisms to increase data availability and data reuse, as well as support the development of common European data spaces in strategic domains (i.e. health, environment, energy, agriculture, mobility, finance, manufacturing, public administration and skills). According to the OECD data from 2019, data sharing can "generate social and economic benefits worth between 0.1% and 1.5% of GDP in the case of public-sector data, and between 1% and 2.5% of GDP (in a few studies up to 4% of GDP) when also including private-sector".[237] In order to unlock these potentials, the Impact Assessment on enhancing the use of data in Europe among others includes looks into options to establish a European structure for governance aspects of data sharing by meeting the necessary conditions in relation to the agreement and implementation of data standards, metadata standards, data schemes and interoperability principles.[238] Although spatial data is only a small part of all data, it is crucial to keep the INSPIRE Directive aligned with the broader data governance framework in order to reach the maximum EU added value.

[235] Cetl V., Tomas R., Kotsev A., de Lima V.N., Smith R.S., Jobst M. (2019), Establishing Common Ground Through INSPIRE: The Legally-Driven European Spatial Data Infrastructure. In: Döllner J., Jobst M., Schmitz P. (eds) Service-Oriented Mapping. Lecture Notes in Geoinformation and Cartography. Springer, Cham.

[236] European Commission (2020), Proposal for a Regulation of the European Parliament and of the Council on European data governance (Data Governance Act), COM/2020/767 final.

[237] OECD (2019), Enhancing Access to and Sharing of Data: Reconciling Risks and Benefits for Data Re-use across Societies.

[238] European Commission (2020), Impact Assessment on enhancing the use of data in Europe. Report on Task 1 – Data governance, written by Deloitte, The Lisbon Council, JIIP, GOVLAB, TIMELEX.

For example, spatial data is becoming an important tool for delivering on the objectives of the European Green Deal[239]. Through the use of environmental and climate-related spatial data one can better assess and understand the state of the environment and how it affects society and the economy. An effective data governance is required to strengthen the evidence-based policymaking and implementation. According to the MIG work Programme[240], the conclusions of this evaluation will feed the 'Greendata4all' initiative announced in the European strategy for data.[241] The coherence analysis (see EQ 5.4) indicated that the recent alignment initiatives aiming at harmonization of the reporting obligations under the environmental acquis with the INSPIRE Directive are considered to be an important step forward in the context of the ambition to develop common European data spaces, in particular the Green Deal data space. Such developments provide additional added value at the EU level and in the light of the fast legislative changes in the field of data and sectoral policies, it is important to ensure the continuous relevance of the Directive in a broader data governance landscape.

Consultation activities

Focus Group interviews

In one of the Focus Group interviews, several achievements stemming from the INSPIRE Directive that bring an EU added value were mentioned by the participants, including common standards for data exchange and conditions of use, usage of data by different stakeholders (not only at national level), greater reach and dissemination, stronger commitment across borders, better justification of the use of resources for the implementation and a rationale for other necessary investment in the national SDI. In other Focus Group interviews, additional achievements were listed. One respondent suggested that common rules and an interoperable framework bring an added value by achieving harmonized data at national level, whereas two respondents in another interview indicated that an EU added value lies in creation of the INSPIRE community, or even some sort of an ecosystem. However, it is difficult to assess the added value before the system is fully implemented. For example, one respondent clarified that due to the low implementation maturity in their country, the EU added value of INSPIRE is not visible.

As mentioned in one of the Focus Group interviews, the added value of the INSPIRE Directive is that it is Europe-wide, and it covers a wide range of themes. The broad scope of INSPIRE has been helpful compared to prior international initiatives, which were usually sectoral or much more limited in scope. One Focus Group interview respondent also indicated that in the past, there was a long bureaucratic procedure to obtain data from other countries, which was sometimes not free of charge, and one needed to get approvals from different authorities. According to the participant, there has been an improvement in the sense of accessibility, but also in terms of quality of data.

The INSPIRE Directive has been an incentive for the mapping agencies to cooperate with the neighbourhood countries, even if no effective guidelines for cross border

[239] European Commission (2019), The European Green Deal. Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2019) 640 final.

[240] European Commission (2020), Maintenance and Implementation Work Programme for the INSPIRE Directive for the period from 2021-2024: "Towards a Common European Green Deal data space for environment and sustainability", endorsed at the 12th MIG meeting on 26-27 November 2020.

[241] European Commission (2020), European strategy for data. Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, COM/2020/66 final.

aspects have been developed. A Focus Group participant mentioned that in their country they receive data requests from various authorities, institutions, companies and citizens from other Member States or from the EU level and as said in another Focus Group, citizens can due to INSPIRE easily obtain access to data from others. The INSPIRE system helps to compare countries for reporting purposes – it makes it easy to compare countries data and progress in certain areas. However, according to one Focus Group participant, a cross-border collaboration is still hindered due to the lack of harmonization. As indicated by participants in a Focus Group from a federal country, INSPIRE led to a much closer collaboration across regional levels, and there was less focus on the collaboration with stakeholders from other Member States. A few examples of cross border collaborations as provided by two other Focus Group participants are provided below.

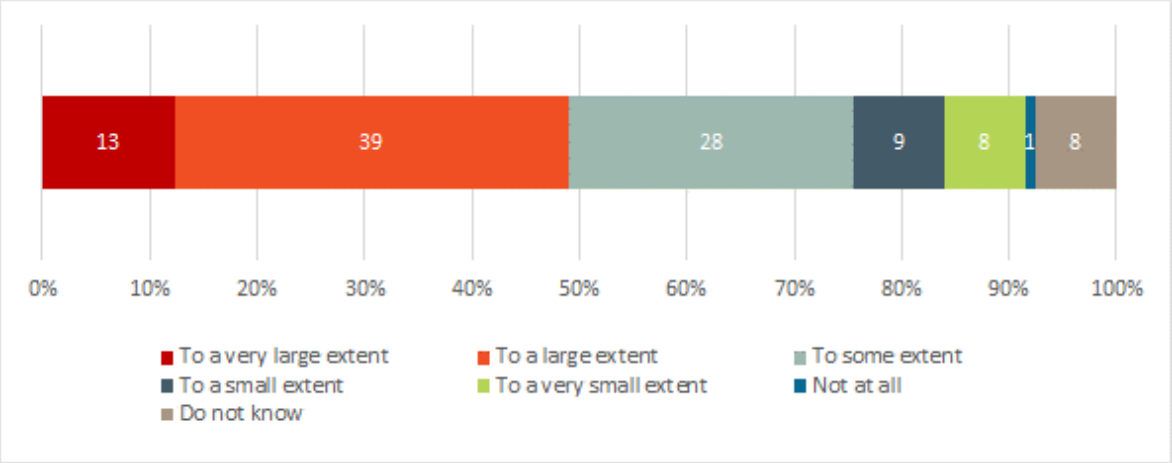
Text box 5-30 Examples of cross border collaboration

A few concrete examples of cross border collaboration were mentioned during the interviews, which were mostly pilot cases: an Interreg project connecting the French region Vale d'Aosta and the Italian region Piemonte as regards the harmonisation related to natural risks (hyperlink); a project funded by DG CNNECT involving stakeholders from Slovenia and Italy to create common structure related to landslide and floods risks; an Interreg project (Harmo-Data) involving Slovenia and two Italian regions (Veneto region, Friuli-Venezia Giulia region) to establish a common approach to some aspects of mobility and transport(hyperlink). One participant mentioned an international project carried under the umbrella of Eurogeographics related to topographic data. The project members encountered many technical problems related to access to the services, cross border consistency, missing edge matching, different granularity of the data, different density of objects within datasets, missing attributive information, etc. However, despite these challenges, the organisations started collaborating, which would probably not have happened without INSPIRE. The benefit of such collaboration is also the possibility to identify technical problems.

Targeted surveys

Two targeted surveys, for environmental and spatial data communities respectively, included a question on the extent to which the EU-wide standardization of data policies, licences and technical infrastructure brought additional benefits as a result of the INSPIRE Directive, in comparison to what could have been achieved at national, regional and/or local level. 75% of respondents (80 out of 106) responded that the standardization brought additional benefits to at least some extent: 13 respondents (12%) answered that it was to a very large extent, 39 (37%) that it was to a large extent and 28 (26%) replied 'to some extent'. Only 16% (17 out of 106) of respondents assessed that it brought additional values to small or very small extent. On the other hand, only 1 respondent indicated that the standardization did not bring additional value and 8 respondents did not know/ could not assess.

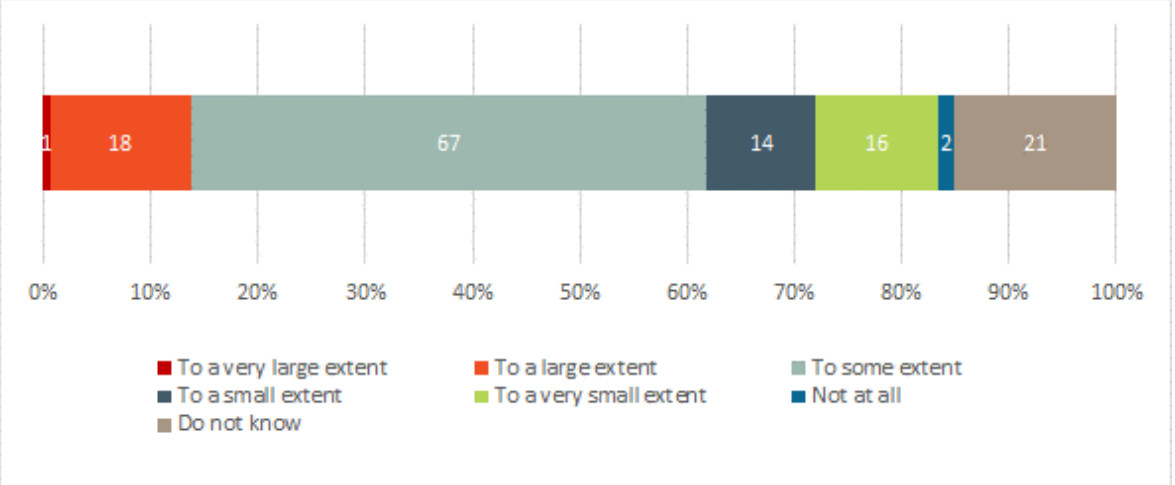
Figure 5-36 Extent to which the EU-wide standardization of data policies, licences and technical infrastructure brought additional benefits as a result of the INSPIRE Directive (N=106)



Source: All respondents, Targeted surveys (combined) April-May 2021, Question 29: To what extent has the EU-wide standardization of data policies, licences and technical infrastructure brought additional benefits as a result of the INSPIRE Directive, in comparison to what could have been achieved at national, regional and/or local level?

In addition, the respondents in all four targeted surveys addressed to environmental, spatial data, agriculture and marine community were asked whether the INSPIRE Directive contributed to effective cross-border collaboration and data-sharing in the EU. The majority of respondents indicated that the Directive was effective in this regard to some extent (67 out of 139, 48%), 13% (18 out of 139) of survey participants agreed that it was effective to a large extent and 22% (30 out of 139) assessed that it was effective to a small or very small extent. Only two respondents believed that the Directive has not contributed to effective cross-border collaboration and data-sharing in the EU, and 15% of respondents could not assess the matter.

Figure 5-37 Contribution of the Directive to effective cross-border collaboration and data-sharing in the EU (N=139)



Source: All respondents, Targeted surveys (combined) April-May 2021, Question 9: Has the INSPIRE Directive contributed to effective cross-border collaboration and data-sharing in the EU?

Public consultation

This question was not addressed in the Public consultation and no comments were made by respondents on this issue.

5.6.2. EQ 6.2 To what extent do the issues addressed by INSPIRE continue to require action at EU level?

Based on the principle of subsidiarity, the EU should act only when the objectives can be better achieved at the EU level rather than at national, regional or local level. This question aims to establish whether the EU intervention is required and justified, for example by identifying benefits that could have not been achieved in the absence of the Directive.

Text box 5-31 ***Key/summary findings EQ 6.2: The extent to which INSPIRE continues to require action at EU level***

The **desk review** and the **targeted consultation activities** confirmed that the demand for harmonised data has been growing, e.g. for ensuring an effective response to cross-border challenges such as climate change and natural disasters. A vast majority of respondents (106 out of 139, 79%) indicated that action is required at EU level to least some extent or even to a large or very large extent. Only a fraction of survey participants believed that EU action is required only to a small or very small extent or not at all.

Desk review

When considering the situation before the Directive, the accessibility of data was limited. In the 1990s, data was poorly documented, missing or kept in incompatible formats.[242] Data was needed for formulation, assessment and monitoring of EU policies, however it was challenging to use data, because it was time-consuming to combine different datasets (from different sources) and data sharing was limited due to cultural and institutional barriers.[243] In order to provide solutions, a strong coordination across stakeholders at all levels (local, regional, national and European) was needed. Even today, as climate change and natural disasters are extending across borders, the mitigation of such impacts and support to sustainable development should be accompanied by sharing of information and spatial data across organisations and borders.[244] The demand for more and better-quality data has been growing in Member States and the European Commission. Data are needed for informed policy support in different sectors, and not only for environment policy. The aim of INSPIRE is to produce harmonized national datasets which can be used at cross-border and transnational levels thus facilitating the development of pan-European datasets,[245] and thereby providing a response to a need for relevant data to support effective policy making.

Consultation activities

Focus Group interviews

[242] Cetl V., Tomas R., Kotsev A., de Lima V.N., Smith R.S., Jobst M. (2019), Establishing Common Ground Through INSPIRE: The Legally-Driven European Spatial Data Infrastructure. In: Döllner J., Jobst M., Schmitz P. (eds) Service-Oriented Mapping. Lecture Notes in Geoinformation and Cartography. Springer, Cham.

[243] Ibid.

[244] Rajabifard A., Feeney MEF, Williamspon IP (2002), Future directions for SDI development. International Journal of Applied Earth Observation and Geoinformation 4(1): 11-22.

[245] Minghini, M, V. Cetl, A. Kotsev, R. Tomas, and M. Lutz (2021), INSPIRE: The Entry Point to Europe's Big Geospatial Data Infrastructure. In: Werner M., Chiang YY. (eds.) Handbook of Big Geospatial Data. Springer, Cham. https://doi.org/10.1007/978-3-030-55462-0_24

The participants in the Focus Group interviews mostly agreed that an action at EU level is required to achieve interoperable data in Europe. In the view of one participant, there is no doubt that INSPIRE has responded to a need that could be addressed only at EU level. Otherwise, there would most likely have been many different systems at different levels of maturity. It is unlikely that Member States would have harmonized their data without the INSPIRE Directive, as it is already difficult.

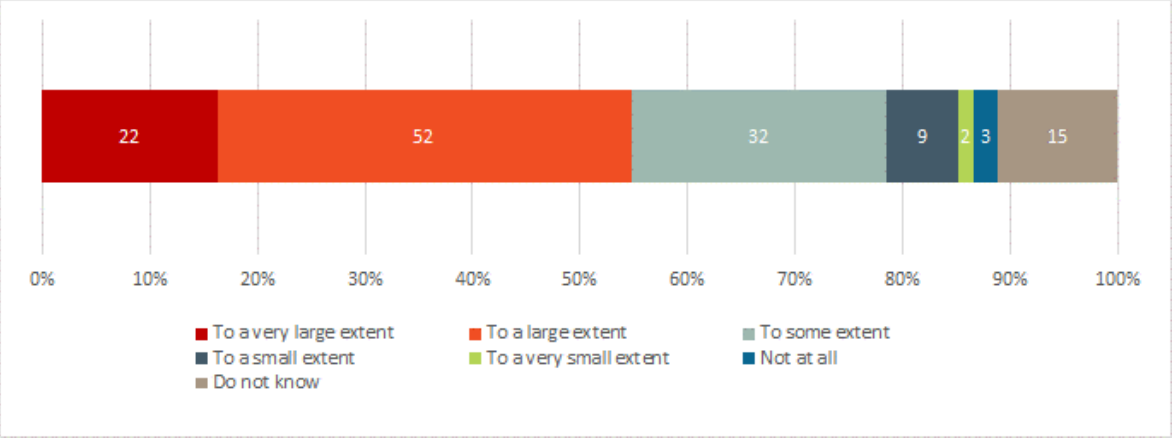
One participant clarified that it is important to achieve harmonized datasets across Europe which can be easily reused and combined across Member States and at the EU level. Another participant in the same interview suggested however, that harmonization is not sufficient and that besides the format, the content should be also harmonized. By example, many citizens have real estate in another EU Member State and are interested in information related to e.g. buildings and parcels, and therefore the information should circulate freely across borders.

The Focus Group participants from a country, where according to the participant the national open data play a much bigger role than INSPIRE data, agreed that a common scheme across Europe is required and that the ambition and the reasoning behind the INSPIRE Directive is justified. In their view, the problem lies in its poor implementation and the fact that the INSPIRE Directive has not considered operational realities enough, together with it that the framework to actively support the implementation has not been put in place. In another Focus Group, the participants suggested that for further development of data specification, an exchange of technical and professional knowledge at European level is required. Additionally, standardization of general technical specifications simplifies interdisciplinary collaboration, which is becoming increasingly important for solving global problems.

Targeted surveys

All four targeted surveys addressed to environmental, spatial data, agriculture and marine community included a question on the extent to which the obstacles and needs related to sharing and disseminating spatial data as addressed by the INSPIRE Directive continue to require action at EU level. A significant majority of respondents (106 out of 139, 79%) indicated that the action is required at EU level to least some extent: 16% respondents indicated a very large extent, 39% of survey participants answered large extent and 24% of respondents replied some extent. 8% of respondents suggested that the EU action is required to a small or very small extent and 3 respondents (2%) were convinced that it is not required at all.

Figure 5-38 Extent to which the obstacles and needs related to sharing and disseminating spatial data as addressed by the INSPIRE Directive continue to require action at EU level (N=139)



Source: All respondents, Targeted surveys (combined) April-May 2021, Question 30: To what extent do the obstacles and needs related to sharing and disseminating spatial data as addressed by the INSPIRE Directive continue to require action at EU level?

Public consultation

This question was not addressed in the Public consultation and no comments were made by respondents on this issue.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

The key conclusions from the evaluation of the INSPIRE are presented as follows.

6.1.1. Current status

The current status analysis provided an assessment of the implementation of the INSPIRE Directive in the Member States and EEA countries and the effects that this has had on various stakeholders. The analysis also includes an assessment of the implementation of the 2016 REFIT recommendations. This analysis constitutes the first part of the evaluation and provides input to the evaluation criteria, especially, but not only, relevance, effectiveness, and efficiency.

The INSPIRE Directive has been partially and heterogeneously implemented across the European Union until the reference year 2020 (EQ 1.1).

There has been a partial and heterogeneous implementation of the INSPIRE Directive. No single country has yet achieved full implementation in alignment with the roadmap and several countries lag behind. There were fewer data sets available in 2020 than reported in previous years. In some cases, this is a result of data cleaning processes at national level, but another reason for removing data sets is also that the Member States and the EEA/EFTA countries might see this process as an opportunity to improve their overall implementation performance.

Considering the INSPIRE performance indicators the values are generally low (based on the harvesting results from December 2020)[246]. Around half of available data sets are not yet accessible across the EU Member States and EEA/EFTA countries. In general, there is a low conformity of metadata for spatial data sets and spatial data services (less than 60%). Half of all listed data sets are in conformity with relevant legislation as regards the interoperability of spatial data sets. The conformity of network services has improved since 2019, but several countries still offer only a few interoperable network services and most countries do not offer transformation services.

The low average values of the INSPIRE indicators in reference years 2019 and 2020 are not surprising though. Significant changes to their calculation was introduced in 2019 by Commission Decision (EU) 2019/1372. The new automated approach is based on the processing of all metadata harvested from member countries discovery services and entails a stricter and more reliable validation method than the previous self-declared assessments. Low results could be because countries often lack expertise and technical capacity to implement the requirements. Technical requirements are considered very complex and difficult to operate with.

The recommendations put forward by the REFIT evaluation of the INSPIRE Directive were partially implemented by Member States and continue to be relevant. The recommendations addressed to the European Commission have to a large extent been implemented (EQ 1.2).

[246] For several countries, the indicator values from a later harvest than December 2020 were taken into account with the agreement of the European Commission: Malta, Poland, France, Liechtenstein and Switzerland.

Member States increased the overall availability of environmental priority data sets. However, there are still limited linkages between the implementation of the INSPIRE Directive and other national initiatives related to e-Government and Open Data policies. The recommendations addressed to the European Commission have largely been implemented. The European Commission has put forward several initiatives and actions summarized in the MIG Work Programme. Among the initiatives are: The evaluation study on data sharing between public authorities and public access and use provisions; the proposal for a regulation streamlining reporting obligations in the field of environmental policy; the new monitoring and reporting decision; a list of common datasets related to environmental reporting obligations; and initiatives towards technical cooperation and coordination.

6.1.2. Effectiveness

The effectiveness analysis has assessed the results and effects of the implementation of the INSPIRE Directive in the light of the objectives. Data was collected to identify the level of implementation of the Directive in the different Member States as well as barriers to implementation. Use cases have been assessed to check the extent to which the infrastructure was used by various end users (policy makers and other beneficiaries). The following key conclusions are the results of the analysis of the effectiveness[247].

Even though the monitoring system does not allow to fully capture the state of implementation, Member States have nonetheless progressed in the implementation of the Directive. Still, no country has achieved full implementation yet. Implementation gaps still need to be closed to fully capture effects and impacts (EQ 2.1 & 2.2).

As of June 2021, and close to the last deadline set for implementing the INSPIRE Directive (December 2021), full implementation is not yet achieved. The analysis of the monitoring data and current status forms (see previous conclusions EQ 1.1 et 1.2) highlights several gaps in implementation. Overall progress at Member States level is however observed. Some progress is observed regarding governance and organizational issues at Member State level. Evidence suggests that, in at least three countries, the INSPIRE Directive has been instrumental in driving an improvement in the organizational aspects of spatial data sharing.

The current geographical coverage of implementation does not allow to meet the INSPIRE Directive objective in terms of interoperability (EQ 2.3).

The geographical coverage of the implementation of the INSPIRE Directive is uneven across Member States, and at national and regional level. The heterogeneity of datasets that are made available by Member States affect the capacity to use data from different regions and different Member States. The combination of the uneven geographical coverage of implementation and the heterogeneity of datasets renders it difficult to achieve the INSPIRE Directive's ambition of interoperability.

The implementation of the INSPIRE Directive as well as the sharing and reuse of existing spatial data still face barriers already identified in the

[247] Note that there is no specific conclusion on EQ 2.4 because the main challenge lies in the coherence of the INSPIRE Directive with the PAEI directive.

previous evaluation – these barriers are primarily of a technical nature (EQ 2.5).

The implementation of the Directive as well as the sharing and reuse of existing spatial information has progressed since the last evaluation. Still, barriers observed at that time remain valid. The greatest challenge lies in the technical complexity of the framework required by INSPIRE. This issue of technical complexity applies to implementation as well as to the development of use outside data producers (see EQ 2.6 and 2.7). The other strong remaining barrier lies in the heterogeneous licensing conditions which impacts the sharing and use of datasets. The other identified barriers (legal, knowledge, financial, cooperation and organization) were not unanimously regarded as obstacle for the implementation and use of the INSPIRE framework.

The use of datasets and services through the INSPIRE framework is developing. However, an effort remains at the Member State level to increase the use of the INSPIRE framework – be it for EU level purposes, national or regional purposes. (EQ 2.6 & 2.7).

Assessments do not lead to clear conclusions regarding the use of the INSPIRE framework for reporting under the environmental acquis and for policy making in the field of environment in general. On the one hand, there has been progress in use and efforts have been deployed to align effectively INSPIRE to EU reporting requirements. The results of these efforts are welcomed by Member States, as the main effect of INSPIRE at the EU policy level. It is not straightforward to conclude on the use of INSPIRE for other policies because the INSPIRE framework is less known and thus considered less useful for specific local or regional policy needs.

There is no evidence that INSPIRE has at this stage any qualitative and quantitative effects on users active in economic sectors influencing environment. This also applies to small businesses using spatial data. INSPIRE data is only to a limited extent used by users other than national public authorities and agencies. (EQ 2.8 & 2.9).

Most Member States do not monitor the use. They therefore have limited knowledge about who the users of the spatial data in specific economic sectors are, how they use the data and, in the case of the private sector, what commercial applications they might eventually develop. At sector level, several studies have been conducted to assess the available data and how they could be used for specific purposes. However, the effects of the use of data on users has not been analysed. Focus Group interviewees indicated that the effects are very limited at best on users outside of the public domain.

6.1.3. Relevance

The relevance analysis assesses the needs of the different stakeholders (public authorities, private actors, NGOs, researchers, and the general public), improving availability, quality, organisation, accessibility and sharing of spatial information and decreasing the costs of public sector in search for data. Information was collected on the needs of the different actors and on the current obstacles. The impacts of current and future technological developments on INSPIRE and on the way to address

harmonisation and interoperability was assessed. The following key conclusions are the results of the analysis of the relevance[248].

INSPIRE aims to address two needs: i) improving availability, quality, organisation, accessibility and sharing of spatial information and ii) decreasing the costs of public sector in searching for data. These needs are still valid and INSPIRE matches them and remains relevant for addressing the obstacles (EQ 3.1 & 3.2).

Public authorities have a need for spatial data and INSPIRE is a relevant response to this need. As regards actors outside of the public domain - although their needs have not been precisely assessed and identified - the reasoning is that if spatial data are made available and accessible, they would be used and dedicated services would be developed. However, at this stage, the evidence to support this causality is scarce.

Regarding barriers, INSPIRE is considered as a relevant tool to overcome them and thereby make data available, accessible, and reusable.

The objective of harmonisation and interoperability within the INSPIRE framework entails technical specificities for standards that are considered as too rigid to be fit-for-the-future in the context of evolving standards and technologies (EQ 3.3).

INSPIRE is envisaged to be based on the national spatial data infrastructures (NSDI) of Member States. It establishes a framework for the sharing relevant spatial data within the European Community for users and applications in the environmental domain. To ensure effective sharing as well as interoperability, common standards must be used. INSPIRE mostly relies on the standards from the Open Geospatial Consortium (OGC). Technical requirements may constitute a barrier to implementation and to use because it restrains use for a diversity of users (outside data providers). The level of ambition for the standardization currently required within INSPIRE may thus constitute a barrier to its full materialisation and use.

6.1.4. Efficiency

The efficiency analysis collected evidence on the effects/benefits of the implementation of INSPIRE Directive, as well as, to the extent possible the assessment of the costs of the implementation of the Directive. Data was collected on the experienced costs impacts and benefits to different stakeholders (e.g. national authorities, regional/local authorities, businesses, and NGOs). Areas/processes with scope for reducing inefficiencies were identified.

INSPIRE has improved the work of the stakeholders in the area of spatial data provision. A key benefit has been the provision of better overviews, discoverability, availability and access to data (EQ 4.1).

The implementation of INSPIRE is not complete. Still, the benefits are beginning to emerge and have contributed to improving the operational efficiency of concerned stakeholders. The key direct benefits are experienced by stakeholders in regards to: b*etter overview, discoverability, availability, accessibility of data* and especially

[248] Note that there is no specific conclusion on EQ 3.4 because the main challenge lie in the coherence of the INSPIRE Directive with the PAEI directive.

harmonisation and interoperability. In Member States where data were previously stored in many different formats and some of these formats were not readable using the most common GIS systems, creating services and formats that can be used by all users is one of the most important benefits.

In terms of indirect benefits, two factors were pointed to most significantly by Member States: openness to share data by data providers and national infrastructures and development of national geoportals. Overall, this suggests that INSPIRE has been instrumental in furthering the development of the national geoportals as well as in promoting an increased sharing of data.

Harmonization of data and interoperability are the two most important cost factors in the INSPIRE implementation. The approach to the implementation of INSPIRE influences the costs (EQ 4.2).

Harmonization and interoperability of spatial data are some of the key benefits of INSPIRE. Mirroring this however, these are also the most costly elements of implementation. This relates to financial costs and human resource/expertise needs and is a particularly relevant for national governments. The activities that are necessary to achieve coherent, consistent and harmonised data sets that adhere to shared data models on a national level and at a pan-European level are perceived as costs intensive. The interviews, the surveys and the public consultation all confirm that harmonization and interoperability are the main cost drivers. For users (who are not also producers), the majority perceives that there are no additional costs, and if there are, these relate to purchasing additional or new software to access/use the spatial data.

It is difficult to point to specific provisions which would make the INSPIRE implementation more cost-efficient. This largely depends on the institution and/or administrative level in question. The costs of implementation are also influenced by the approach taken by the individual Member States to INSPIRE implementation. INSPIRE might be implemented as an integral part of the national SDI or implemented as a separate system. The latter can lead to disjoined data foundation and/or separate IT-infrastructure which again influences the cost (and the perceived value) of INSPIRE. Further, Member States that implement INSPIRE as a separate system, in parallel to the national SDI, may tend to perceive the harmonization linked to INSPIRE as more costly and/or invoking additional costs. Member States that implement INSPIRE as part of the national SDI system cannot in general identify the costs. This suggest that the activities are integrated in these situations.

Different stakeholders in Member States also have difference perceptions depending on whether they are providers or users, their administrative level or specific type of stakeholder. Even stakeholders at the same administrative level, but from different institutions (i.e. organizations/institutions at national level) may assess cost levels differently. Large providers of data such as cadastres or mapping agencies do not have infrastructure costs. Such institutions experience costs in relation to processing and harmonizing data instead.

There is a simplification potential of the implementation in terms of addressing the requirement for interoperability and reporting on the implementation. There is also simplification potential in terms of better adjusted data-models – targeting difference user groups (EQ 4.3).

Simplification may happen at two levels; A) Simplifying the implementation and thereby reducing costs of harmonisation and interoperability and B) align with other digital processes and making use and data reuse easier. The latter may not necessarily lead to reduced cost but to an increased use. Further, increasing the

correspondence between national SDI and INSPIRE will not only reduce cost but also increase the value of national SDI data that is more targeted for specific use cases.

Some Member States find that the reporting on INSPIRE is time intensive and not always straightforward (technically difficult). The already introduced simplification may not be enough to reduce the burden (costs) for the Member States. However, Public consultation feedback suggests that respondents are more concerned with harmonisation and interoperability than with basic functionality regarding downloading and viewing of spatial data.

Users perceive that data models and the way data is available is too complicated for a number of users. Different types of users have different needs regarding data models: Advanced users might need quite complex data structures for the data to match their needs - but using data models with this complexity will be a burden to other users with simpler needs. INSPIRE specifies one data model per data theme covered by INSPIRE: the data model covering the combined needs from the most advanced users.

The results achieved so far are commensurate with the resources put forward and are in line with the ones expected from the ex-ante evaluation of INSPIRE in observed cases. However, implementation is not yet complete and hence results cannot be fully assessed yet (EQ 4.4).

A limited number of cost-benefit assessments of the implementation of INSPIRE are available supplementing those that were included in the recent evaluation. Most of those focus on the benefits of a SDI in general (and not on INSPIRE). Overall, they conclude that the benefits of a national SDI by far outweigh the costs. The reviewed Cost Benefit Analysis find that when the SDI is implemented this has a large positive impact/benefit for both the public (cost savings) and private sector (costs savings and business opportunities). However, a number of Member States found that it is too early to really assess the costs and benefit of INSPIRE, especially as INSPIRE is not fully implemented yet.

The costs are perceived are 'asymmetrical' according to stakeholders. Most costs relate to setting up the system and are thus borne by national governments. User do not perceive extraordinary costs, but use is also limited to date (EQ 4.5).

Overall, national authorities and agencies are the stakeholders where most of the cost occur and where less of the (direct) benefits are expected to fall. Depending on the administrate structure of the Member State and of the responsibilities allocated, the allocation of cost can vary considerably between Member States. In countries with a federal structure, some implementation responsibilities may lie at subnational level. The main costs identified by national and local level institutions relate to acquiring and processing of geospatial data, i.e. the production and harmonization of data and Businesses, in addition to the national and regional level, find that perceived costs are larger than benefits.

The resources for implementation have in most cases been made available, but some Member States have perceived it as a challenge to secure the resources. In these Member States, costs are perceived as higher, possibly due to treating INSPIRE and the national SDI as two difference systems (EQ 4.6).

Member States have applied different ways of funding the implementation of INSPIRE. In most cases, INSPIRE implementation has been funded as part of the budget allocation for the institution in question (with some difference in terms of which costs

are carried by the different government levels, mostly the funding is provided by the national level government (state budget)). Some Member States have also used funding via European Structural Investment Funds (ESIF).

For some Member States the key problem is not the availability of resources, but the availability of the required expertise. Many different institutions can be involved in the implementation of INSPIRE. Budget allocations therefore have to be spread across a number of institutions, often considered insufficient. Some Member State administrations have outsourced the development of INSPIRE software and harmonisation.

The effect on environmental reporting is limited and it is too early to conclude on a possible reduction in the administrative burden – this is due to the incomplete implementation (EQ 4.7).

Environmental authorities to some extent make use of the spatial data that are made available through INSPIRE. It is noted that this does not necessarily reflect on the reporting burden. The administrative burden of environmental reporting has not been confirmed to have been reduced through use of data made available through INSPIRE. Findings under effectiveness (EQ 2.6) and under coherence (EQ 5.2) point to that although the alignment has increased, the use of data from INSPIRE is still limited. More work in terms of making it technically more efficient will be needed before INSPIRE can really support the reduction of the administrative burden.

A further streamlining of the provisions in Articles 7 and 8 of Directive 2003/4/EC on public access to environmental information would not necessarily affect the administrative burden of the member states (EQ 4.8)

There are no inconsistencies between the INSPIRE Directive and Directive 2003/4 on Public Access to Environmental Information. The two Directives are dissimilar in terms of scope and depth and serve different purposes (transparency vs interoperability and data accessibility through view and download services) and have different scopes (despite some overlap). INSPIRE can however support the implementation of Directive 2003/4 providing a technical framework for electronic data sharing. Stakeholders perceive that INSPIRE supports the implementation of Directive 2003/4/EC by improving the capacity of stakeholder to provide spatial data, which should have an effect on the administrative burden.

6.1.5. Coherence

The coherence assessment considered whether the INSPIRE Directive and its provisions were coherent internally and with other environmental legislation, with other policies and legislation with a spatial dimension outside the environmental acquis, as well as with the EU legal framework on public data sharing (Directive 2003/4 on Public access to environmental information, and Directive 2019/1024/EU on Open Data).

No issues of internal coherence have been found. INSPIRE is however outdated with regards to its references to comitology procedures, which are not in line with Articles 290 and 291 of the Lisbon Treaty. (EQ5.1)

Although INSPIRE consists of several layers of rules and technical guidance, with different statuses and revision procedures, no instances of incoherence have been found. However, overlaps between data themes identified by stakeholders should be resolved in the relevant technical committees. Revision procedures applied to

Implementing Rules may also appear cumbersome for the revision of technical elements. Aligning the comitology procedures referred to in the INSPIRE Directive to the Lisbon treaty might lead to more flexible revision procedures.

INSPIRE is legally coherent with environmental legislation with geospatial reporting obligations (EQ5.2) and with other relevant areas of EU policy with geospatial reporting obligations (EQ5.3). In practice however, data specifications are not yet fully aligned, leading to instances of duplication of reporting processes.

INSPIRE applies to all environmental policies and other policies or activities which may have an impact on the environment. A review of the relevant EU legislation did not find provisions that would potentially impede the applicability of INSPIRE rules within the scope of the legislation. In fact, many pieces of legislation make direct reference to INSPIRE rules and it was found that such references do support compliance in practice.

The coherence assessment also identified many ongoing initiatives, both from the Commission services/agencies and stakeholders, to develop synergies between INSPIRE and data collection and sharing processes and instruments under other pieces of legislation. In particular in the environmental field, of particular relevance is the ongoing work to align reporting obligations in EU environmental legislation with INSPIRE rules. Such initiatives are supported by reporting guidance and increased cooperation between sectoral authorities and authorities responsible for INSPIRE both at EU and national level. However, stakeholders stressed that environmental reporting obligations are not yet fully coherent with INSPIRE, both in terms of data content and models. Similar comments were made in relation to non-environmental policy areas. Such situations currently lead to duplication of reporting processes.

Alignment initiatives are especially relevant in the context of the recently announced ambition to develop common European data spaces, in particular the Green Deal data space, as INSPIRE could become an important instrument for building these data spaces. Some of these initiatives (for instance in the transport sector) also show that INSPIRE services, as they are, cannot satisfy all data needs in all sectors. Some current developments, such as the new Climate Adaptation Strategy, question a possible expansion of the scope of INSPIRE to be more in line with sectoral data needs.

The INSPIRE Directive has been designed to be consistent with the EU legal framework on data sharing and dissemination – Public Access to Environmental Information Directive and the Open Data Directive. Synergies between the three Directives could however be better exploited (EQ5.4 and EQ 5.5)

Unlike the Public Access to Environmental Information Directive (Directive 2003/4) and the Open Data Directive, the INSPIRE Directive does not have as a core objective on the transparency of policy decisions or the openness of data. By providing data services accessible to the public, the INSPIRE Directive has the potential to serve these objectives of both Directives. This potential is not fully realised yet due to the varying levels of implementation of the INSPIRE Directive across Member States and the tendency in some Member States to implement the three Directives separately.

In the case of the Public Access to Environmental Information Directive, the limited synergies with INSPIRE can also be explained by the fact that no link is made between the two Directives in the legislation. As it was adopted earlier, Directive 2003/4, which requires the dissemination of environmental information held by public authorities,

including through electronic means, does not refer to INSPIRE rules for disseminating geospatial data covered by Article 7(e), or to the open data framework (formerly PSI Directive, now Open Data Directive). The Directive is in this regard outdated and could benefit from stronger alignment with INSPIRE.

Coherence issues between the INSPIRE Directive and the Open Data Directive might however arise in the future and could require aligning INSPIRE with the open data legal framework. (EQ 5.5)

Potential conflicts have been identified in the relation to the Open Data Directive and the upcoming High Value Datasets Regulation. Provisions of Article 14 of the Open Data Directive might conflict with provisions in Articles 13, 14 and 17 of the INSPIRE Directive, which provide ample possibilities to limit public access to spatial data, and to license and/or require payment for spatial datasets and services. Given the evolution of the legal framework on open data, there might be a need to consider the alignment of the INSPIRE Directive with the open data legal framework in the future.

Although the Open Data Directive does not set legal obligations in terms of technical standards or data format and makes several references to INSPIRE, it will nonetheless be crucial to ensure that future developments, supporting guidance, and recommendations for both directives remain compatible in the future.

6.1.6. EU Added value

The EU added value assessment identified the added value of the INSPIRE Directive compared to what could be achieved at Member State and or regional level as well as the extent to which the issues addressed by INSPIRE continue to require action at EU level.

The added value at the EU level has been limited due to the incomplete implementation of the INSPIRE Directive. The most significant EU added value has been related to the reporting under the environmental acquis and for other policymaking and implementation purposes (EQ 6.1).

Due to the incomplete implementation of the INSPIRE Directive, the EU added value has been limited. The EU added value of the Directive as acknowledged by the majority of stakeholders so far relates mostly to the policymaking and implementation purposes at national and European level. One of the key benefits concerns the environmental reporting by the Member States. At a national level, the Directive has led to EU added value through the establishment of governance structures, achieving interoperability in a broader scope (EU-wide), unlocking public data and creating a pool of EU level expertise. The EU added value of the Directive in terms of data sharing is limited when it comes to benefits for users outside the policy-making field and could be further exploited, e.g. by providing more user-friendly applications. Cross-border collaboration is not always smooth due to technical challenges. Nevertheless, the stakeholders in the targeted survey agree that EU-wide data sharing and cross-border collaboration has improved due to the INSPIRE Directive.

Important EU added value of the Directive can be achieved through its effective positioning in the emerging European data governance landscape and to become one of the key drivers of the upcoming Green Deal data space (EQ 6.1).

Environmental and climate-related spatial data is becoming an important tool for delivering on the objectives of the European Green Deal, which is also acknowledged

in the European Data Strategy by putting forward the GreenData4all initiative. Interoperable data of high quality is crucial to ensure informed and evidence-based policy making and implementation. INSPIRE-relevant data must be aligned with other data policy initiatives in order to achieve its full potential at the European level. A close collaboration between policy makers and other relevant stakeholders is crucial in shaping future developments. Coherence between various initiatives and instruments is required for developing the Green Deal data space, as mandated by the MIG Work Programme.

The intervention at the EU level is required when it comes to sharing and disseminating spatial data (EQ 6.2).

The demand for harmonised data has been growing in Europe, especially for ensuring an effective response to cross-border challenges such as climate change and natural disasters. Most of the stakeholders acknowledge that the action is required at EU level and that the rationale behind and the principles of the INSPIRE Directive are justified.

6.2. Recommendations

The above outlined conclusions of the evaluation of the INSPIRE Directive leads us to forward the following recommendations to the European Commission and the Member States.

I. Closing the implementation gap

The implementation of INSPIRE according to the INSPIRE roadmap supposed to have been completed in 2021. This evaluation shows that there is still some way to go to reach the initial expectations. The following recommendations are targeted at closing the implementation gap.

It is suggested that the Member States in consultation with the European Commission consider the following:

- to improve the implementation of the INSPIRE Directive that guarantees a better data availability and better cross border usage of data.
- to develop ways to link the implementation of the INSPIRE Directive with a common demand across administrative levels and use cases.

It is furthermore recommended that the European Commission considers:

- to continue assisting the Member States in their reporting processes by ensuring the technical functioning of the INSPIRE Geoportal.
- to development more comprehensive qualitative indicators to monitor the coordination, governance structure and data sharing arrangements set-up by the Member States as part of the implementation of the Directive.
- to assess possibilities to expand the target groups for the implementation of the INSPIRE Directive, by providing more opportunity to involve the European institutions, private sector actors and citizens as implementation bearers.
- to further support the Member States in the implementation through capacity building trainings and peer-to-peer exchange of good practices.
- to promote synergy between INSPIRE and the NSDIs by developing best practice recommendations and/or changes to the INSPIRE implementing rules and guidelines that encourage Member States to develop coordinated frameworks for INSPIRE and the NSDI.
- to prioritize achieving full interoperability of those data sets that are selected on the basis of user needs' assessments.
- to establish an implementation framework that is technology neutral, while at same time following well-established, but also emerging technological standards that can be deployed by implementers in a more flexible manner.

II. Applying a user-driven approach

The evaluation has identified that there is limited knowledge of the needs of the different users and the constraint that they experience, it is therefore suggested that the **Member States in consultation with the European Commission** consider:

- to maintain a focus on the environmental priority data sets, in order to ensure that the data is relevant to the user groups.
- to promote benefits of pan-European data sets and EU data sharing in order to unlock more public and private data, solicit more support to the implementation

of the Directive and create a broader understanding of the benefits stemming from the INSPIRE Directive.
- to reduce the perceived complexity of data models by offering simpler views of structures and relationships between data elements than what is specified in the full data models. Such simplified views could be offered via complementary data models that are easier to handle for non-expert users.
- where possible, to develop case studies describing existing use cases of INSPIRE-relevant data at sectoral and national level which would help design appropriate means for making spatial data available and usable.
- to identify and further develop a community of spatial data users with the aim to identify their current and future needs, e.g. in terms of content of data and its utilisation purpose, tools they use and products and services they develop based on the spatial data.

It is furthermore recommended that the **European Commission** considers:

- to develop more support to Member States in defining schemes and mechanisms to incite the private actors to share their data in order to improve data quality.
- to promote possibilities to reduce the perceived complexity of data models by specifying complementary, simpler views of structures and relationships between data elements than what is specified in the full data models.
- consider possible ways to reduce the cost of the implementation, especially the cost incurred as a result of potential additional efforts to maximize the use potential for non-expert users.
- to support the identification of best practices among Member States as regards licensing and use of data and develop common guidelines supporting these.
- to support the Member States by identifying best practices for using INSPIRE as a tool to report their national data for the policy purposes at the EU level.
- to develop dedicated measures to support the creation of projects using spatial data for developing products and services at Member State level.
- to improve the future use of INSPIRE by facilitating data quality improvements conducted by (approved/authorized) individuals/companies.

III. Ensuring an alignment with the emerging data legislation

Although the evaluation overall finds that there are very limited coherence issues between the INSPIRE Directive and other existing legislative acts, there is a need for alignment with emerging data legislation. It is therefore recommended that the **European Commission** considers:

- to align the INSPIRE Directive with comitology procedures laid down in Article 290 and 291 of the Lisbon Treaty and in Regulation (EU) 182/2011.
- to amend Directive 2003/4 to add in Article 7 a reference to INSPIRE, indicating that data referred to in Article 7(e) should be shared in accordance with INSPIRE.
- If coherence issues arise following the adoption of the High Value datasets Regulation,
    - to align the provisions of the INSPIRE Directive linked to derogations for public authorities to limit public access, license and require payment for data covered by the High Value datasets Regulation with the provisions of the Open Data Directive and the High Value datasets Regulation.
    - to ensure an effective positioning of the INSPIRE Directive in the emerging European data governance landscape by achieving synergies with other initiatives stemming from the European Strategy for Data

such as the data reuse provisions of the Open Data Directive, the related initiative for an Implementing Act on High Value Datasets and the Proposal for a regulation on European data governance (Data Governance Act).

IV. Extending the scope

The evaluation is inconclusive on the topic of scope of the INSPIRE Directive, taking into consideration that the implementation of INSPIRE is behind schedule and an expansion of the scope should be well considered and prioritized. It is recommended that the Member States in consultation with the European Commission consider:

- to create incentives to public administrations at national, regional and local level, private actors, academic institutions and citizens to share data in a transparent manner and develop a common INSPIRE infrastructure focused on a common demand.
- to identify data needs in various policy sectors to understand better the potential of data coming from various stakeholders.

It is furthermore recommended that the **European Commission** considers:

- possibilities to include more data beyond the spatial data scope in the INSPIRE infrastructure and develop a linked data approach to associate spatial and non-spatial data.
- to develop more support to Member States in defining schemes and mechanisms to incite the private actors to share their data in order to improve data quality.

V. Key instrument for the European Green Deal

With its deliberate emphasis on interoperability, the INSPIRE Directive has the potential to play a critical role in the implementation of EU ambitions for the creation of wider data spaces, including the Green Deal data space. It is thus recommended for the Member States in consultation with the European Commission:

- to improve the implementation of Directive and aligning it better with sectoral legislation and implementation in practice should be done urgently, as these steps will contribute to wider European Green Deal objectives.
- to reshaping the objectives and orientation of the legislation to bring greater political legitimacy to the urgency of implementation and practical usage of the INSPIRE infrastructure at Member State level, and wider awareness of it amongst key stakeholders.
- to facilitate data-driven innovation and evidence-based decisions by the citizens, public and private sector in support of the transition to a more sustainable society.

It is furthermore recommended that the **European Commission** considers:

- to support data-based solutions that support the transition to a greener and carbon-neutral economy, and reducing administrative burden.
- to develop ways to unlock the full potential of the INSPIRE Directive in the context of the European Strategy for data as an enabler for the European Green Deal.

7. APPENDICES

Appendix	Title
Appendix 1	List of evidence sources
Appendix 2	Current status
Appendix 3 (separate document)	Country forms
Appendix 4 (separate document)	Synopsis report
Appendix 5 (separate document)	Report on the public consultations

Appendix 1 List of evidence sources

The current appendix presents an overview of the identified data sources, that are compiled in the project data inventory. The first table (Table 7-1) presents relevant evaluations and other relevant studies and reports, including academic papers. The second table (Table 7-2) provides an overview of identified legislation relevant for the evaluation study. In both tables, the sources are shown in an alphabetical order.

Table 7-1 Evidence sources (reports, studies, academic papers, etc.)

Identified evaluations, other relevant studies/ reports and academic papers
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Consultation on the Implementation of the Infrastructure for Spatial Information in the European Community - INSPIRE Directive (2007/2/EC).

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COWI, Epsilon, Alterra - Wageningen UR (2018), Evaluation and assessment of INSPIRE Directive 2007/2/EC data sharing between public authorities and public access and use provisions – Final Task 1 Report.
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Table 7-2 Legislation and policy documents

Identified legislation and policy documents
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Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information
Commission Implementing Decision (EU) 2018/1135 of 10 August 2018 establishing the type, format and frequency of information to be made available by the Member States for the purposes of reporting on the implementation of Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions

Commission Implementing Decision (EU) 2019/1752 of 25 February 2019 establishing questionnaires, as well as the format and frequency of reports to be prepared by the Member States in accordance with Regulation (EU) 2017/852 of the European Parliament and of the Council
Commission Implementing Decision of 11 July 2011 concerning a site information format for Natura 2000 sites (notified under document C(2011) 4892)
Commission Implementing Decision of 12 December 2011 laying down rules for Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council as regards the reciprocal exchange of information and reporting on ambient air quality
Commission Implementing Decision of 12 December 2012 establishing the type, format and frequency of information to be made available by the Member States for the purposes of reporting on the implementation of Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions - no longer in force
Commission Implementing Regulation (EU) 2017/1454 of 10 August 2017 specifying the technical formats for reporting by the Member States pursuant to Regulation (EU) No 1143/2014 of the European Parliament and of the Council
Convention on access to information, public participation in decision-making and access to justice in environmental matters, done at Aarhus, Denmark, on 25 June 1998.
Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission
Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste
Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture
Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources
Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
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Data and Service Sharing (Commission Regulation (EC) No 268/2010)
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Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise
Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC
Directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the re-use of public sector information
Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries and amending Directive 2004/35/EC - Statement by the European Parliament, the Council and the Commission

Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC
Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks
Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)
Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds
Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport
Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)
Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC
Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning
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Network Services (Commission Regulation (EC) No 976/2009)
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Regulation (EC) No 166/2006 of the European Parliament and of the Council of 18 January 2006 concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC
Regulation (EU) 2017/852 of the European Parliament and of the Council of 17 May 2017 on mercury, and repealing Regulation (EC) No 1102/2008
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Regulation (EU) 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants (recast)
Regulation (EU) 2021/696 of the European Parliament and of the Council of 28 April 2021 establishing the Union Space Programme and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013 and (EU) No 377/2014 and Decision No 541/2014/EU
Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species
Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU
Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission's exercise of implementing powers
Regulation (EU) No 377/2014 of the European Parliament and of the Council of 3 April 2014 establishing the Copernicus Programme

Appendix 2 Current status analysis

Methodology

The current status analysis provides an assessment of the implementation status of the INSPIRE Directive in the 27 Member States and 4 EEA/EFTA countries and its impact of on various stakeholders in terms of governance structures, data sharing and usage, cost and benefits. The analysis was conducted per country and for each country a form was developed by the evaluation team. The country forms include a qualitative assessment of governance, coordination, usage of data, data sharing arrangements and costs/benefits and an assessment of the implementation progress based on the INSPIRE indicators. All country forms were submitted for validation to the respective NCPs.

The current status form includes in the first part a qualitative assessment of governance, coordination, usage of data and costs/benefits. The aim is to assess, based on monitoring data and other written sources, what the effects on stakeholders have been to date. The latest information included in the country forms is based on reporting as provided in the country summary reports 2021.[249] The summary reports were published on the 'INSPIRE in your country' website in March 2021.[250]

The second part of the country forms provides an assessment of the implementation progress based on the INSPIRE indicators. Until 2018, INSPIRE monitoring and reporting was based on 48 indicators, calculated based on the information that the countries provided to the European Environment Agency (EEA). With the new Implementing Decision in 2019, a new set of only 19 performance indicators was established and the process is since then is fully automated by using the INSPIRE Geoportal and the INSPIRE Reference Validator software tools to process the metadata harvested from the Member States' discovery services. Since the reporting and monitoring framework changed, a shift in trend is observed for most of the assessed countries, leading to generally lower values of the indicators in 2019. Several countries also identified other reasons for the shift in trends and low compliance levels, including 1) the limited use of the Validator in preparation of the monitoring and reporting process; 2) the presence of various technical issues with metadata harvesting; 3) the complexity of the approach used by the INSPIRE Geoportal to establish linkages between spatial data sets and services; and 4) the general lack of resources and technical expertise, especially from data providers, to improve the monitoring and reporting process.[251] This was to a great extent confirmed in the feedback to the country forms, provided by the National Contact Points.

The third part of the country forms presents the scoring of results, illustrated through three grades based on defined thresholds. The development of the country forms is not part of a regulatory reporting or compliance exercise and therefore it has been adapted in several ways to support an objective evaluation of the INSPIRE Directive in collaboration with the EU Member States and EEA/EFTA countries. The scoring methodology for performance indicators is mimicking the JRC Summary Report on Status of implementation of the INSPIRE Directive in EU (the 2016 country fiches),[252] which also provided the baseline for the qualitative indicators (i.e. effective coordination, data sharing). As regards the quantitative indicators (i.e. INSPIRE performance indicators), the indicator results from earlier years (prior to the adoption of Commission Implementing Decision (EU) 2019/1372) were adapted to follow the new indicator framework for the purpose of this country form.

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[249] Due to errors in the system/ processes, later harvesting results than December 2020 were taken into account for Malta, Poland, France, Liechtenstein, Switzerland upon request of the respective NCPs.

[250] See: https://inspire.ec.europa.eu/INSPIRE-in-your-Country

[251] JRC (2020), Establishing a new baseline for monitoring the status of EU Spatial Data Infrastructure. Experiences and conclusions from INSPIRE 2019 monitoring and reporting, JRC technical report.

[252] Cetl V., V. Nunes de Lima, R. Tomas, M. Lutz, J. D'Eugenio, A. Nagy, J. Robbrecht (2017), Summary Report on Status of implementation of the INSPIRE Directive in EU. EUR 28930 EN. Luxembourg: Publications Office of the European Union.

The scoring thresholds established in the country forms for the three levels of implementation are the following:

- Top performance: >89%
- Middle performance: 31-89%
- Low performance: <31%

A direct comparison across different years is not possible due to the legislative and technical changes in 2019. It is important to notice that the scoring must be therefore interpreted in the way that progress trends cannot be established based solely on these summarized results and without detailed understanding of the national contexts. The scoring was also further adapted by excluding the performance as regards the conformity of transformation services in the assessment of conformity of network services due to the fact that very few transformation services have been documented and made available by the countries so far. Additionally, when it comes to the indicators related to the conformity of spatial data sets, the interpretation of the results must take into consideration that this indicator will in many cases never reach 100% conformity, since majority of countries provide their national data sets in addition to the INSPIRE harmonised data sets.

The country forms include monitoring data reported/ harvested annually acquired through:

- Country summary reports (country fiches 2019, 2020, 2021)
- Country fiches (2016)
- Monitoring data (INSPIRE Monitoring 2019, INSPIRE Monitoring 2020, INSPIRE official monitoring dashboards (reference years 2010 - 2018), INSPIRE Geoportal)

Coordination, governance structure, data sharing arrangements and usage of the infrastructure

When assessing the impact of the Directive on various stakeholders, the evaluation team relied on qualitative indicators. These include self-declared information on coordination, governance structure, data sharing and usage, as well as cost and benefits, as provided in the INSPIRE country fiches by the Member States and EFTA/EEA countries. In order to avoid duplication of information, the assessment of costs and benefits is described under the efficiency evaluation (see EQ 4.1 and EQ 4.2).

To ensure a relevant governance structure, each Member State and EEA/EFTA country designated a National Contact Point (NCP), usually a public authority, to be responsible for contacts with the European Commission in relation to the INSPIRE Directive. The NCPs are responsible for collecting the information about the implementation of the INSPIRE Directive and report on behalf of their country to the European Commission.

The Member States and EEA/ EFTA countries have set up different coordination and governance structures for their implementation of the Directive, depending on their governance culture and constitutional organisation. As reported in the by JRC in 2017, in some cases, the INSPIRE implementation was entrusted to mapping and cadastral agencies, which could result in lack of coordination with the environment authorities and a lesser focus in terms of availability of Annex III data sets (compared to Annex I and Annex II data sets). In most Member States the current governance structure addressed the need for coordination across different types of authorities. Currently, around two thirds of countries show a positive development ensuring an effective coordination. Based on the assessments in the country forms, the coordination structure has in a few cases not been further improved or changed since 2016, when JRC assessed the Member States' coordination and governance structures.

As regards the data sharing and usage of the infrastructure among stakeholders, the documentation of spatial data sets and services through metadata helped improve the situation by making the public authorities aware of their availability. It is important to

ensure availability of view and download services which can be reused by targeted applications.[253] The analysis has shown that in several countries, open data strategies and other national initiatives are separate from the INSPIRE related processes, however, they do not conflict with the principles and ambition of the INSPIRE Directive. In some other countries, use cases are being developed and the INSPIRE infrastructure can be used for other data work streams, which brings a desired complementarity and an increased added value of the INSPIRE Directive.

The table below (Table 7-3) shows the overall implementation status regarding coordination as well as data sharing arrangements and usage of the infrastructure in 2016 and in 2020. The scoring thresholds are as follows: green smiley (top performance), yellow smiley (middle performance) and red smiley (low performance). The assessment of the qualitative indicators in 2016 is based on the Summary Report on Status of implementation of the INSPIRE Directive in EU, published by JRC in 2017.[254] In case of positive developments, the scoring has been corrected for the year 2020.

Table 7-3 Implementation status across EU Member States regarding coordination, data sharing arrangements and usage of the infrastructure[255]

	Effective coordination		Data sharing arrangements and usage of the infrastructure	
	2016	**2020**	**2016**	**2020**
Austria	🙂	🙂	🙂	🙂
Belgium	🙂	🙂	🙂	🙂
Bulgaria	😐	🙂	😐	😐
Croatia	😐	😐	😐	🙂
Cyprus	😐	😐	😐	😐
Czechia	🙂	🙂	😐	🙂
Denmark	🙂	🙂	🙂	🙂
Estonia	😐	😐	😐	🙂
Finland	🙂	🙂	😐	🙂
France	🙂	🙂	🙂	🙂
Germany	🙂	🙂	🙂	🙂
Greece	😐	😐	😐	😐
Hungary	😐	😐	😐	😐
Ireland	😐	🙂	😐	🙂

[253] Cetl V., V. Nunes de Lima, R. Tomas, M. Lutz, J. D'Eugenio, A. Nagy, J. Robbrecht (2017), Summary Report on Status of implementation of the INSPIRE Directive in EU. EUR 28930 EN. Luxembourg: Publications Office of the European Union.

[254] Cetl V., V. Nunes de Lima, R. Tomas, M. Lutz, J. D'Eugenio, A. Nagy, J. Robbrecht (2017), Summary Report on Status of implementation of the INSPIRE Directive in EU. EUR 28930 EN. Luxembourg: Publications Office of the European Union.

[255] The table does not include a scoring for the EFTA/EEA countries Liechtenstein, Switzerland, Norway and Iceland.

Italy	😐	😐	😐	😐
Latvia	☺	☺	☺	☺
Lithuania	☺	☺	☺	☺
Luxembourg	☺	☺	☺	☺
Malta	☺	☺	☺	☺
Netherlands	☺	☺	☺	☺
Poland	☺	☺	☺	☺
Portugal	☺	☺	☺	☺
Romania	😐	☺	😐	☺
Slovakia	☺	☺	😐	☺
Slovenia	☺	☺	😐	☺
Spain	☺	☺	☺	☺
Sweden	☺	☺	☺	☺

Performance monitoring based on the INSPIRE indicators

To ensure better comparison pre- and post-2019, the country forms include the results for the entire period from 2014 to 2020, adapted to the new indicator framework established in the most recent Implementing Decision. All 19 indicators measure implementation of the INSPIRE Directive and are grouped into 5 categories as shown in the table below.

Table 7-4 Implementation categories and corresponding indicators

Implementation category	Codes of performance indicators
Availability of spatial data and services[256]	DSi1.1, DSi1.2, DSi1.3, DSi1.4, DSi1.5
Conformity of metadata	MDi.1.1, MDi1.2
Conformity of spatial data sets	DSi2, DSi2.1, DSi2.2, DSi2.3
Accessibility of spatial data sets through view and download services	NSi.2, NSi2.1, NSi2.2
Conformity of network services	NSi.4, NSI.4.1, NSi.4.2, NSi.4.3, NSi.4.4

All indicators except those related to the availability of spatial data and services are presented in a percentage, thus providing a direct measure of performance.[257] In

[256] The indicators for availability of spatial data and services operate with absolute numbers and therefore cannot present any trends.

[257] For the indicators, where the entry provided was #N/A, the value in the calculation was considered as an empty cell, which does not have an effect on the average performance results. In general, the entry #N/A means "not reported", which was mostly the case when it comes to the indicator NSi4.4 (conformity of transformation services). In 2020, this indicator was reported only by one country. For majority of the countries, it was reported either as #N/A, or 0%. It must be highlighted that the analysis related to the indicator NSi4.4 is not relevant due to such extremely low availability of transformation services across countries and was excluded from the scoring.

graphical presentations of chronological results, a shift in trend between 2018 and 2019 is clearly outlined, showing a change in monitoring and reporting process that was driven by the new Implementing Decision. Furthermore, a transition from the Metadata Technical Guidance v. 1.3 to Technical Guidance v. 2.0 also played a role in determining a shifting trend (also between 2019 and 2020) as at the end of the transition period in December 2019, only 3% of the total number of metadata from all countries were encoded according to Technical Guidance v. 2.0.

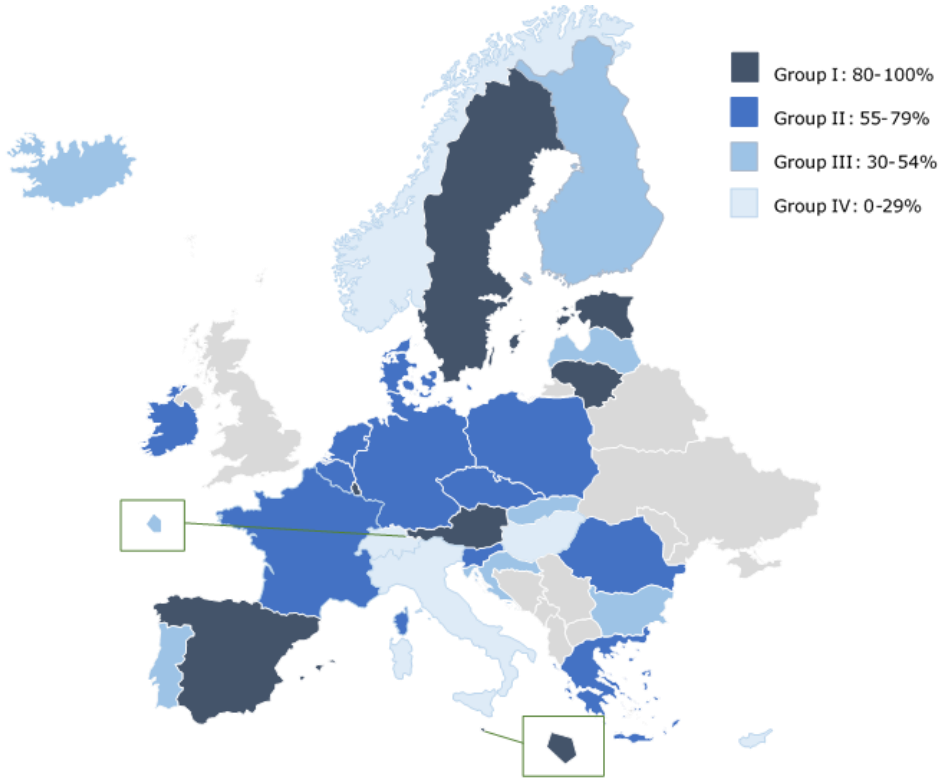
Based on the performance indicators established according to the monitoring data harvested in 2020 for 27 Member States and four EEA/ EFTA countries, an aggregated overview of implementation performance was established as shown in the graph presentations in the subsequent sub-sections. In addition, taking into consideration the results (in percentage) from the four implementation steps (conformity of metadata, conformity of spatial data sets, accessibility of spatial data sets through view and download services and conformity of network services), four distinct implementation groups of countries can be identified:

- Group I: 80-100%
- Group II: 55-79%
- Group III: 30-54%
- Group IV: 0-29%

The preparation of the country forms and the related validation process have demonstrated that this ranking, which is based solely on these summarized results does not present a complete picture of the implementation and can be difficult to interpret without any detailed understanding of the national contexts. The Member States often face technical problems related to the monitoring and reporting and thus the compliance risks being underestimated or even overestimated. In several cases, the results have been skewed due to various factors, including the changes in the monitoring and reporting method, changes in technical guidance, national political processes, and data policies. Thus, the scoring and rankings in this analysis provide a general indication of the implementation process in different countries in Europe.

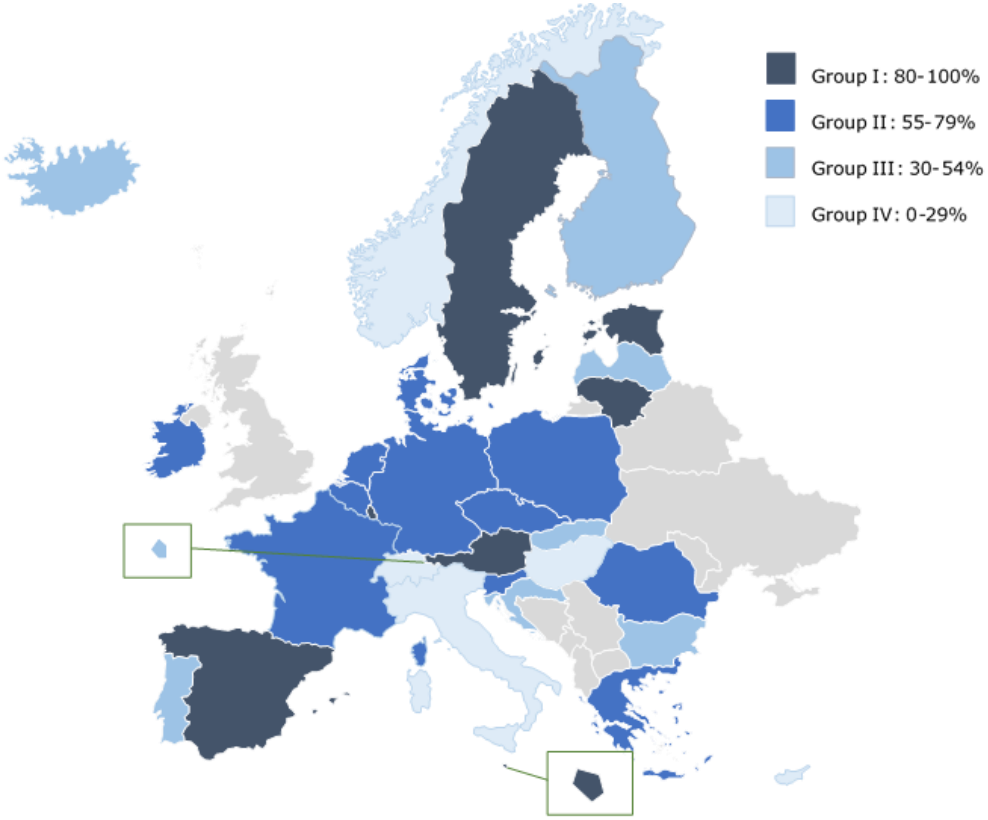
The map below (see Figure 7-1) shows the countries represented in each of the four implementation groups when considering the overall set of performance indicators and according to the percentage threshold defined above. The countries are quite evenly spread across the four groups, which shows considerable differences between the countries regardless of the geographic location.

Figure 7-1 INSPIRE implementation, based on the INSPIRE performance indicators, 2020



The map below (Figure 7-2) shows the Member States and EEA/ EFTA countries according to the four implementation groups, the ranking of which is established based on the overall assessment of INSPIRE performance indicators and availability of environmental spatial data sets across the countries, i.e. priority data sets. When also considering the performance in terms of availability of priority data sets, the groupings remain largely the same as on the previous map (Figure 7-1) that presents solely the INSPIRE performance indicators.

Figure 7-2 INSPIRE implementation, based on the INSPIRE performance indicators and availability of priority data sets, 2020



Availability of spatial data sets and services

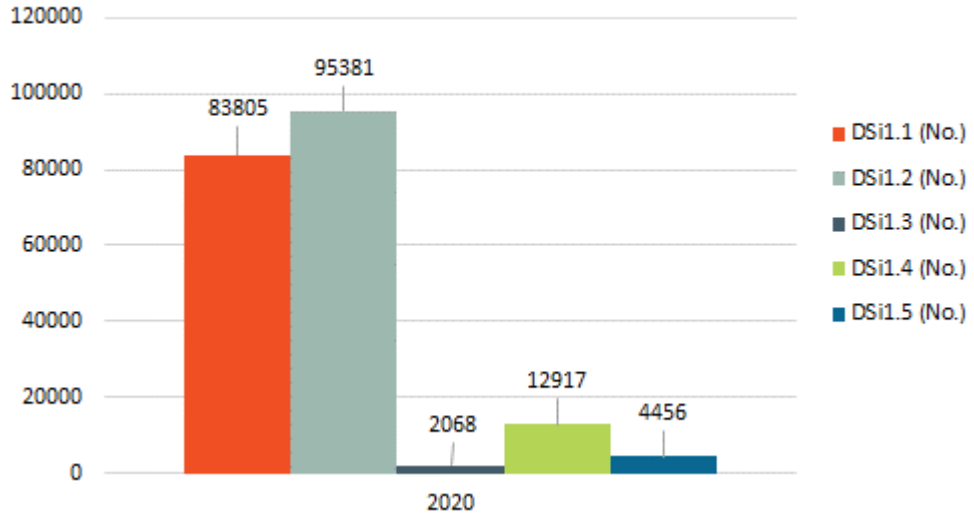
As shown in the figure below, the total number of spatial data sets and services with metadata offered across Europe in December 2020 equalled 179,186 records, comprising of 83,805 data sets and 95,381 spatial data services. 2,068 spatial data sets were used for reporting under the environmental legislation, i.e. priority data sets. Overall, 12,917 were regional data sets and 4,456 data sets were tagged as national.

In terms of availability of data sets, there were now fewer available than in 2016. The JRC report showed that by mid-2016, Member States had identified more than 90,000 spatial data sets with relation to the themes listed in the INSPIRE annexes.[258] These records did not even include the data sets reported by the EFTA/ EEA countries. Although in some cases this is a result of data cleaning processes at national level, aiming at aggregating local and regional datasets and deleting for users irrelevant data sets and/or duplicates of data sets, one of the reasons for removing data sets is also that the Member States see this as an opportunity to improve their overall performance.

[258] Cetl V., V. Nunes de Lima, R. Tomas, M. Lutz, J. D'Eugenio, A. Nagy, J. Robbrecht (2017), Summary Report on Status of implementation of the INSPIRE Directive in EU. EUR 28930 EN. Luxembourg: Publications Office of the European Union.

The number of data sets and services varies across countries and regions. In the recent years, several countries reduced the number of spatial data sets, for example, by combining several local and regional data sets into national ones. Thus, the number of data sets and services does not show any findings in terms of implementation maturity; it only presents the overall picture together with other indicators.

Figure 7-3 Availability of spatial data sets and services[259]

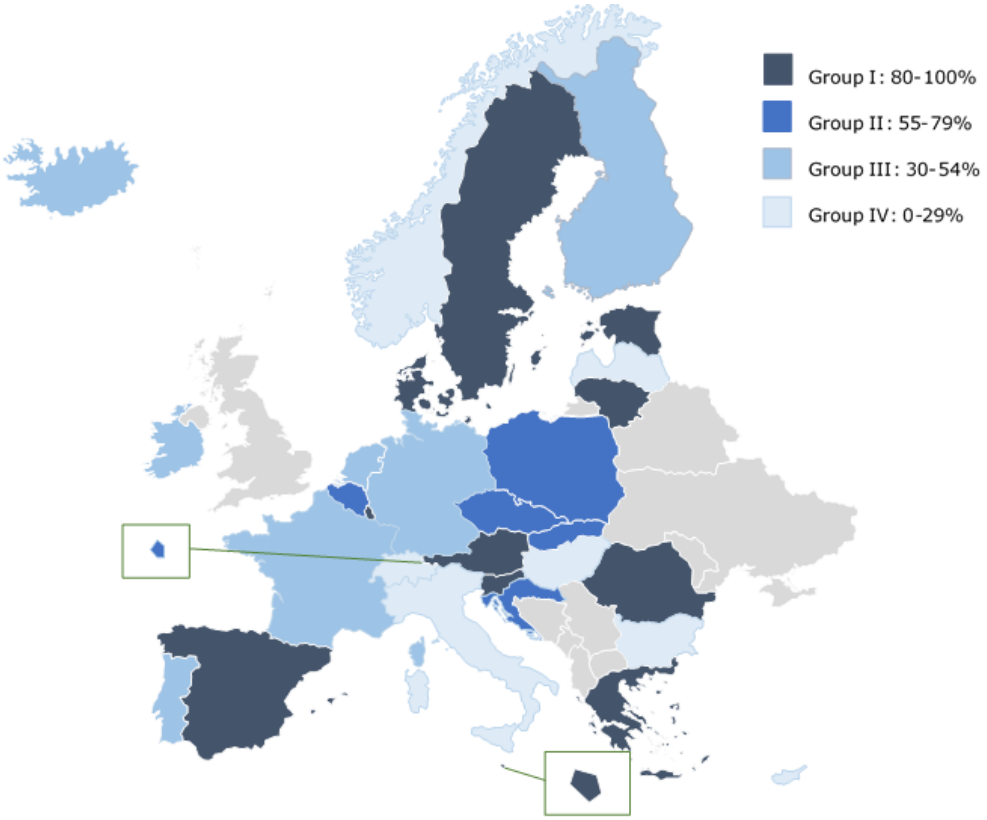


Conformity of metadata

As regards the indicators related to the conformity of metadata for spatial data sets and spatial data services, the values are heterogenous across countries, spanning from 0% to 100%. One third of all the listed countries are placed in the best implementation group, Group I. The number of countries is slightly higher in the first two implementation groups (Group I and Group II) compared to the number of countries in the last two groups (Figure 7-4).

[259] DSi1.1: number of spatial data sets for which metadata exist; DSi1.2: The number of spatial data services for which metadata exist; DSi1.3: The number of spatial data sets for which the metadata contains one or more keywords from a register provided by the Commission indicating that the spatial data set is used for reporting under the environmental legislation; DSi1.4: The number of spatial data sets for which the metadata contains a keyword from a register provided by the Commission indicating that the spatial data set covers regional territory; DSi1.5: The number of spatial data sets for which the metadata contains a keyword from a register provided by the Commission indicating that the spatial data set covers the national territory.

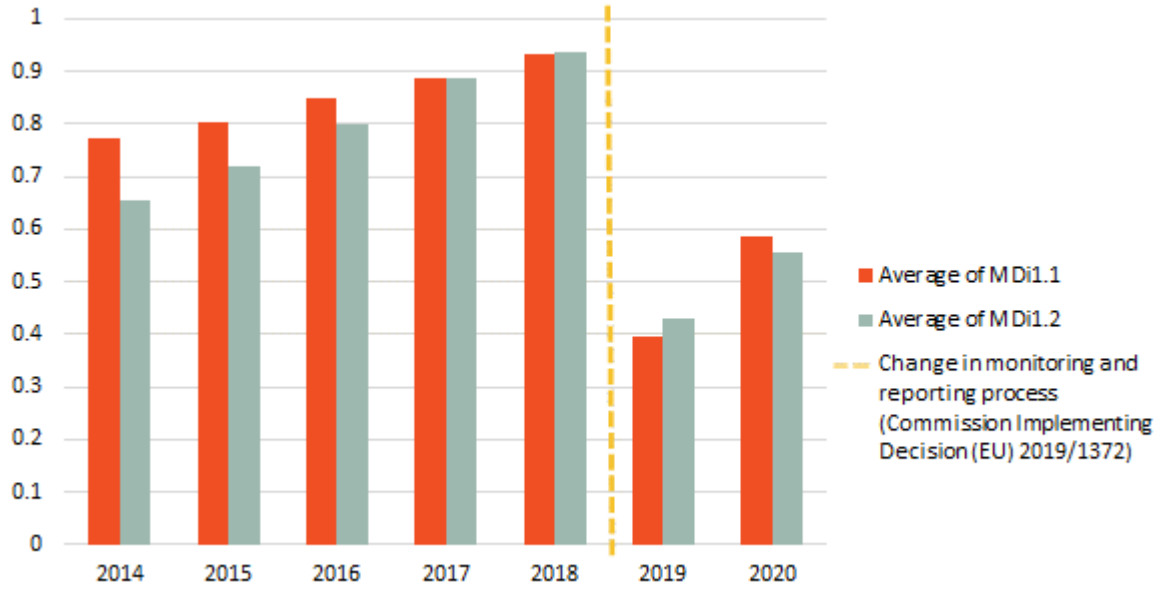
Figure 7-4 INSPIRE implementation based on the INSPIRE performance indicators related to the conformity of metadata (MDi.1.1, MDi1.2), 2020



As can be seen in the graph presenting the implementation status from 2014 and 2020 (see Figure 7-5), the average values for both indicators were rather low in 2020, i.e. 59% for MDi1.1 and 55% for MDi1.2.

There is a significant shift in the trend between 2018 and 2019 because the values related to these two indicators were until 2018 reported based on the old indicator scheme. From 2019 onwards, the indicators are calculated using the INSPIRE Reference Validator. Transition to the new version of the Technical Guidance (TG v. 2.0) importantly contributed to the shift in trends. As described in the country forms, countries reported additional issues that contributed to the drop in performance from above 90% in 2018 to around 50% in 2019, including structural problems, and software configuration accessibility restrictions. Some of the problems were resolved in the in the reference year 2020, which is also visible in the column presenting the performance results in 2020.

Figure 7-5 Conformity of metadata with Regulation (EC) No 1205/2008[260]

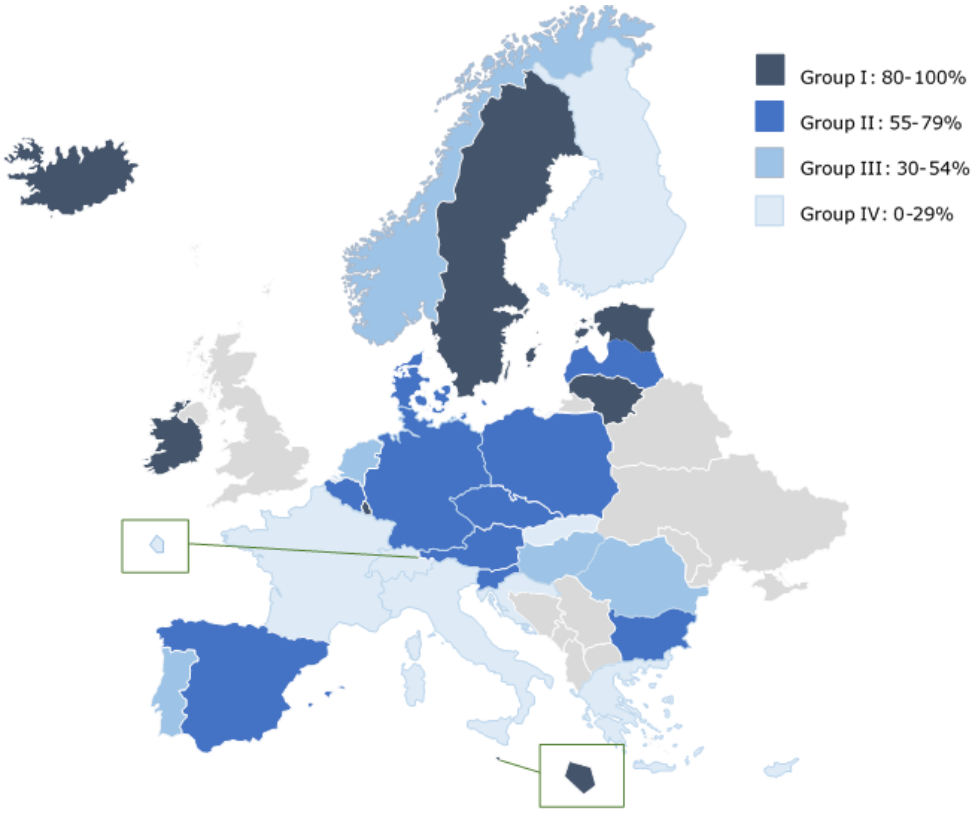


Conformity of spatial data sets

When it comes to the spatial data sets, which are conformant with Commission Regulation (EU) No 1089/2010 as regards interoperability of spatial data sets, four indicators are being used to assess the performance: DSi2 (overall percentage of conformant spatial data sets) and three indicators reflecting the conformity of spatial data sets corresponding to the themes listed in Annex I (DSi2.1), Annex II (DSi2.2) and Annex III (DSi2.3). The values of these indicators are calculated using the INSPIRE Geoportal. The information about conformity is included in the metadata of spatial data sets and is self-declared by the Member States. As outlined in the map below, the performance of countries is very heterogenous. The values spanned from 3% to 100% in the reference year 2020. One third of all the listed countries were located in the second-best implementation group, Group II.

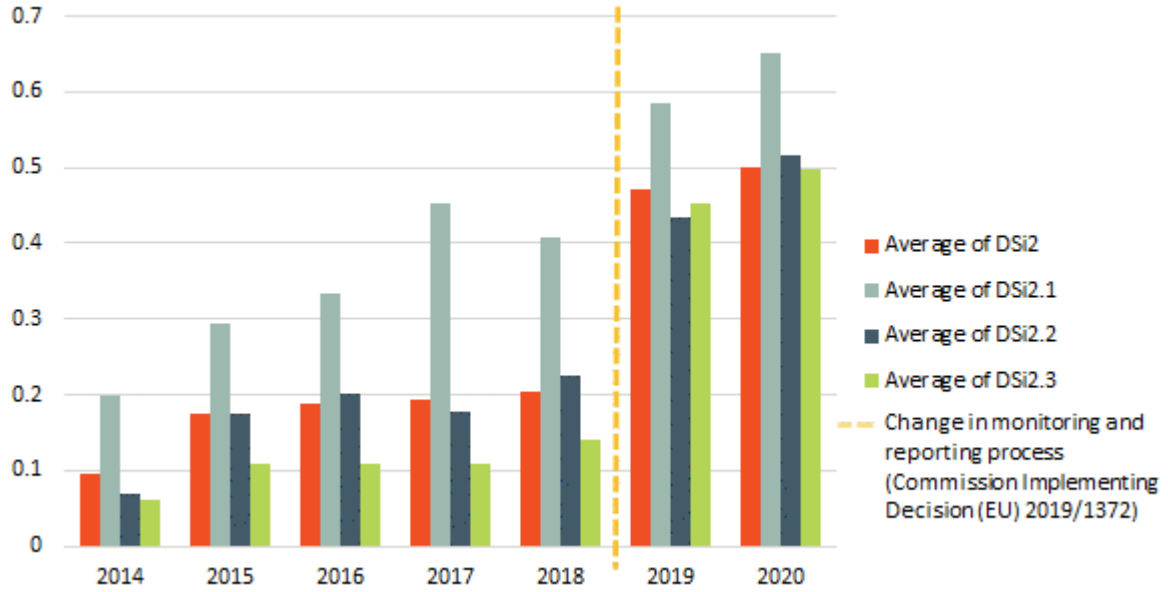
[260] The indicator MDi1.1 denotes the percentage of metadata for spatial data sets conformant with Commission Regulation (EC) No 1205/2008 as regards metadata, while the indicator MDi1.2 presents the percentage of metadata for spatial data services conformant with Commission Regulation (EC) No 1205/2008 as regards metadata.

Figure 7-6 INSPIRE implementation based on the INSPIRE performance indicators related to the conformity of spatial data sets (DSi2, DSi2.1, DSi2.2, DSi2.3), 2020



The graph below (Figure 7-7) demonstrates a significant shift in trend between 2018 and 2019 that resulting an increase in compliance, despite the change in monitoring and reporting process. The aggregated value for DSi2 increased from 20% in 2018 to 47% in 2019. The reason behind is that the deadlines for implementation of the spatial data set interoperability were in 2018 and 2019 still in the future: 23 November 2017 for Annex I data and 21 October 2020 for Annex II and III data. In 2020, the situation further improved and the average value of indicator DSi2 reached 50%. An interpretation of these results must take into consideration that these indicators will in many cases never reach 100%, since majority of countries provide their national data sets ('as-is' data) in addition to the INSPIRE harmonised data sets.

Figure 7-7 Conformity of spatial data sets[261]



Accessibility of spatial data sets through view and download services

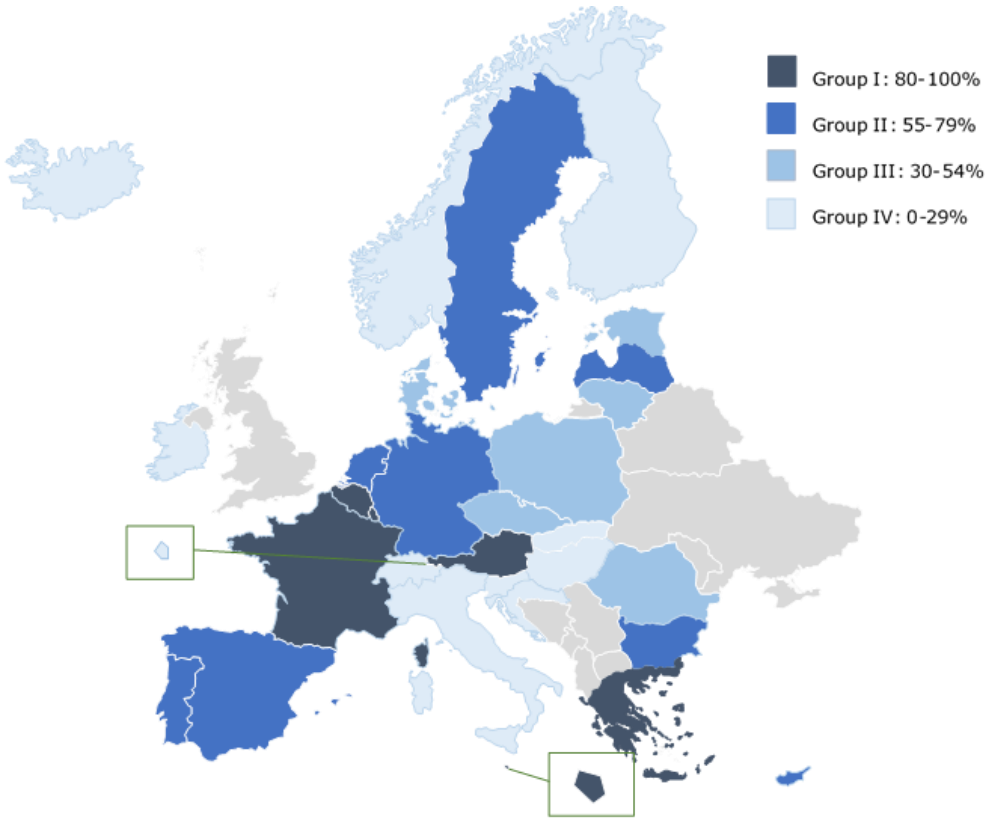
Three indicators measure the actual accessibility of INSPIRE spatial data sets from a user perspective: NSi2 corresponds to the percentage of spatial data sets accessible through both view and download services; NSi2.1 corresponds to the percentage of spatial data sets which are accessible through view services and NSi2.2 measures the accessibility of data sets through download services. The values of these indicators are calculated using the INSPIRE Geoportal, which, based on the metadata records harvested from national catalogues, aim to establish linkages between metadata of spatial data sets and those of spatial data services (in particular view and download services). When linkages are found, the data set is classified as viewable and/or downloadable.[262]

As illustrated in the map below (see Figure 7-8), the performance of countries is quite heterogenous, with majority of countries (17 out of 31) located in the lowest two implementation groups. In 2020, 42% of datasets were available through both view and download services (NSi2), 50% were viewable (NSi2.1) and 50% were downloadable (NSi2.2). This means that around half of available data sets were not yet accessible across the EU Member States and EEA/ EFTA countries.

[261] DSi2: Percentage of spatial data sets that are in conformity with Commission Regulation (EU) No 1089/2010 as regards interoperability of spatial data sets; DSi2.1: Percentage of spatial data sets, corresponding to the themes listed in Annex I, that are in conformity with Commission Regulation (EU) No 1089/2010 as regards interoperability of spatial data sets; DSi2.2: Percentage of spatial data sets, corresponding to the themes listed in Annex II, that are in conformity with Commission Regulation (EU) No 1089/2010 as regards interoperability of spatial data sets; DSi2.3: Percentage of spatial data sets, corresponding to the themes listed in Annex III, that are in conformity with Commission Regulation (EU) No 1089/2010 as regards interoperability of spatial data sets.

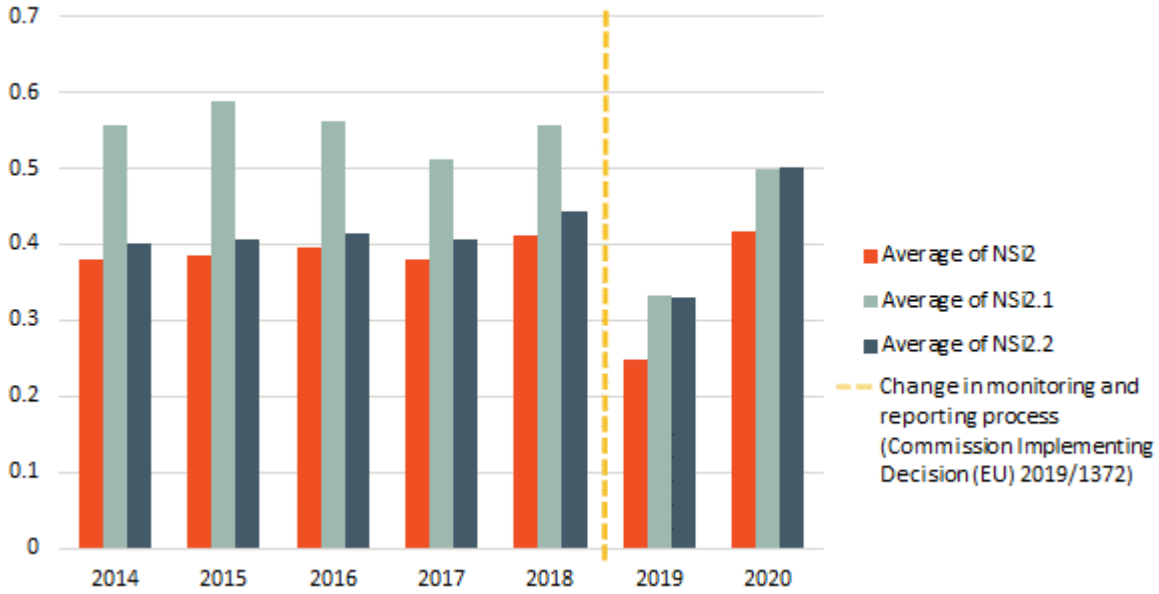
[262] JRC (2020), Establishing a new baseline for monitoring the status of EU Spatial Data Infrastructure. Experiences and conclusions from INSPIRE 2019 monitoring and reporting, JRC technical report.

Figure 7-8 INSPIRE implementation based on the INSPIRE performance indicators related to the accessibility of spatial data sets through view and download services (NSi.2, NSi2.1, NSi2.2), 2020



The graph below (see Figure 7-9) shows a stable trend between 2014 and 2018, followed by a relatively significant drop in performance in 2019 due to the change in monitoring and reporting process. The situation has considerably improved in the next reporting round (reference year 2020).

Figure 7-9 Accessibility of spatial data sets through view and download services[263]



Conformity of network services

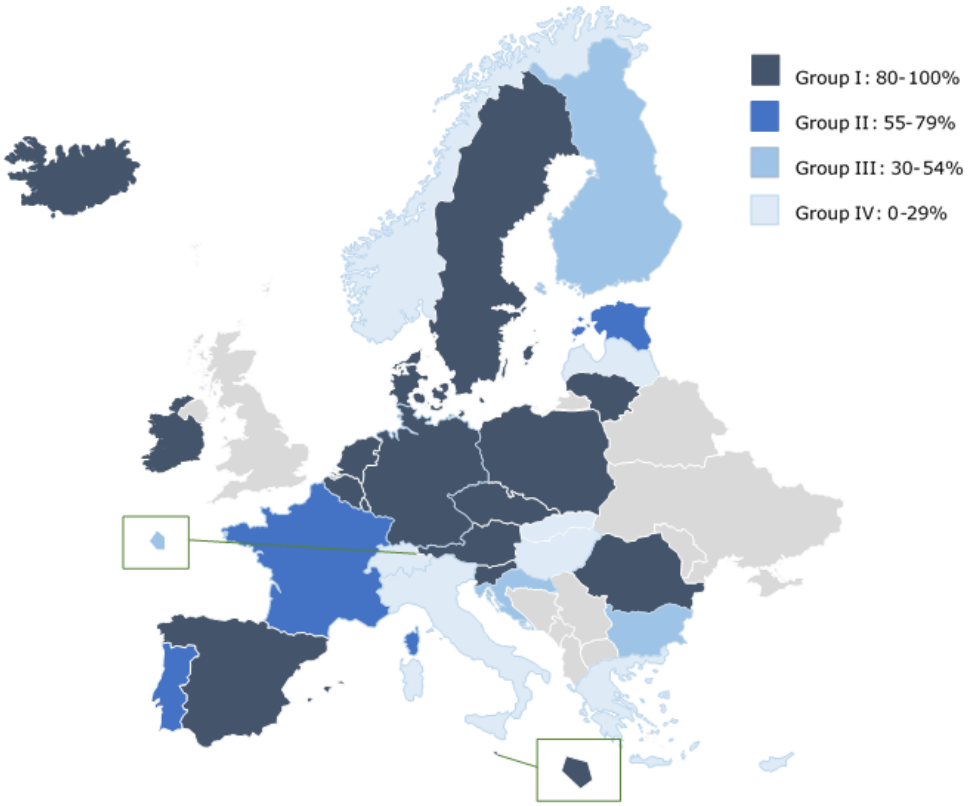
The last five indicators measure the conformity of spatial network services. While the indicator NSi4 measures the overall percentage of conformant network services, indicators NSi4.1, NSi4.2, NSi4.3 and NSi4.4 correspond to the conformant portions of each type of network services, i.e. discovery services, view services, download services and transformation services, respectively. The calculation of performance is based on self-declaration of conformity included in the network service metadata harvested from the INSPIRE Geoportal.[264] With the exception of NSi4.4 (related to the conformity of transformation services), the values of all performance indicators reached similar values in 2020. The average share of conformant discovery, view and download services was 65%, 65% and 62%, respectively. The overall average percentage of conformant network services amounted to 63%.

The statistical analysis related to the conformity of transformation services (NSi4.4) is not considered in this current status analysis due to the extremely low availability of transformation services across countries. Thus, the scoring in the country forms is further adapted by excluding the indicator NSi4.4 in the assessment of conformity of network services. When omitting this indicator, more than a half of countries (16 out of 31) is positioned in the group of 'group I' implementers (see Figure 7-10), with overall average values of four indicators spanning from 80% to 100%.

[263] NSi2: The percentage of spatial data sets that are accessible through view and download services; NSi2.1: The percentage of spatial data sets that are accessible through view services; NSi2.2: The percentage of spatial data sets that are accessible through download services.

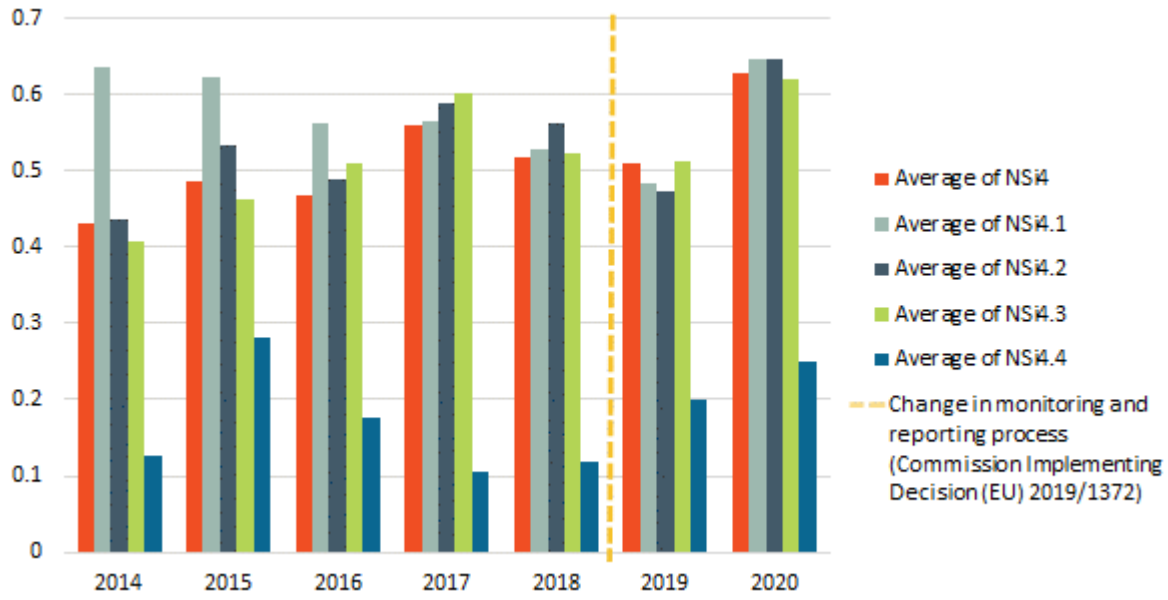
[264] JRC (2020), Establishing a new baseline for monitoring the status of EU Spatial Data Infrastructure. Experiences and conclusions from INSPIRE 2019 monitoring and reporting, JRC technical report.

Figure 7-10 INSPIRE implementation based on the INSPIRE performance indicators related to the conformity of network services (NSi.4, NSI.4.1, NSi.4.2, NSi.4.3), 2020



As presented in the graph below (see Figure 7-11), the performance over the reporting years has remained fairly stable. The average value of indicator NSi.4 has been reported to reach between 43% to 63% between 2014 and 2020. The overview of annual results is marked with a slight shift in the trend in 2018 and 2019, when the average values slightly decreased, mostly due to the introduction of the new monitoring and reporting process in 2019.

Figure 7-11 Conformity of the network services[265]



[265] NSi4: The percentage of the network services that are in conformity with Commission Regulation (EC) No 976/2009 as regards the network services; NSi4.1: The percentage of the discovery services that are in conformity with Commission Regulation (EC) No 976/2009 as regards the network services; NSi4.2: The percentage of the view services that are in conformity with Commission Regulation (EC) No 976/2009 as regards the network services; NSi4.3: The percentage of the download services that are in conformity with Commission Regulation (EC) No 976/2009 as regards the network services; NSi4.4: The percentage of the transformation services that are in conformity with Commission Regulation (EC) No 976/2009 as regards the network services.

Appendix 3 Current status country forms

This appendix is provided in a separate document. Individual country forms are available on the COWI SharePoint (hyperlink).

Appendix 4 Synopsis Report

This appendix is provided in a separate document.

Appendix 5 Report on the public consultation

This appendix is provided in a separate document.

[Catalogue number]