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COMMISSION STAFF WORKING DOCUMENT

EVALUATION

of DIRECTIVE 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)

{SWD(2022) 196 final}

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Annex 1: Procedural information

1. LEAD DG, DECIDE PLANNING/CWP REFERENCES

Lead DG: Directorate-General for Environment

Decide planning references: PLAN/2020/8050

CWP reference: COM(2020) 690 final, Annex II, "A European Green Deal" - "12. Evaluation of Directive 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)"

2. ORGANISATION AND TIMING

The evaluation has been coordinated by the European Commission's Directorate-General (DG) for Environment supported by an interservice steering group involving representatives of DG Climate Action, DG Agriculture and Rural Development, DG Maritime Affairs and Fisheries, DG Regional and Urban Policy, DG Mobility and Transport, DG Energy, the Joint Research Centre, Eurostat, DG Research and Innovation, DG Health and Food Safety, DG Economic and Financial Affairs, DG Communications Networks, Content and Technology, DG Informatics, the Legal Service, the Secretariat-General and the European Environment Agency.

The group steered and monitored the evaluation's progress and ensured that it met the necessary standards for quality, impartiality and usefulness. A webpage was set up on the INSPIRE knowledge base hosted by the Joint Research Centre to provide information on the evaluation process. The evaluation roadmap was published on 7 September 2020, with a four-week period for the public to give feedback. The open public consultation ran for 12 weeks (19 April-12 July 2021) on EU Survey. It consisted of two parts. The first part included general questions on the relevance of the INSPIRE Directive to EU citizens and was aimed at all respondents to the public consultation. The second part of the questionnaire included more detailed questions on the implementation of the Directive and its performance according to five evaluation criteria (effectiveness, efficiency, coherence, relevance and EU added value). This second part was particularly aimed at respondents directly involved with or affected by the Directive and its requirements.

Preparations for the evaluation commenced shortly after its announcement. The initial phase of the evaluation involved the preparation of the terms of reference, the call for tender and the award of a supporting study. The study[1] started in December 2020 and was conducted by COWI, MILIEU and TECHNOPOLIS. The final report was approved

[1] 070201/2020/837303/SFRA/ENV.E.4 implementing Framework Contract no. ENV.F.1/FRA/2019/0001

in September 2021 after a stakeholder validation workshop on 7 September 2021 had validated the key finding, conclusions and recommendations of the study.

All information is also available on INSPIRE knowledge base hosted by the Joint Research Centre: http://inspire.ec.europa.eu/

3. EXCEPTIONS TO THE BETTER REGULATION GUIDELINES

The evaluation was completely carried out in the framework of the Better Regulation Guidelines, no exceptions were made.

4. CONSULTATION OF THE RSB

An upstream meeting with the Regulatory Scrutiny Board took place on 9 October 2020. The Regulatory Scrutiny Board received the draft version of the Staff Working Document on 11 October 2021. Following the hearing, which took place on 10 November 2021, the Regulatory Scrutiny Board issued a positive opinion on the Evaluation and suggested some improvements. In its opinion, the Board recommended to further improve the report with respect to the following aspects:

1) The conclusions are not sufficiently nuanced and do not reflect the weaknesses and regulatory deficiencies identified in the main body of the report.
2) The report does not sufficiently analyse the drivers behind the partial implementation and limited use of the Directive, nor does it consider the implications of this underachievement for the continued relevance of the Directive.

The Board's comments have been addressed as follows:

RSB recommendations / Revisions

(1) The analysis transparently identifies shortcomings in the performance of the Directive and its current adequacy. However, these shortcomings and the lessons learned from 14 years of implementation are not sufficiently reflected in the conclusions. This is particularly the case for the conclusion that the Directive is still largely fit for purpose. Conclusions on effectiveness and efficiency should be more nuanced, given the partial implementation of the Directive, the limited uptake by users and the criticisms presented in the report on costs. The conclusions should better acknowledge the remaining gaps and identify potential areas for improvement.

We have revised the conclusions on relevance, effectiveness and efficiency to better reflect the findings of the analysis and give a more nuanced picture of the Directive's performance. The need for further action at European level is better balanced against the need to revise the current legal framework to make it fit-for-future. It was also made more prominent in the conclusions that although the original objectives of the Directive remain valid, the legislation must be adapted to the fast-changing data landscape and technical reality to remain relevant and improve effectiveness and efficiency.

(2) The evaluation identifies aspects where the Directive has not delivered on its initial objectives. However, it should analyse in greater depth why this has happened, and

what should have been achieved by this point in time. It should analyse and explain why many Member States have developed parallel systems for their own purposes in addition to those required to comply with the Directive. It should also analyse the reasons why businesses and citizens (by and large) are not using the data provided on the platform and whether this differs by Member State. The analysis should then conclude whether the Directive is still relevant given such analysis.

In Section 5.1.3 we highlighted that the INSPIRE Directive was a front-running initiative regarding spatial data sharing that unfortunately was not always picked up by technology providers, resulting in lack of cost-effective, out of the box software solutions to support its implementation.

Section 5.2.1 was amended to better explain where the implementation of the INSPIRE was successful and where the implementation is lagging behind and does not meet its objectives.

Furthermore, in Sections 5.2.5 and 5.2.7 the evaluation was revised to clarify that the current INSPIRE interoperability rules are often considered over-specified and unfit for national use cases by data providers, giving way to parallel national spatial data infrastructures. These national infrastructures are better suited to meet practical national and regional needs, but also result in a limited and less rich INSPIRE-compliant data offering that is difficult to use in practical cross-border and EU application.

References to studies to support the analysis have been added in Sections 5.1.3 and 5.2.7.

(3) While evaluations are backward-looking exercises and should not pre-empt possible future revisions, the analysis should more operationally present and substantiate with evidence the key elements where the Directive has performed well and where it has not, and thus needs to be adapted. The review of elements where the Directive performed well should go beyond the very high-level objectives of the initiative, and look at the details of implementation across Member States. Likewise, the elements to be improved should be investigated in more detail, e.g. the simplification of data requirements, or the implications of ensuring consistency with the Open Data directive. These will also provide the basis for any forthcoming forward-looking exercise.

Building on the findings in Section 3.1 on the state of play of the implementation of the INSPIRE Directive, we highlighted under section 5.2.1 the key elements where the implementation of the INSPIRE was successful and where not. This was substantiated by a reference to a Science for policy report prepared by the Commission's Joint Research Centre on "INSPIRE - A Public Sector Contribution to the European Green Deal Data Space".

Possible remediation and recommendations to address the identified regulatory bottlenecks and implementation gaps have been elaborated in more detail in Section 6.7 on lessons learned.

5. FIT FOR FUTURE PLATFORM OPINION

The Fit for Future Platform[2] is a high-level expert group that helps the Commission in its efforts to simplify EU laws and to reduce related unnecessary costs. The platform strengthens the Regulatory fitness and performance (REFIT) programme's outreach by bringing together expertise from national, regional and local authorities, the Committee of the Regions, the European Economic and Social Committee, and various stakeholders (such as the SME Envoy Network).

The Platform examines whether existing laws can achieve their objectives efficiently as we tackle new challenges such as digitalisation. The Commission will take into account the Platform's opinions to ensure EU laws help, not hinder, people and business, in particular small and medium-sized enterprises. The Platform opinions are based on the Platform's annual work programmes[3].

Having considered the evidence, the Platform adopted an opinion on 10 December 2021 as a contribution to the evaluation of the INSPIRE Directive (Ref: 2021/SBGR2/09)[4]. Overall, the Platform's suggestions are in line with the findings of this evaluation. The Commission will consider and explore the suggestions in its impact assessment work that is expected to commence in Q2 2022.

Fit For Future Platform suggestions

(1) Data specifications can be less technology-bound, more generic and focused on the purpose.
(2) The focus should be on defining priorities and on clarifying policy needs.
(3) Mechanisms to improve European legislation in the field of geospatial information
(4) The potential benefits of INSPIRE have not yet been fully exploited.
(5) To overcome technical and financial barriers, non-legislative initiatives should be supported.

6. EVIDENCE, SOURCES AND QUALITY

Given the abundant availability of INSPIRE relevant documents and data sources preference was given to desk research, complemented with a broad stakeholder consultation consisting of an open public consultation, Member State implementation interviews, targeted surveys for the main relevant sectors (spatial data, environment, marine, agriculture) and scoping interviews with European Commission services.

[2] https://ec.europa.eu/info/law/law-making-process/evaluating-and-improving-existing-laws/refit-making-eu-law-simpler-less-costly-and-future-proof/fit-future-platform-f4f_en

[3] https://ec.europa.eu/info/law/law-making-process/evaluating-and-improving-existing-laws/refit-making-eu-law-simpler-less-costly-and-future-proof/fit-future-platform-f4f/annual-work-programme_en

[4] https://ec.europa.eu/info/sites/default/files/final_opinion_2021_sbgr2_09_directive_establishing_an_infrastructure_for_spatial_information_in_the_european_community.pdf

The evaluation could build on an extensive source of data and information for the period 2014 -2021 acquired from:

- official country reports,
- country monitoring reports including indicators, data sets and services provided through the INSPIRE Geoportal,
- the 2014 midterm evaluation,
- the 2014-2021 INSPIRE conferences,
- national and cross-border conferences,
- reports from EU and national related projects and activities,
- EU-national-international policy documents,
- public consultations and independent assessments on the technical implementation of INSPIRE.

The supporting study includes a list of all data sources, reports on all consultation activities used and also describes how the information and data were assessed for its quality and robustness.

Annex 2: Stakeholder consultation

1. INTRODUCTION

In line with the Better Regulation guidelines on stakeholder consultation, the synopsis report summarises the methodology and results of all of the consultation activities undertaken for the study to support the evaluation of the Directive2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE Directive). It is the result of the consultation strategy that was developed by the Commission's Directorate-General for Environment (DG ENV) for the evaluation.

This report presents the key issues raised in the consultation activities. The detailed overview of quantitative and qualitative results of the public consultation is contained in a separate report. The results of each consultation activity are also presented in the main evaluation report.

2. CONSULTATION STRATEGY

2.1. OBJECTIVES

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 public to provide input and comply with the Better Regulation guidelines. 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, etc.).

2.2. TARGET GROUPS

As INSPIRE covers a wide range of geospatial data, which can be useful for many types of institutions and business in multiple sectors, there was a long and diverse list of stakeholders across the EU that could provide valuable input on the performance of the INSPIRE Directive. There are four main ways in which stakeholders interact with INSPIRE, which is useful for understanding how to approach them in consultation activities. These are the following:

- **Authorities/institutions in charge of the governance and coordination of the implementation of INSPIRE:** these are mainly EU-level stakeholders, including Commission services, the JRC, the EEA and Eurostat, which maintain and oversee the infrastructure from legislative/policy, technical and networking perspectives.
- **Authorities/institutions responsible for implementing the Directive**: mostly national authorities, as well as other agencies involved in spatial data and data infrastructure.
- **Data producers**: authorities and agencies who collect spatial datasets through a variety of activities including legal mandates and environmental monitoring responsibilities.

- **Data users**: the wide range of institutions and stakeholders who require geospatial datasets to conduct their activities, including planning; environmental responsibilities; research; advocacy and informing the public; and commercial activities such as development of software and interactive instruments, engineering designs, etc.

Stakeholders have been identified across the following five general groups:

- INSPIRE coordination team / European Commission contacts
- EU/international organisations
- Member State/EEA/EFTA country administrations/agencies (national level)
- Sub-national level authorities
- Non-governmental stakeholders

The lists of various contact points (e.g., national focal points responsible for various pieces of legislation) were collected from different DGs following the kick-off meeting. The project team created, based on these contact lists and publicly available contacts (notably the database Who's who in INSPIRE), a stakeholder database that has been used for all consultation activities.

2.3. CONSULTATION METHODS AND TOOLS

Consultation activities consisted of several field research activities including interviews, targeted surveys, online public consultation, and a stakeholder workshop.

Consultation activity	Number
Scoping interviews	10 interviews + 2 written inputs
Focus group interviews	7 interviews in 7 Member States involving 56 participants
Targeted surveys	4 surveys reaching 144 responses
Online public consultation	1 OPC reaching 93 responses
Validation workshop	1 workshop involving 61 participants.

A detailed description of each activity and their results is provided in the sections below.

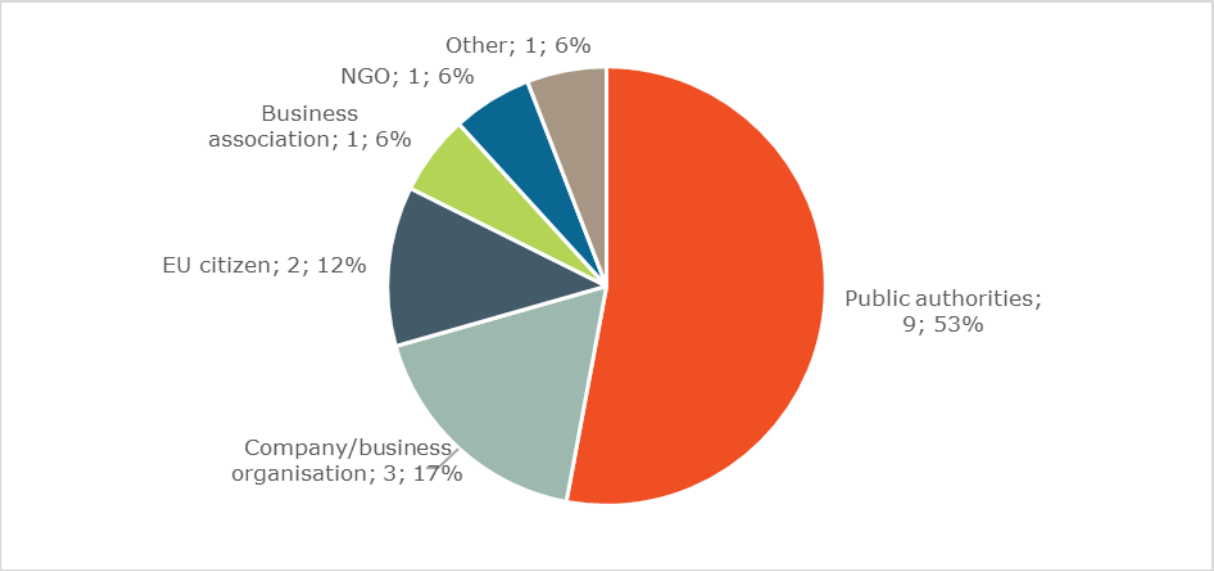
3. CONSULTATION ACTIVITIES

3.1. CONSULTATION ON THE EVALUATION ROADMAP

The evaluation roadmap[5] was opened for feedback from 7 September 2020 to 19 October 2020. The roadmap received 17 contributions, from various types of stakeholders, but with a predominance of public authorities (9 out of 17). All contributions are published on the European Commission's website.

[5] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12427-Sharing-geospatial-data-on-the-environment-evaluation-INSPIRE-Directive-_en

Figure 10 : Overview of feedback to evaluation Roadmap (n=17)



Main feedback received

- Several contributions indicated that INSPIRE has had a positive effect on the availability of standardised spatial data and on the development of national SDIs.
- Several contributions noted the heterogeneity of the data available in the geoportal and the heterogeneity of the implementation of the Directive across Member States
- On the same note, two contributions observed that there are very few European datasets in the INSPIRE Geoportal that are completely harmonised and so that fragmentation is still a significant obstacle to full interoperability.
- One contribution therefore stressed the need for a strong EU body with sufficient capacity to coordinated implementation (including in relation to technical guidance, monitoring, capacity building, user communication and outreach).
- Several contributions underlined that some data specifications are outdated and should be revamped – this was noted in particular for Transport Networks, which uses an outdated linear referencing model and should be aligned with the ISO standard, and Elevation, which follows outdated standards and should be aligned with more up-to-date elevation standards.
- Several contributions underlined the need to reduce the complexity of technical requirements and data models, which make INSPIRE difficult and costly to implement. Two public authorities underlined that the complexity of INSPIRE is a significant cost driver.
- One public authority stressed the need for prioritisation in the implementation of the Directive. The scope of spatial data defined in the 34 data themes is very broad, making implementation difficult. Further prioritisation would help Member States prioritise their investments.
- One public authority underlined the need for more flexible technical requirements

that would allow the uptake of new technologies when they become available.

- Several contributions reflected on the limited use of INSPIRE data and underlined that at national or regional / local levels, spatial data are often used in different data models that those of INSPIRE or through different services, as INSPIRE does not fully cover national and regional/local needs. One contribution also indicated that INSPIRE is too complex for many users. Another explanation for the limited use of INSPIRE data is that the national SDI existed before INSPIRE and covered most national use cases, leading to little demand for INSPIRE data.

- The situation described above explains, according to several contribution, that INSPIRE has been implemented in some Member States in parallel to the national SDI, merely for compliance reasons. One contribution expressed the concern that INSPIRE services may end up as a set of 'shadow services' meeting the requirements of the Directive but attracting few users.

- Based on this, one contribution underlined that the focus on specific use cases with concrete benefits at the local, regional and national level would improve the effort-benefit ratio on the ground and thus acceptance.

- Two contributions advised that several initiatives (in the field of transport and environment) should be aligned to avoid multiple reporting processes. Another contribution however indicated that the value of using INSPIRE specifications in the context of environmental reporting is unclear as only a small part of the environmental reports consists of spatial data defined by INSPIRE implementing rules

- Two contributions stressed that potential limits to data sharing imposed by personal data protection legislation should be taken into account.

- One contribution stated that restrictions must be maintained regarding public access to data on critical infrastructures / essential services to protect those infrastructures from malicious acts and protect people's health and the environment.

3.2. PUBLIC CONSULTATION

Objectives and target group

The public consultation aimed to provide an opportunity to all interested parties and the general public to provide input and comply with the Better Regulation guidelines. To adapt to the broad audience of the public consultation, a number of questions focused on the experience of the user.

Questionnaire

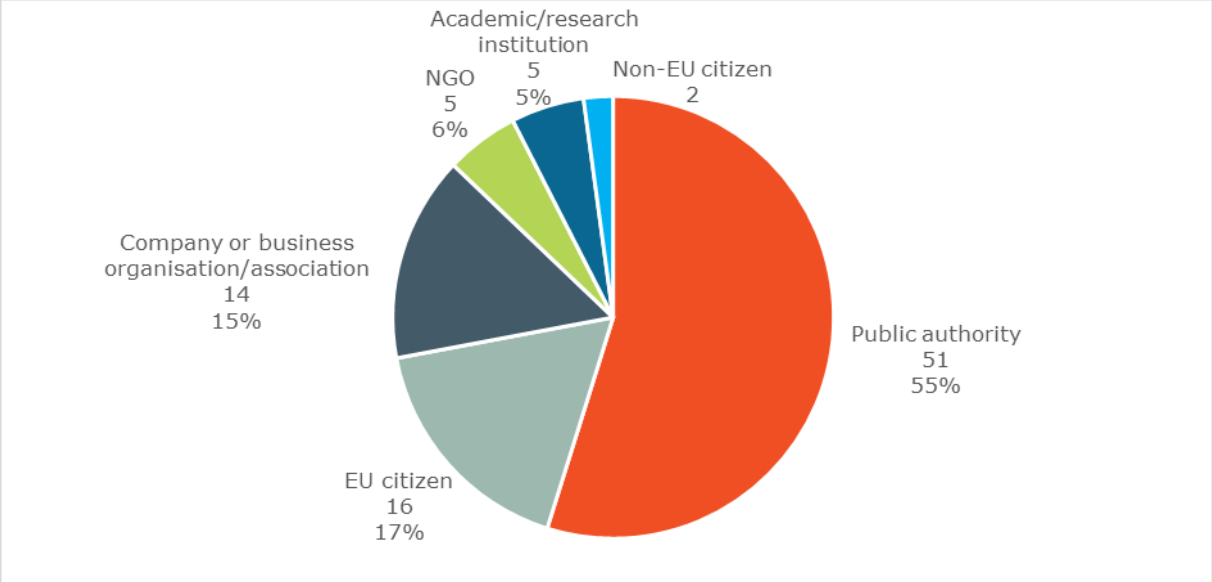
The questionnaire was available in all EU official languages[6]. The consultation ran for 12 weeks (19 April-12 July 2021) on EU Survey. It consisted of two parts. The first part included general questions on the relevance of the INSPIRE Directive to EU citizens and was aimed at all respondents to the public consultation. The second part of the questionnaire included more detailed questions on the implementation of the Directive and its performance according to five evaluation criteria (effectiveness, efficiency, coherence, relevance and EU added value). This second part was particularly aimed at respondents directly involved with or affected by the Directive and its requirements.

Responses received

The public consultation received **93 responses**. 77 respondents replied to both parts of the questionnaire, while 16 replied only to the first part.

More than half of the respondents (55% or 51 respondents) were public authorities. EU citizens responding in a personal capacity were the second largest group of respondents, representing a total of 17% (16), followed by companies or business organisations/associations (15% or 14 respondents). Figure 1 shows the distribution of respondents by type.

Figure 11 : Responses to the online public consultation, by stakeholder group (N=93)



The consultation received replies from 21 EU Member States (all except Bulgaria, Ireland, Latvia, Lithuania, Malta and Slovakia), and one EFTA country (Norway). The largest group of respondents came from Germany, representing 30% of respondents (28 in total).

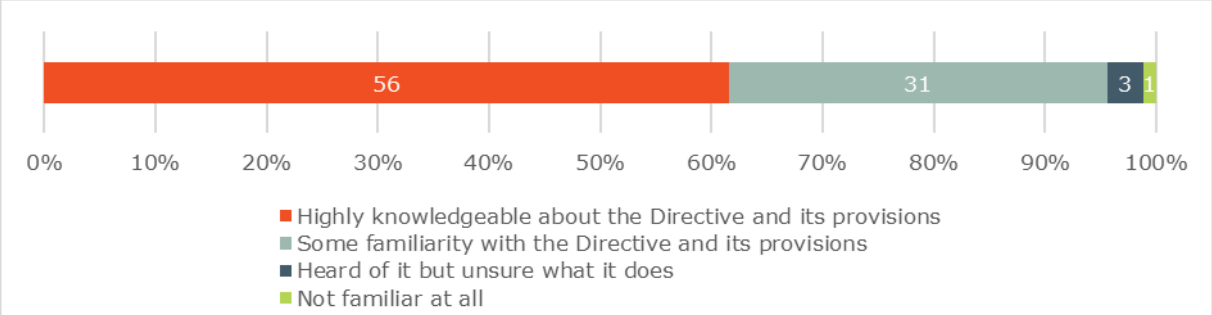
[6] The public consultation questionnaire is available in Appendix I of the Report on the public consultation.

Responses to online public consultation by country (N=93)

Country	Number of respondents	Country	Number of respondents	Country	Number of respondents
Austria	5	**Finland**	2	**Non-EU**	2
Belgium	5	**France**	3	**Norway**	2
Croatia	2	**Germany**	28	**Poland**	3
Cyprus	1	**Greece**	2	**Portugal**	6
Czech Republic	1	**Hungary**	4	**Romania**	6
Denmark	4	**Italy**	5	**Slovenia**	1
Estonia	1	**Luxembourg**	1	**Spain**	3
EU-level	2	**Netherlands**	3	**Sweden**	1

Respondents to the online public consultation overall stated that they have a good knowledge of the INSPIRE Directive. More than half of the respondents (62%, 56 respondents) indicated that they are highly knowledgeable about the Directive and its provisions. It can be concluded from these responses that respondents to the online public consultation are mostly experts, rather than citizens.

Figure 12 : Online public consultation respondents' familiarity with the INSPIRE Directive (N=91)



Processing and use of responses

Contributions to the online public consultation were published on the Commission website. Following the Better Regulation template for public consultations, respondents to the consultation were provided with two options for the publication of their contributions: 1) Public, with both organisation details and respondent details published; 2) Anonymous, with only organisation details published.

Results from the online public consultation were downloaded in Excel format from EU Survey. A full report was drafted[7], presenting the profile of respondents, the results of the closed questions and summaries of responses to open-ended questions. In the evaluation report, results from the online public consultation were summarised in each evaluation question under a dedicated heading.

[7] The report on the public consultation is available in Appendix 5 of the evaluation report.

Main results from the online public consultation

Effectiveness

- Respondents found that data discoverability is facilitated by INSPIRE, but opinions are more mixed regarding access to data:
    - Most respondents (51%, 39 in total) reported that it is very or moderately easy to find relevant geospatial data published under the INSPIRE Directive.
    - 39% of respondents (30) indicated that it is very or moderately easy to get access to the content of geospatial data published under INSPIRE, while 26% (20) indicated that it is moderately or very difficult.
- Opinions were also mixed regarding the ease of use and reuse of data under INSPIRE:
    - A slightly higher proportion of respondents (32%, 25) indicated that it is moderately or very difficult to use the geospatial data published under the INSPIRE Directive from a technical accessibility point of view than moderately or very easy (30%, 23) – while 27% (21) indicated that it is neither easy nor difficult.
    - Similarly, a slightly higher proportion of respondents (30%, 23 in total) indicated that it is moderately or very difficult to reuse or re-publish geospatial data published under the INSPIRE Directive than respondents who indicated that it is moderately or very easy (27%, 21 in total).
- According to respondents, the INSPIRE Directive supports the process of planning and assessing impacts, at least in some policy areas:
    - More than half of the respondents indicated that the INSPIRE Directive supports (slightly or strongly) the Water Framework Directive (55%, 36 respondents) and the Birds and Habitats Directive (51%, 33 respondents); 47% (31 respondents) indicated that the INSPIRE Directive supports floods management.
- According to respondents, the INSPIRE Directive supports the active dissemination of environmental data to the public at least in some policy areas:
    - Nearly half of the respondents indicated that the INSPIRE Directive supports (slightly or strongly) the active dissemination of environmental data in relation to the Birds and Habitats Directives (49%, 31 respondents), the Water Framework Directive (49%, 32 respondents) and for floods management (45%, 29 respondents).

Efficiency

- The vast majority of spatial data providers that replied to the public consultation indicated that the INSPIRE rules on data harmonisation, metadata, view services and download services and rules on publishing spatial data covered by INSPIRE resulted in additional costs.
- Better comparability and interoperability between spatial data sources was the most frequently selected benefit linked to the INSPIRE Directive selected by respondents (64%, 45 respondents).
- Overall, a higher proportion of respondents believe that the costs linked to sharing/using spatial data outweigh the current or expected future benefits for their

organisation (37%, of the respondents (26) indicated that there are some benefits, but that costs prevail).

- The vast majority respondents (79%, 50 respondents) indicated that the process for harmonising spatial data could be simplified and more than half of the respondents (over 30 respondents) indicated that the processes for transforming, documenting and publishing spatial data along with the process of making spatial data downloadable could be simplified.

Coherence

- One fourth of the respondents believe that INSPIRE supports authorities in complying with their obligations under the Open Data Directive to a large extent (19 respondents / 76 – 25%) and roughly the same proportion to a moderate extent (20 respondents / 76 - 26%)

Added value

- Nearly half of the respondents (49%, 37 respondents) believe to a large extent that the EU-wide standardisation of data policies, licences and technical infrastructure resulting from INSPIRE has brought additional benefits compared to what could have been achieved a national and subnational levels.

Nearly half of the respondents (49%, 37 respondents) believe to large extent that the obstacles and needs related to sharing and disseminating spatial data as addressed by INSPIRE still require EU-level action.

3.3. SCOPING INTERVIEWS

Objectives and target group

Scoping interviews were carried out with EU-level stakeholders, in particular with relevant Commission services and the EEA. The main purpose of these interviews was to understand the key issues for the evaluation, including the main implementation issues, the main benefits and uses of INSPIRE, to support a better interpretation and scoping of the evaluation questions, and the preparation of other consultation tools.

Interview questionnaires

Interview questionnaires, tailored to each interview were drafted by the evaluation team and sent beforehand to participants. A number of standard questions on the implementation, uses and benefits of INSPIRE, which were asked in most interviews, were complemented by specific questions related to the role of the different Commission services and EU-level organisations in the development of INSPIRE, the use (or expectations towards the use) of INSPIRE in different policy areas (e.g. agriculture, transport, marine environment, climate), the main benefits of INSPIRE for these policy areas, and the coherence between INSPIRE and reporting obligations or data sharing provisions in other pieces of legislation.

Interviews completed

Ten interviews were carried out by the evaluation team between March and early May. In addition, one EU organisation and one Commission Unit (contacted at a later stage in the project) provided written feedback to interview questions. An overview of the interviews completed is presented below.

Table 15 Scoping interviews completed

Participants	Date
Commission services	
• **DG JRC – Digital economy**	26 March 2021
• **DG CONNECT – Data Policy and Innovation**	6 April 2021
• **DG MARE – Maritime innovation, Marine Knowledge and Investment**	8 April 2021
• **DG MOVE - Sustainable and Intelligent Transport**	12 April 2021
• **DG CLIMA – Climate Adaptation / EEA (Climate-ADAPT)**	16 April 2021
• **DG ENV – Compliance and Better Regulation**	20 April 2021
• **EEA – Data and Information Services & Data Management units**	26 April 2021
• **DG AGRI – Implementation support and IACS / JRC – Land Resources Unit**	29 April 2021
• **DG ESTAT - Regional statistics and geographical information**	3 May 2021
• **DG MOVE – TEN-T**	Provided written feedback to interview questions
EU-level stakeholders	
• **Eurogeographics**	17 April 2021
• **Eurogeosurveys**	Provided written feedback to the scoping interview questionnaire

Processing and use of responses

Transcripts were drafted for each interview and shared with the whole evaluation team. In the evaluation report, results from scoping interviews were integrated in each evaluation question under a specific heading.

Main results from scoping interviews

Effectiveness

- There is still a great heterogeneity in the data available within and across Member

States, which limits as of today the effectiveness of INSPIRE. The availability and harmonisation of data also vary across data themes (for some themes, like orthophotos, availability is quite good, for others it is much lower).

- Many users that need data for regional or national purposes will not use INSPIRE data but other national datasets following other standards (e.g. open data) instead.

- INSPIRE is not fully aligned with sectoral needs and therefore the cross-sector use is limited at the EU level. Efforts have been made to align between INSPIRE provisions and data requirements in different thematic domains.

- INSPIRE is too specific in terms of technological standards and implementing rules are quite rigid. One solution to move on from this issue is to work on communities of best practices instead of over-specifying the implementing rules too much

Efficiency

- Data sets and services that created in order to meet INSPIRE requirements but are not used in other contexts are considered by data providers at national level as a burden from a technical and organisational perspective.

Coherence

- Work is ongoing to align better reporting obligations with INSPIRE rules. This long and complex process will extend over many years and require significant coordination with Member States. Reportnet 3.0 will allow for the intake of INSPIRE datasets.

- INSPIRE is considered as an opportunity in several sectors to have a centralised entry point to access and share data. Alignment of various data sharing instruments is ongoing at EU level. In some sectors, relationships with INSPIRE and how INSPIRE might support those policy areas is still largely to be defined (MSP, TEN-T, climate adaptation). Further collaboration with sectoral DGs at EU level and through committees could be developed, where relevant. The creation of a single data platform for all sorts of spatial data might however be an unachievable perspective as some sectors have specific objectives and data needs.
- Directive 2003/4 could benefit from aligning some of its terminology with INSPIRE as INSPIRE provides a technical framework for electronic data sharing. Directive 2003/4 refers to data sharing through 'electronic means' but without further specifications, it could be made explicit that this is referring to the INSPIRE Directive specifications.
- 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). DG CONNECT is working with the Member States on the interoperability of INSPIRE and Open Data metadata. The upcoming Regulation on High Value Datasets will ensure maximum alignment with INSPIRE both in terms of the technical obligations and in terms of the geospatial datasets covered.

3.4. FOCUS GROUP INTERVIEWS

Objectives and target group

The main objective of the focus group interviews was to better understand the different ways the Directive is being implemented in the Member States and how the national context and governance structure might influence the successes and failures in implementation. They aimed to collect information on current drivers and barriers to the implementation of the Directive in the Member States, including on the progress made in the Member States in relation to the implementation roadmap. Focus group interviews also aimed to collect relevant information to respond to evaluation questions for which only limited literature is available – including uses of INSPIRE for policy-making and reporting purposes, uses of INSPIRE by other types of users (research community, companies, including SMEs), costs and benefits of INSPIRE, relationships between INSPIRE and PSI/Open Data and Public Access to Environmental Information Directives, and the added value of the INSPIRE compared to what would have happened in the Member State without the EU framework.

As differences in implementation was a focus of the interviews, Member States were selected for their diversity of national contexts (larger vs smaller Member States, federated vs centralised Member States), their different levels of advancement in the implementation of the INSPIRE Directive (more advanced vs less advanced Member States), and their geographic spread across the EU. The level of advancement in the implementation of the INSPIRE Directive of each Member States was assessed based on the criteria of the INSPIRE reporting (conformity of metadata, conformity of spatial datasets, accessibility of data through view and download services, conformity of network services). Based on these criteria, four groups of Member States were created. Focus group interviews targeted two Member States of each group (as initially eight interviews were planned).

The focus group interviews were organised with small groups (around 6-8) of national stakeholders, responsible for and/or involved in the implementation of the Directive, as well as for the production of and use of spatial data. Participants were selected by the INSPIRE National Contact Point, who was always present during the interview.

Focus group interview guide

A standard interview guide was prepared by the evaluation team and sent to all participants beforehand (see Appendix I). The questions were the same for all Member States. To prepare the interview and be ready to tailor questions to the national situation, moderators from the team reviewed the country forms before the interview. Several Member States sent written responses to this questionnaire to complement the discussions in the focus group interview.

Focus group interviews completed

Seven focus group interviews were carried out between Mid-April and early May. An additional interview was initially planned but was cancelled following the defection of one Member State. Focus group interviews were carried out online. Two moderators from the evaluation team were present in each interview, as well as a note taker. An overview of the focus groups interviews carried out and of the participating organisations is provided below.

Table 16 Focus group interviews completed

Member State	Participants
• **BE (4 May 2021)**	11 participants • National Geographic Institute of Belgium • Federal Public Service for Policy and Support, DG Digital Transformation • Flemish Agency for Geographical Information • Flemish Environment Agency • Public Service of Wallonia, Geodata Integration Directorate • Public Service of Wallonia, Agriculture, Natural Resources and Environment • Brussels Environmental Agency (Bruxelles Environnement) • Brussels Regional Informatics Centre
• **BG (27 April 2021)**	5 participants from: • State e-Government Agency • Geodesy, Cartography and Cadastre Agency • Ministry of Interior • Ministry of Agriculture, Food and Forestry • National Institute of Meteorology and Hydrology
• **DE (22 April 2021)**	8 participants from: • Steering Committee SDI Germany • Coordination Office SDI Germany • Federal Agency of Cartographie and Geodesy • Federal Institute for Geosciences and Natural Resources • Federal Ministry for the Environment, Nature Conservation and Nuclear Safety • State Agency for Nature, Environment and Consumer Protection of North Rhine-Westphalia • State Agency for Agriculture, the Environment and Rural Areas of Schleswig-Holstein
• **IE (6 May 2021)**	7 participants from: • Department of Housing, Local Government and Heritage • Ordnance Survey Ireland • Geological Survey Ireland • Environmental Protection Agency • Central Statistics Office
• **IT (26 April 2021)**	7 participants from: • ISPRA • Ecological Transition Ministry • AgID (Agency for Italian Digitalization) • Italian National Institute of Statistics • Interregional Center for Statistic and Geographic Information System

Member State	Participants
• **LT (4 May 2021)**	11 participants from: • Ministry of Agriculture • National Center for Remote Sensing and Geoinformatics "GIS-Centras" • State Enterprise Centre of Registers • National Land Service • Environmental Protection Agency • National Public Health Centre • State Service for Protected Areas
• **ES (20 April 2021)**	7 participants from: • National Center of Geographic Information • Ministry of Agriculture, Fisheries and Food • Ministry of Finance (Directorate General for Cadastre) • SDI of Navarre region (IDENA) • SDI of Catalonia region (IDEC)

Processing and use of responses

Transcripts were drafted for all focus groups interview and shared with the whole evaluation team. In the evaluation report, results from focus group interviews were summarised in each evaluation questions under a dedicated heading.

Main results from Focus Group interviews

Effectiveness

- The governance structure varies greatly from one Member State to another – ranging from a very 'slim' governance structure to extensive governance structure. Each Member State has tried to adapt the INSPIRE Directive requirements to their national situation (e.g. federated systems vs centralised systems). INSPIRE has been a driver in some Member States in setting up a governance structure to manage the national SDI.

- Harmonisation of regional datasets is a challenge and a cost, but also brings up benefits. The harmonisation process triggered by INSPIRE is seen in some Member States as a driver for improving the harmonisation of regional and local datasets.

- The implementation of the INSPIRE SDI is sometimes carried out in parallel to the maintenance of national SDIs, to reach a better compliance rate.

- The implementation of INSPIRE and environmental reporting are also still largely separated processes, although positive experiences were mentioned for some policy areas where reporting obligations are aligned with INSPIRE rules.

- It is almost impossible for Member States to identify the nature of INSPIRE users if they are not the data providers as there are no requirements for users to register or provide personal data to use INSPIRE services.

- Many users that need data for regional or national purposes will not use INSPIRE data but other national datasets following other standards (e.g. open data) instead.

Relevance

- The objectives of the INSPIRE Directive (harmonised datasets and services at EU level) are still relevant.

- The relevance of the Directive for potential users (outside of EU authorities) is however not completely obvious as diverse user groups might need diverse services (simpler services accessible though apps for many users vs more specific and detailed services for professional users). A new focus could be on easy access to data for mainstream users and for the general public.

Efficiency

- National authorities see harmonisation and interoperability is a key benefit of INSPIRE.

- There are different assessments within the Member States as to the main cost drivers as costs often depend on the institution and/or administrative level. It also depends on the organisations of SDI in the country and on the size and structure of the country. For instance, 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 costs of data harmonisation was often mentioned as a key cost, identified as a cost category for both national and local level institutions.

- The perception on the availability of funding and expertise to implement INSPIRE varies across Member States. Some Member States did mention problems of lack of funding and staff expertise, leading to INSPIRE implementation not being prioritised, and significant outsourcing of tasks.

- There is a need to simplify the implementation at the technical level, in particular as regards the complexity in the data models. Focus group interviews also mentioned that technical specifications are not easy to understand for public authorities.

- It is too early to assess the proportionality of cost and benefits due to the fact the benefits are only now beginning to emerge.

Coherence

- There are some overlaps between INSPIRE data themes leading to diverse implementation of INSPIRE across Member States.

- A clear reference to INSPIRE in the environmental legislation is useful to promote awareness of INSPIRE rules among authorities. Because reporting obligations under environmental Directives are not yet fully aligned with INSPIRE rules, environmental reporting is still quite largely separated from INSPIRE implementation. INSPIRE and environmental reporting are often dealt with at national level by different authorities, which makes coordination more complex.

- Member States authorities indicated that there are relatively few interactions in the implementation of Directive 2003/4/EC and INSPIRE at national level; that both Directives are implemented separately.
- Member States authorities indicated that there are relatively few interactions in the implementation of the Open Data Directive and INSPIRE at national level and that both Directives are implemented separately.
- A few Member States authorities 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.

Added Value

- The broad scope of INSPIRE (geographically and in terms of themes) is perceived as an added value. 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 were some elements of added value mentioned.
- The INSPIRE Directive has also been an incentive for the mapping agencies to cooperate with the neighbourhood countries, even if no effective guidelines for cross border aspects have been developed.
- EU-level action is still required to achieve interoperable data in Europe.

3.5. TARGETED SURVEYS

Objectives and target group

The focus group interviews described above mainly targeted authorities who are chiefly responsible for the implementation of the Directive, as well as production of data and high-level use of data sets, in seven Member States. To reach a broader coverage of stakeholder groups (e.g. data users such as research institutions, business associations, NGOs) and of Member States, a series of four targeted surveys were organised. In terms of stakeholder coverage, targeted surveys also aimed to reach stakeholders that were less represented in the focus groups interviews, in particular environmental authorities. If a representative from the Ministry responsible for Environment or the EPA, was often present in the focus group interview, it was not always the right person to discuss issues linked to environmental reporting. Representatives from various environmental policy area were often not present in the interview. Similarly, representatives from regional authorities were present in focus group interviews of federated countries, but the coverage of regional and local authorities could only be minimal in those interviews. The surveys provided a good opportunity to reach out to a broader range of stakeholders and was therefore widely distributed.

The survey of the spatial data community had the broadest target group and really aimed to reach a broad range of stakeholders producing and using spatial data in all Member States and EFTA countries.

Environmental reporting was the focus of the survey of the environmental community. As the issue of environmental reporting was covered both in effectiveness and coherence evaluation questions, this survey was particularly important for the evaluation.

The targeted surveys also provided an opportunity to focus on selected sectors to investigate more in-depth uses of INSPIRE for policy-making, reporting, research and planning. Those two sectors, marine policy and agriculture, were selected with the Commission at the beginning of the project based on their high level of spatial data needs and potential for cooperation with INSPIRE. In addition to specific uses for these sectors, those sectoral questionnaires provided an opportunity to investigate potential coherence issues and alignment of data sharing and reporting.

Table 17 Target groups of the four targeted surveys

Surveys	Target stakeholder groups
• **Spatial data community**	• National Mapping, Cadastre and Land Registry Authorities/Agencies • Geological surveys • National authorities responsible for the implementation of the Open Data Directive • EU and international organisation with responsibilities related to spatial data dissemination (Copernicus, OECD, UNGGIM / UNGGIM-Europe) • Smart cities / Sustainable cities service providers • PSI reusers • TN-ITS community
• **Environmental community**	• EIONET network • National focal points to the Aarhus Convention • Environmental Protection agencies • Meteorological organisations • Business associations / research organisations in specific environmental sectors
• **Marine community**	• EMODNET network • MSFD DIKE working group • EIONET network (organisations in marine fields) • Regional Sea Conventions • The Technical Expert Group "Data for MSP" • Copernicus marine service
• **Agriculture community**	• National EAGF/ EAFRD paying agencies • EU farmers associations: COPA-COGECA and members, European Council of Young Farmers

Targeted survey questionnaires

A specific questionnaire was drafted for each survey (see Appendix II). The four questionnaires had relatively similar structures, and similar sets of questions (e.g. questions on costs and benefits, added value, consistency with Open data and Public Access to Environmental Information Directive). However, they also all contained specific sets of questions targeted at the specific community reached by the survey – e.g.

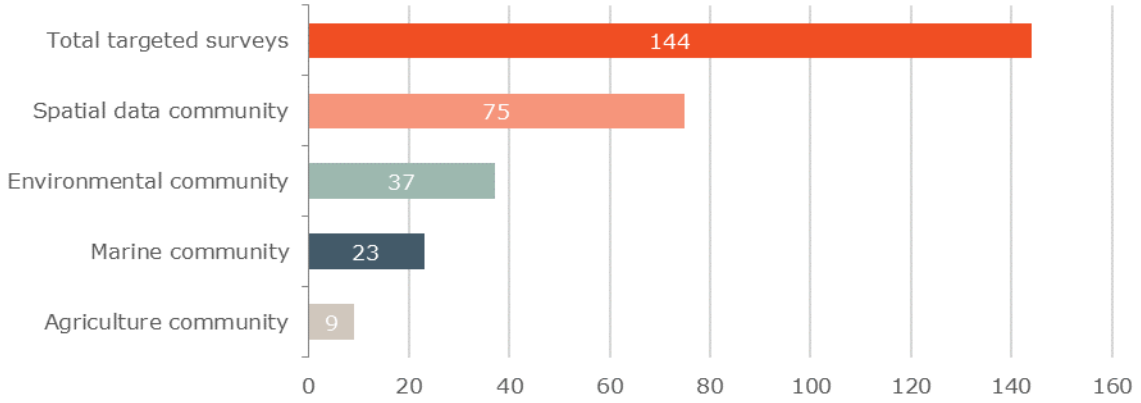
environmental reporting, Maritime spatial planning, reporting of IACS data. The four questionnaires were put online on EU survey.

Dissemination was done partly by the evaluation team and partly by Commission DGs and the EEA. The evaluation team took charge of the dissemination to stakeholders whose contacts could be found either in the INSPIRE database (Who's who in INSPIRE) or from public sources. Commission services and the EEA targeted their own working groups (e.g. EIONET, EMODnet network, MSFD working groups, national paying agencies, Copernicus services, smart cities service providers). Participants were given five weeks to respond (from 29 April to 4 June 2021).

Responses received

In total, 144 responses were received. The largest number of responses were received from the spatial data community and the environmental communities, which had the largest target groups.

Figure 13 : Overview of responses to the targeted surveys (n=144)

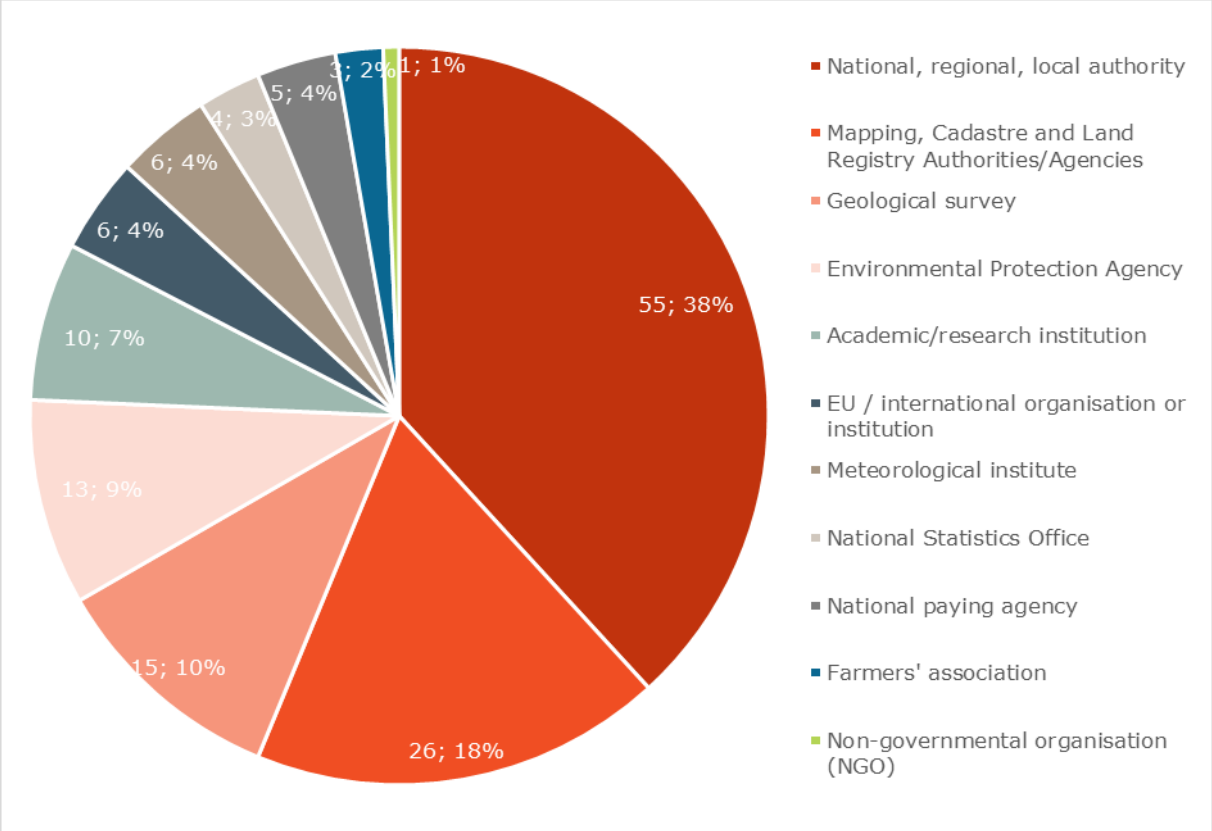


It is difficult to estimate the response rate (percentage of targeted stakeholders who responded) as the evaluation team did not have access to all Commission distribution lists for confidentiality reasons. The evaluation team therefore does not have full knowledge of the number of targeted stakeholders, in particular as overlaps between the various distribution lists are very likely. The stakeholder database compiled by the evaluation team contained 422 stakeholders. It should be noted, as a general remark, that there might be overlaps between responses to the targeted survey, the public consultation and the focus group interviews. It is however difficult to fully grasp as in some cases different divisions of the same organisation might have participated in the various consultation activities.

In terms of stakeholder groups, most responses were received from public authorities, in particular authorities directly involved in the implementation of INSPIRE as data producers (national authorities, environmental protection agencies, mapping agencies, geological surveys). In this regard, the surveys did not completely fulfil to the initial objective of reaching out a broader stakeholder range, in particular in reaching out to other types of data users than public authorities. This can be explained partially by the difficulty to identify them and reach them. This might also come from the fact that those stakeholders might not differentiate between INSPIRE data and other types of open data and feel less concerned by INSPIRE. Results from consultation activities also showed

limited use of INSPIRE data in some communities, which might also explain the low response rate.

Figure 14 : Responses to the targeted survey by stakeholder groups (n=144)



At least one answer was received from each Member State. Among EFTA countries, responses were only received from Norway. Poland, Czech Republic, Belgium, Netherlands and Germany represent around a third of responses. As three of these countries were not selected for focus group interviews, the targeted surveys have succeeded to broaden the stakeholder range participating in consultation activities in terms of country coverage.

Table 18 Responses to targeted survey by Member States (n=144)

Member State	Nb of respondents	Member State	Nb of respondents
Poland	10	**France**	4
Czech Republic	10	**Portugal**	4
Belgium	10	**EU-level**	4
Netherlands	9	**Ireland**	4
Germany	9	**Romania**	3
Spain	7	**Latvia**	3
Cyprus	6	**Croatia**	3
Denmark	6	**Greece**	3
Hungary	6	**Norway**	3

Member State	Nb of respondents	Member State	Nb of respondents
Italy	6	**Estonia**	3
Slovenia	5	**Luxembourg**	2
Slovak Republic	5	**Non-EU**	1
Finland	5	**Lithuania**	1
Austria	5	**Bulgaria**	1
Sweden	5	**Malta**	1

Processing and use of responses

Results from the targeted consultation questionnaires were downloaded in Excel format from EU Survey. General results from all of the closed questions and results by stakeholder groups and Member States were computed and provided in a readable format to the evaluation team. In the evaluation report, results from the targeted surveys are included in each evaluation question, under a specific heading.

Main results from scoping interviews

Effectiveness

- The progress made so far in the provision of INSPIRE compliant data services is not in line with the initial expectations and the INSPIRE Implementation Roadmap according to 48% of respondents (53).
- Respondents to the targeted surveys believed that the INSPIRE Directive contributed to access, exchange and reuse of geospatial data across public sector organisations to a large extent (48 respondents – 35%) or to some extent (44 respondents – 32%).
- Respondents identified technical access to data as the most important barrier to the use of spatial data from the point of view of the users (83 out of 131, 63%). The second barrier is the level of data available (for 61 respondents, 47%). Format and quality of data are respectively third (56 respondents 43%)and fourth barriers (50 respondents 38%).
- Respondents to targeted surveys think that spatial data are used first by national governments / ministries, regional and local authorities and national and regional agencies. Respondents believe that spatial data made available thanks to INSPIRE are barely used by companies selling data products or services.

Relevance

- According to respondents, the INSPIRE Directive addresses to a very large extent (49%) or large extent (53%) 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 (41%) and for monitoring of policies (39%).

Efficiency

- According to respondents, key costs are related to harmonization and interoperability (almost 50% of the respondents think these activities carry significant costs).

- Main costs are borne by national level organisations, and these organisations these organisations may not see all the benefits. Geological survey, mapping and cadastre and national authorities generally perceived that cost outweigh benefits. Generally, relatively few of the respondents groups found that the benefits where higher than the costs.

- Regarding benefits of INSPIRE, a large share of respondents have rated direct and indirect benefits of INSPIRE proposed as significant (between 25-40% of the respondents), in particular the direct benefits 'Harmonisation and interoperability', 'Better overview, discoverability, availability, accessibility of data' and 'Share and reuse of data', and the indirect benefits 'EU-wide collaboration' and 'National infrastructure and data strategy development'.

- Responses to the targeted surveys pointed to a need or potential for simplifying the INSPIRE data models and increased use of international standards.

Coherence

- There are some inconsistencies or overlaps between INSPIRE data themes – as a result, the same data could fall under various data themes.

- A clear reference to INSPIRE in the environmental legislation is useful to promote awareness of INSPIRE rules and compliance. Reporting under environmental legislation and provision of INSPIRE datasets are still often two distinct processes, resulting in two different datasets produced, because of differences in data specifications and standards, although progress has been made in some environmental areas.

- Results from targeted surveys partially contrast with focus group interviews where it appeared that both Directives where implemented in silos. Respondents to the targeted surveys found that the INSPIRE Directive supports the implementation of Directive 2003/4/EC to a large or very large extent (46 respondents – 34%) or at least to some extent (45 respondents – 33%).

- Similarly, respondents to the targeted surveys found that that INSPIRE supports the implementation of the Open Data Directive to a very large or large extent (62 respondents - 46%) when it appeared in focus groups that there were limited interactions between the two at national level.

Added value

- Respondents generally found that EU-wide standardization of data policies, licences and technical infrastructure as a result of the INSPIRE Directive brought additional benefits in comparison to what could have been achieved at national, regional and/or local level (52 respondents – 49% - to a very large or to a large extent).

- The majority of respondents (74 respondents – 55% - a very large or to a large

extent) to believe that the obstacles and needs related to sharing and disseminating spatial data as addressed by the INSPIRE Directive continue to require action at EU level.

3.6. STAKEHOLDER VALIDATION WORKSHOP

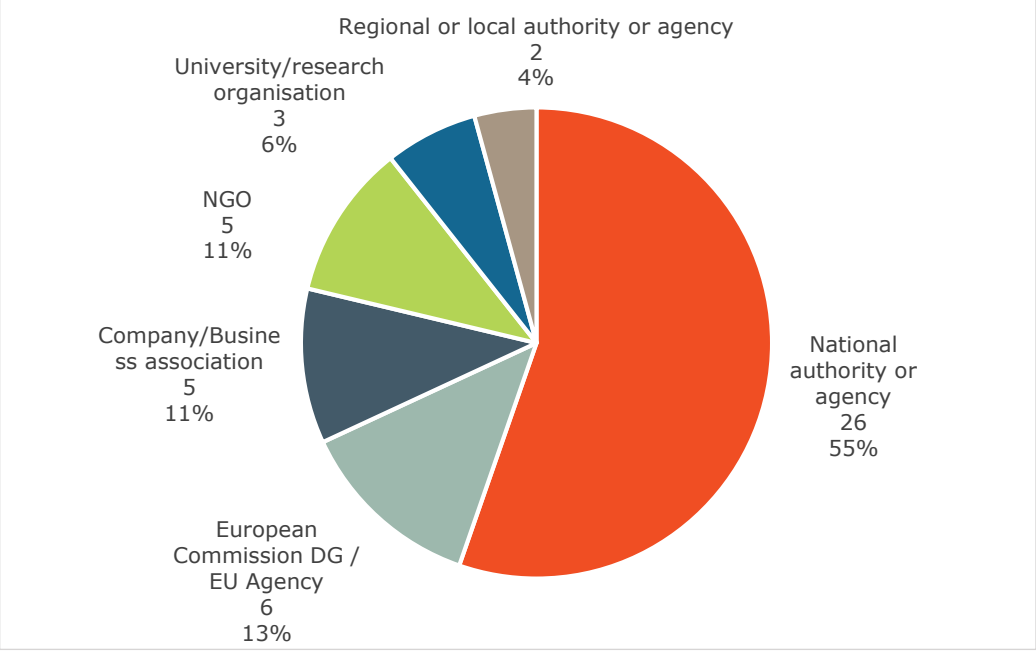
Objectives and target group

The purpose of the workshop was to present and validate the preliminary findings and conclusions of the evaluation and give participants an opportunity to provide feedback. As a variety of perspectives was expected, invitations were sent to a wide range of stakeholders including representatives from relevant Commission services and agencies, national authorities involved in the implementation of INSPIRE (contacted through the national contact point in each Member State / EFTA country), relevant EU umbrella organisations (EuroGeographics, EuroGeoSurveys, EUROGI), companies specialising in GIS software or geospatial data analysis, standards developing organisations (OGC), academics and research organisations. Member States / EFTA countries and other organisations invited were asked to limit their participation to one or two representatives.

Validation survey

Prior to the workshop, a workshop survey had been circulated to registered participants. The survey included nine questions and aimed to gauge participants' support to some of the preliminary conclusions and recommendations included in the evaluation study. The survey received **47 responses**. More than half of the respondents (55%, 26 in total) were from national authorities or agencies. An overview of the results from the survey is available in Workshop Report (Appendix 6 to the evaluation study).

Table 19 Responses to the validation survey (N=47)



Workshop agenda

The workshop was held online, on **7 September 2021 from 10-12 am**. The workshop included a short introduction, during which the main findings per evaluation criterion, the conclusions and recommendations of the evaluation study, as well as the results from the validation survey, were presented to participants. Participants were also provided with the draft final report of the evaluation study prior to the workshop. The introduction was followed by breakout sessions, moderated by members of the evaluation team the desk officer for the study in DG Environment, during which four groups of participants were invited to comment on the preliminary conclusions and recommendations of the study. Feedback gathered through breakout sessions was summed up and discussed in a plenary setting, before the Commission closed the workshop by presenting the next steps in the evaluation and the revision of the INSPIRE Directive.

Table 20 Workshop agenda

Time		content
10.00-10.35		**Introduction** ▪ Welcome ▪ Overview of evaluation process ▪ Criteria, conclusions and recommendations of the evaluation study ▪ Short Q&A
10.35-11.10		**Break-out sessions** ▪ Group discussions on main conclusions and recommendations
11.10-11.55		**Plenary discussions** ▪ Key points from each break-out session by rapporteurs ▪ Plenary discussions
11.55-12.00		**Closing of the workshop** ▪ Next steps in the evaluation process

The breakout sessions were structured according to three themes (i.e. the three groups of recommendations presented during the introduction):

- Closing the implementation gap
- Applying a user-driven approach
- Ensuring the alignment of INSPIRE with other policy areas

The three themes were discussed in each group. To facilitate the discussions, prompting questions were submitted to participants.

Stakeholder participation

The workshop gathered **61 participants** (72 had initially registered). Among the 72 participants registered, 10 were Commission / EU agencies representatives, 36 representatives from national authorities and 26 representatives of umbrella

organisations, private sector and research. Among the 36 representatives of national authorities, 19 Member States and 2 EFTA countries were represented. Although it was difficult to check during the workshop, it seems the balance between groups was quite similar during the event compared to the registration.

Processing and use of feedback

Minutes of the workshop were drafted by the evaluation team based on the recording of the workshop and notes taken by members of the evaluation team during the event and the breakout sessions. These minutes are available in the Workshop Report (Appendix 6 to the evaluation study). The evaluation team then organised a brainstorming session on how to best integrate the feedback of the workshop in the final evaluation study.

Main feedback from the validation workshop

Closing the implementation gap

- There was a consensus among participants that data harmonisation should focus on a pre-identified number of datasets, prioritised based on their level of use. Several participants suggested that prioritisation of datasets should concern datasets that are selected as High Value Datasets, or relevant for the Green Deal and the European data spaces. In the validation survey, the vast majority of respondents (91%) agreed, 40% of which strongly, that there is a need for a more targeted and proportional harmonisation based on use-case driven data priorities in order to reduce costs of implementation.

- In the validation survey, the majority of respondents (81%) agreed, 45% of which strongly, that the INSPIRE Directive should be implemented as part of the national SDI to increase its relevance and reduce costs. During the workshop, two participants also called for more integration between the national and European infrastructures, one of them bringing up the idea of establishing an EU SDI.

- Several stakeholders called for the simplification of INSPIRE specifications and more alignment on international data models (e.g., OGC/ISO) as a way to improve and accelerate the implementation of INSPIRE.

- In the validation survey, the majority of respondents (72%) agreed, 15% of which strongly agreed, that there is a need to involve a more diverse representation of stakeholders (i.e. other stakeholders than EU Member States and EFTA countries representatives) to increase the relevance and usability of INSPIRE. However, this issue was more debated during the workshop. Several stakeholders were of the opinion that other stakeholders should not be involved in the implementation of INSPIRE for fear of it becoming unmanageable and for too many conflicts to arise.

Applying a user driven approach

- There was support from participants for shifting the current approach to the implementation of INSPIRE towards a user driven approach, which would be based on the identification of users' needs and most prominent use cases and would allow prioritising datasets that should be harmonised. The vast majority (93%)of respondents to the validation survey also agreed that there is a need to specifically assess the needs of the different user groups in order to prioritise data to be

harmonised.

- A few participants however highlighted that identifying users' needs could be challenging (in particular for private users) as there is a significant gap between end users and data providers.

- In the validation survey, the vast majority of respondents (79%) agreed that there are constraints to the use of data shared under INSPIRE, especially for less experienced users. During the workshop, a few participants however warned against the additional burden and costs that developing complementary data models for non-expert users would entail.

- A few participants also indicated that the priority should be placed on closing the implementation gap as the lack of data availability, quality and harmonisation is currently impeding the use of INSPIRE.

Alignment with other policy areas

- In the validation survey, the majority of respondents (72%) agreed, 38% of which strongly, that there is a need to update Directive 2003/4 on Public access to environmental information so that the spatial data covered by Article 7 is shared in accordance with INSPIRE rules. This topic did not raise comments from participants during the workshop.

- Two participants commented on the benefits of developing synergies between INSPIRE and Open data platforms, including reducing costs.

- A representative of public utilities service providers underlined the necessity to retain the provisions of Article 13 of the INSPIRE Directive as they are now to ensure the protection of infrastructures vulnerable to attacks and/or criminal damage. This point echoes remarks made in the public consultation by similar types of stakeholders.

Annex 3: Methods and analytical models

This annex provides a summary of the methodology used to prepare this evaluation. The methodology is described in detail in section 4 of this document and in sections 3 and 4 of the supporting study. The methodological approach was guided by a set of 30 evaluation questions, which have been operationalised in an evaluation questions matrix. The evaluation questions were structured around five evaluation criteria: effectiveness, efficiency, relevance, coherence and EU added value.

The main analytical method used for most questions was content analysis, based on the aggregation and analysis of information collected with the literature review, desk study, targeted questionnaires, interviews, public consultation and validation workshop. Data were analysed according to the principles of triangulation of evidence from different perspectives (stakeholder categories) and different sources.

Evaluation questions

CURRENT STATUS
• 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?

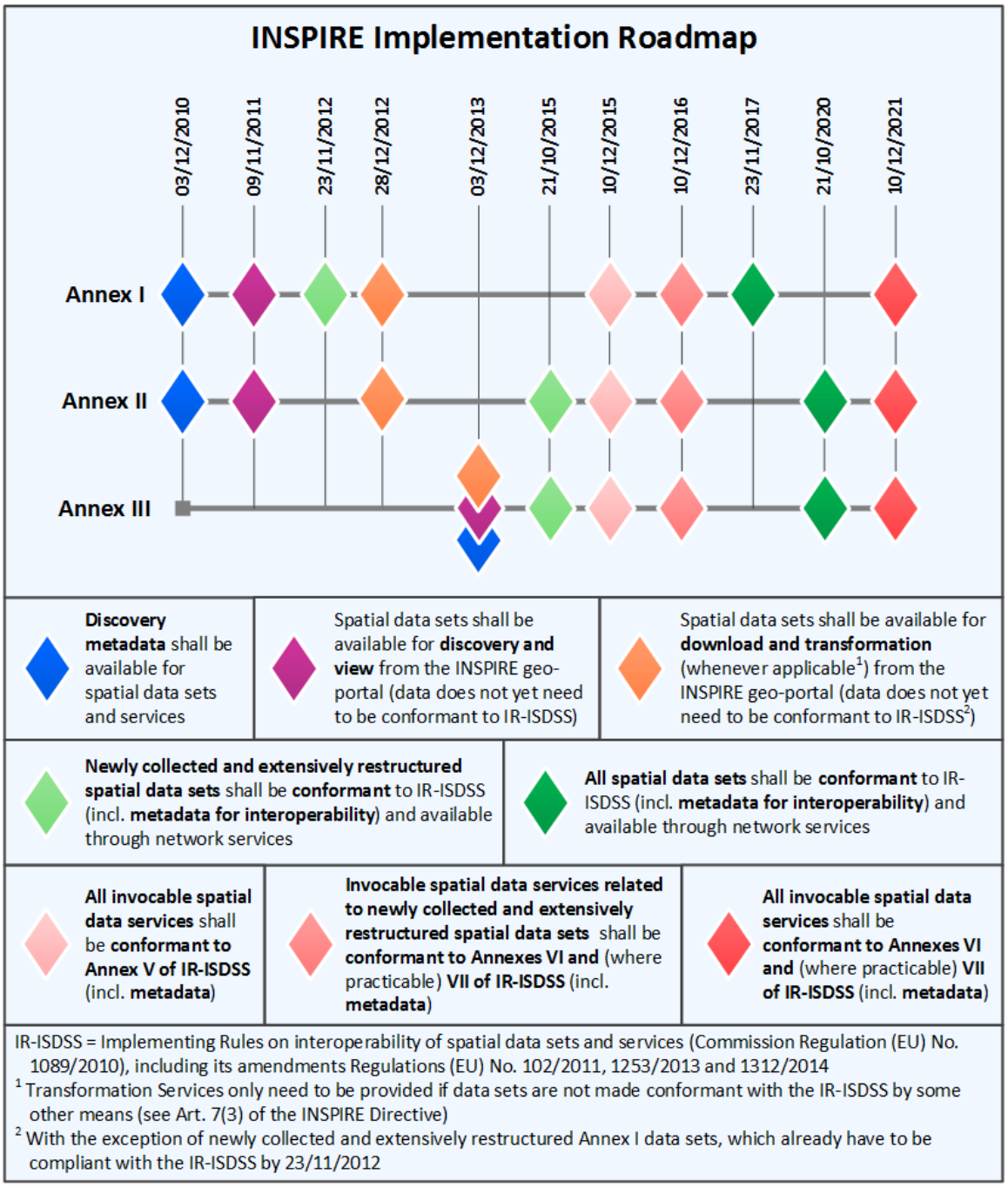
EU ADDED VALUE

- 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?

Annex 4: Logic of the Action

PART A: DETAILED INSPIRE IMPLEMENTATION ROADMAP

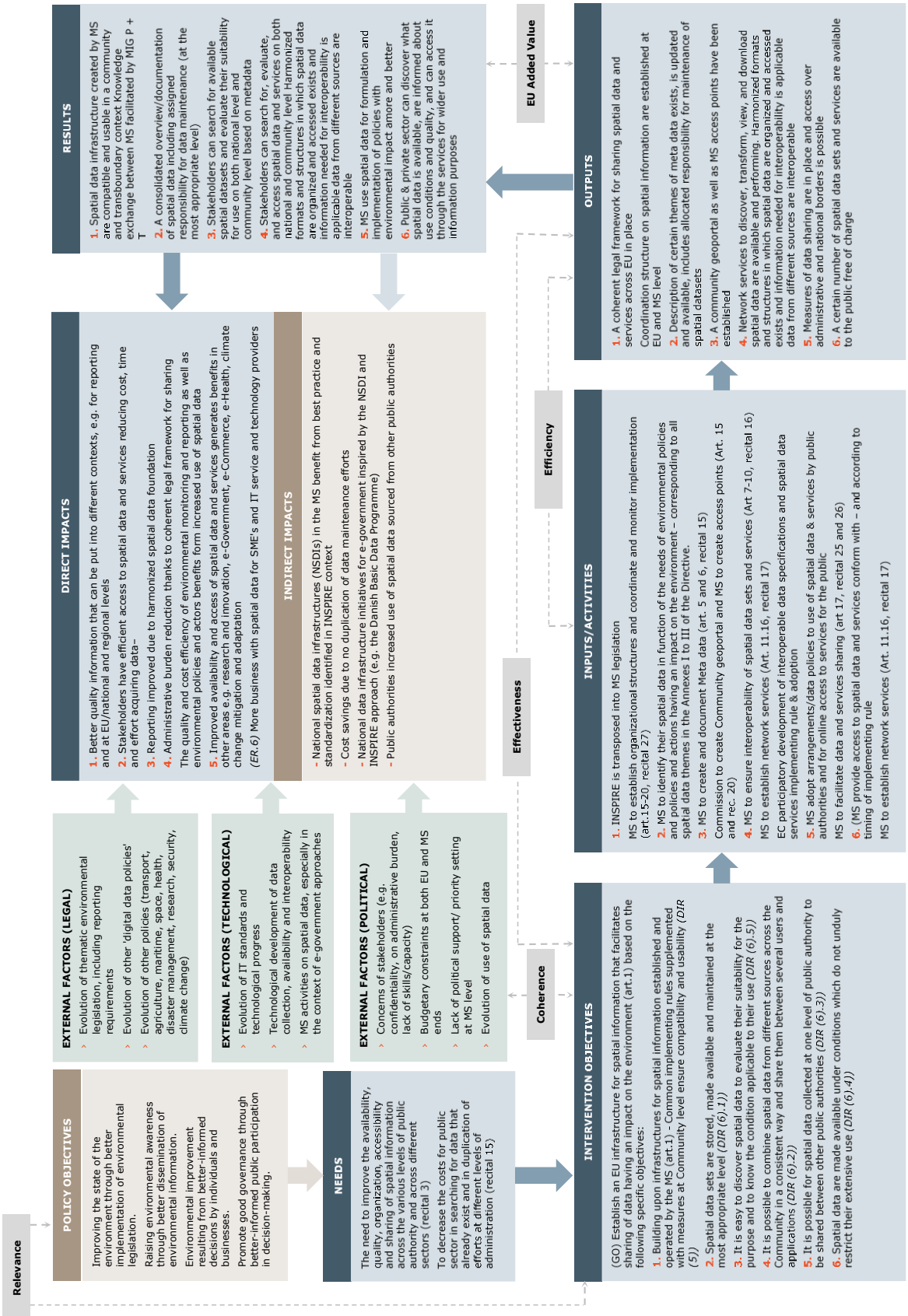
(Source: EEA/JRC Technical report, 10/2014)



ARTICLE	Milestone	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 I spatial 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.

PART B: DETAILED INSPIRE INTERVENTION LOGIC



Annex 5: Coherence of INSPIRE with specific sectoral legislation and initiatives

Agriculture

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:[8]

- 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 (some Member States having regional systems as in Germany and Spain).

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'[9] 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 concerning the ambition to assess its environmental and climate performance, and the general objective of promoting digitalisation of agriculture. [10]

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8 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)

9 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)

10 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)

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. To support national Paying Agencies in this process, DG AGRI setup a process in collaboration with DG ENV and JRC with the aim to have an efficient access to data (use of INSPIRE) and an effective re-use of data (through use cases). An important arrangement AGRI/JRC "IACS 65" (with DG ENV support)has been concluded in 2020. In this context, Technical Guidelines on IACS spatial data sharing[11] through INSPIRE, focusing on data discovery, have been prepared. 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.[12]

According to EU institutions and national authorities, one of the 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); another obstacle is that IACS contains sensitive or personal data, which, however, is generally not spatial data (farmers' registers, entitlements, payments, applications for certain payment schemes), therefore not in the scope of the process setup by DG AGRI. [13]

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 spatial (and non-personal) data, which is scattered across 40 national and regional systems. Using INSPIRE will facilitate the implementation of the new CAP provisions (in particular article 65 (Horizontal Regulation – HZR), 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. [14] In the framework of IACS 65 a new entry in INSPIRE geoportal is proposed to make IACS (limited to LPIS and GSAA) data more discoverable.

The second part of the Technical Guidelines will be published in 2021[15]. 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. [16] 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.

Maritime Spatial Planning

11 Ibid.
12 Ibid.
13 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.
14 Scoping interview with DG AGRI.
15 Ibid.
16 Ibid.

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.[17] According to Abramic et all (2018), maritime uses and activities that must be considered in the MSP process[18] 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 and Aquaculture Facilities', 'Energy resources' or 'Utilities'. [19] 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. [20]

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17 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.

18 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.

19 Abramic, et al. (2018) Maritime Spatial Planning supported by Infrastructure for Spatial Information in Europe (INSPIRE), Ocean and Coastal Management, 152, p. 23-36.

20 Ibid.

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,[21] 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). 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.[22] 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. [23] 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, there are still barriers to supporting the MSP process. The number of marine-related metadata records available in the geoportal is still low, and their availability varies greatly across Member States and marine regions.[24] [25]

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

[21] Ibid.
[22] Ibid.
[23] Ibid.
[24] Ibid.
[25] 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).

data model was developed based on the Planned Land Use data model. [26] HELCOM has developed, as part of the project Pan Baltic Scope 'Guidelines on transboundary MSP output data structure in the Baltic Sea', [27] 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.[28] 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.[29] Work has been done since 2018 to align the EMODnet Human Activities' portal[30] data models to INSPIRE's Data Specifications. A first study published in February 2018[31] 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 mentioned above. [32] Results from this harmonisation exercise with the INSPIRE Land Use data model have been presented online in a dedicated map viewer.[33] The final report from the study concluded that harmonising the EMODnet human activities datasets to the INSPIRE Land Use data

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26 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).

27 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).

28 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).

29 EMODnet Central Portal: https://emodnet.eu/en (Last accessed on 17 May 2021)

30 EMODnet Human Activities: https://www.emodnet-humanactivities.eu/ (Last accessed on 17 May 2021)

31 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).

32 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).

33 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).

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 code list, 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 code list and to extend data models with new attributes. [34]

Transport

TEN-T Guidelines

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).[35] 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. [36] 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

[34] 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).

[35] TENtec: https://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/site/index_en.htm

[36] D2.8.I.7Data Specification on Transport Networks–Technical Guidelines, 2014: https://inspire.ec.europa.eu/id/document/tg/tn

Regulation should 'consistently build on EU data sharing policies, such as the Open Data Directive and the Inspire Directive'. [37]

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. 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 2023, addresses issues linked to monitoring and reporting and could provide a basis to discuss whether and how links to INSPIRE could be created.[38] The data model of the TEN-T network with it specificities could be used under INSPIRE as a good practice. Initial discussions between DG MOVE and DG ENV have started.

Intelligent Transport Systems (ITS) Directive

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. A proposal for the revision of the ITS Directive has been adopted by the European Commission in December 2021, updating its scope in order to reflect the latest developments in the field (e.g. Mobility as a Service and Cooperative, Connected and Automated Mobility). Also, the proposal includes the objective to increase the availability of some of the data types listed in the Delegated Regulations by mandating the availability of specific crucial data types for a specified geographical coverage by a certain date. 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

[37] 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.

[38] Based on information provided in writing by DG MOVE, TENtec Team.

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 Delegated Regulations refer 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 yet exist in the current Delegated 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' and a revision process of the legal text was started in 2020. Article 4 of the Delegated Regulation has been revised to support the use of INSPIRE data specification on transport networks, along with other data standards used for traffic information exchange (such as Datex II)[39]. As a result, the revised Delegated Regulation (EU) 2015/962 has been be aligned with Delegated Regulation (EU) 2017/1926 and the coherence with INSPIRE regarding static data has been ensured, at least legally. The revision also extends the geographical scope of the Delegated Regulation to the entire road network, and includes a number of new data types linked to traffic regulations and restrictions.

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, [40] 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. [41] The 2019 study examined how INSPIRE related with other standards used in the transport domain (Transmodel, NeTEX, DATEX, IATA, TAP-TSI and INSPIRE) and

[39] Datex II: https://www.datex2.eu

[40] 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).

[41] 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).

provided recommendations to Member States on the usage of the various standards for the different data categories covered by the delegated regulation.[42]

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. [43]

Although using INSPIRE data to fulfil the data requirements of the ITS Regulations is in theory possible, experience 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 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 or private initiatives to develop separate datasets on cycling infrastructure. [44]

Climate adaptation (including disaster management)

The new Strategy on adaptation to climate change, [45] 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.

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 and loss

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42 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).

43 Scoping interview with DG MOVE.

44 Scoping interview with DG MOVE.

45 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.

data[46] in Europe was poor. Based on this observation, a European Commission inter-service 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. [47] 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. [48]

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). [49]

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. 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. [50]

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.

Climate ADAPT

Climate-ADAPT[51] 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:

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46 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.

47 Scoping interview with DG CLIMA, Unit A.3 – Adaptation, and the EEA, 16 April 2021.

48 Scoping interview with DG CLIMA, Unit A.3 – Adaptation, and the EEA, 16 April 2021.

49 Scoping interview with DG CLIMA, Unit A.3 – Adaptation, and the EEA, 16 April 2021.

50 Scoping interview with DG CLIMA, Unit A.3 – Adaptation, and the EEA, 16 April 2021.

51 Climate-ADAPT: https://climate-adapt.eea.europa.eu/

- An Urban Adaptation Map Viewer[52], 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[53].

The map services provided by the EEA 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.[54]

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.[55]

Space Policy / Copernicus

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 Europe56, 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, 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.[57]

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.[58] Copernicus offers six thematic services[59]. These services rely on data coming from a set

52 Urban Adaptation Map Viewer : https://climate-adapt.eea.europa.eu/knowledge/tools/urban-adaptation
53 European Climate and Health Observatory : https://climate-adapt.eea.europa.eu/observatory/evidence/projections-and-tools/urban-adaptation-mapviewer-health-focus/
54 Scoping interview with DG CLIMA, Unit A.3 – Adaptation, and the EEA, 16 April 2021.
55 Scoping interview with DG CLIMA, Unit A.3 – Adaptation, and the EEA, 16 April 2021.
56 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.
57 European Commission, Space : https://ec.europa.eu/growth/sectors/space_en
58 Copernicus in detail : https://www.copernicus.eu/en/about-copernicus/copernicus-detail
59 Copernicus services: https://www.copernicus.eu/en/copernicus-services

of dedicated satellites (the Sentinels) and contributing missions (existing commercial and public satellites)[60], 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.[61]

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,[62] 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.[63] On the other hand, the fact that many geospatial datasets and services produced by Copernicus follow INSPIRE guidelines[64] 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[65]), 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' (Recital 9). This obligation is also present in Article 5.2 of Commission Delegated Regulation (EU) No 1159/2013,[66] 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.[67]

60 Copernicus in detail : https://www.copernicus.eu/en/about-copernicus/copernicus-detail

61 In situ component: https://www.copernicus.eu/en/about-copernicus/infrastructure/situ-component

62 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

63 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

64 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.

65 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 68.

66 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.

67 Facchini, M. (DG GROW, Copernicus Unit). Copernicus. Synergies between the EU Copernicus programme and INSPIRE. Presentation at the INSPIRE Conference 2016, 28/09/2016.

Regarding the contribution of INSPIRE to Copernicus in situ data, Regulation (EU) 2021/696[68] 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.[69] 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.[70]

Annex 6: State of play details based on INSPIRE reporting and monitoring obligations.

Coordination, governance structure, data sharing arrangements and usage of the infrastructure

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. 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.

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68 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.

69 Reitz, T., Roller J., Rip F., Bulens, J. (2018) INSPIRE Servicing Copernicus (INSCope). European Environmental Agency, EEA/ IDM/R0/16/010 - Annex 5.

70 Ibid.

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.[71] The supporting Study shows 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 21) 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). For the 2016 baseline, the Summary Report on Status of implementation of the INSPIRE Directive in EU, published by JRC in 2017[72] was used.

Table 21: Implementation status across EU Member States regarding coordination, data sharing arrangements and usage of the infrastructure

	Effective coordination		Data sharing arrangements and usage of the infrastructure	
	2016	**2020**	**2016**	**2020**
Austria	☺	☺	☺	☺
Belgium	☺	☺	☺	☺
Bulgaria	😐	☺	😐	😐
Croatia	😐	😐	😐	☺
Cyprus	😐	😐	😐	😐
Czech Republic	☺	☺	😐	☺
Denmark	☺	☺	☺	☺
Estonia	😐	😐	😐	☺
Finland	☺	☺	😐	☺
France	☺	☺	☺	☺

[71] 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.

[72] 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.

Germany	☺	☺	☺	☺
Greece	😐	😐	😐	😐
Hungary	😐	😐	😐	😐
Ireland	😐	☺	😐	☺
Italy	😐	😐	😐	😐
Latvia	☺	☺	☺	☺
Lithuania	☺	☺	☺	☺
Luxembourg	☺	☺	☺	☺
Malta	☺	☺	☺	☺
Netherlands	☺	☺	☺	☺
Poland	☺	☺	☺	☺
Portugal	☺	☺	☺	☺
Romania	😐	☺	😐	☺
Slovakia	☺	☺	😐	☺
Slovenia	☺	☺	😐	☺
Spain	☺	☺	☺	☺
Sweden	☺	☺	☺	☺

Performance monitoring based on the INSPIRE monitoring indicators[73]

To ensure better comparison pre- and post-2019, the results for the entire period from 2014 to 2020 have been aligned to the new indicator framework established in the most recent reporting Decision. All 19 indicators measure implementation of the INSPIRE Directive and are grouped into 5 categories (see Table 22) that are in line with the envisaged outputs according the intervention logic and the main implementation steps required by the INSPIRE Directive.

Table 22 Implementation categories and corresponding indicators

Implementation category	Codes of monitoring indicators
Availability of spatial data and services[74]	DSi1.1, DSi1.2, DSi1.3, DSi1.4, DSi1.5

[73] Minghini M., Cetl V., Ziemba L., Tomas R., Francioli D., Artasensi D., Epure E., Vinci F. - Establishing a new baseline for monitoring the status of EU Spatial Data Infrastructure, Experiences and conclusions from INSPIRE 2019 monitoring and reporting, EUR 30513 EN, Publications Office of the European Union, Luxembourg 2020, ISBN 978-92-76-27384-4, doi:10.2760/296219, JRC122351, https://publications.jrc.ec.europa.eu/repository/handle/JRC122351

[74] The indicators for availability of spatial data and services operate with absolute numbers and therefore cannot present any trends.

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.[75] In 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.

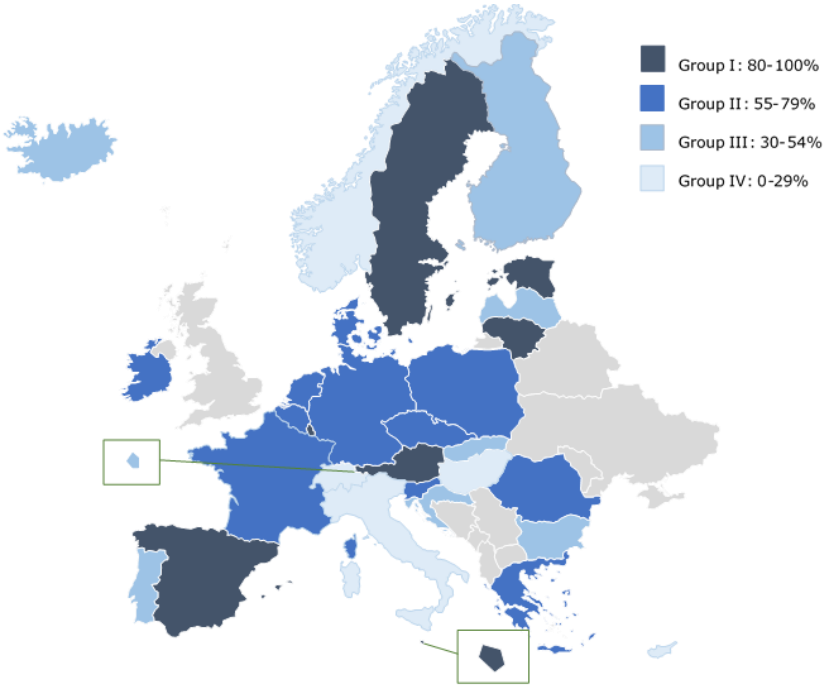
For a more comprehensive overview of the overall performance of the countries, four distinct implementation groups have been defined that are used to group countries based on their performance:

- Group I: 80-100%
- Group II: 55-79%
- Group III: 30-54%
- Group IV: 0-29%

The map below (Figure 15) shows the four implementation groups when considering the overall set of monitoring indicators. The countries are quite evenly spread across the four groups, which shows considerable differences between the countries regardless of the geographic location.

[75] 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.

Figure 6 INSPIRE implementation, based on the INSPIRE performance indicators, 2020



Availability of spatial data sets and services

As shown in Figure 16, 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.[76] 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.

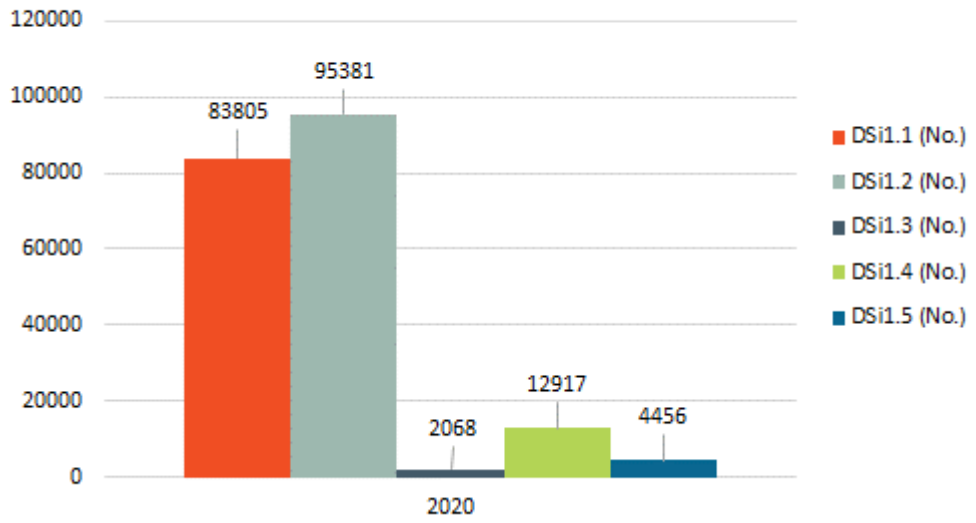
The number of data sets and services varies across countries and regions. In the recent years, several countries reduced the number of spatial data sets, for example, by combining several local and regional data sets into national ones. Thus, the number of

[76] 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.

data sets and services does not show any findings in terms of implementation maturity; it only presents the overall picture together with other indicators.

[77]

Figure 7 Availability of spatial data sets and services

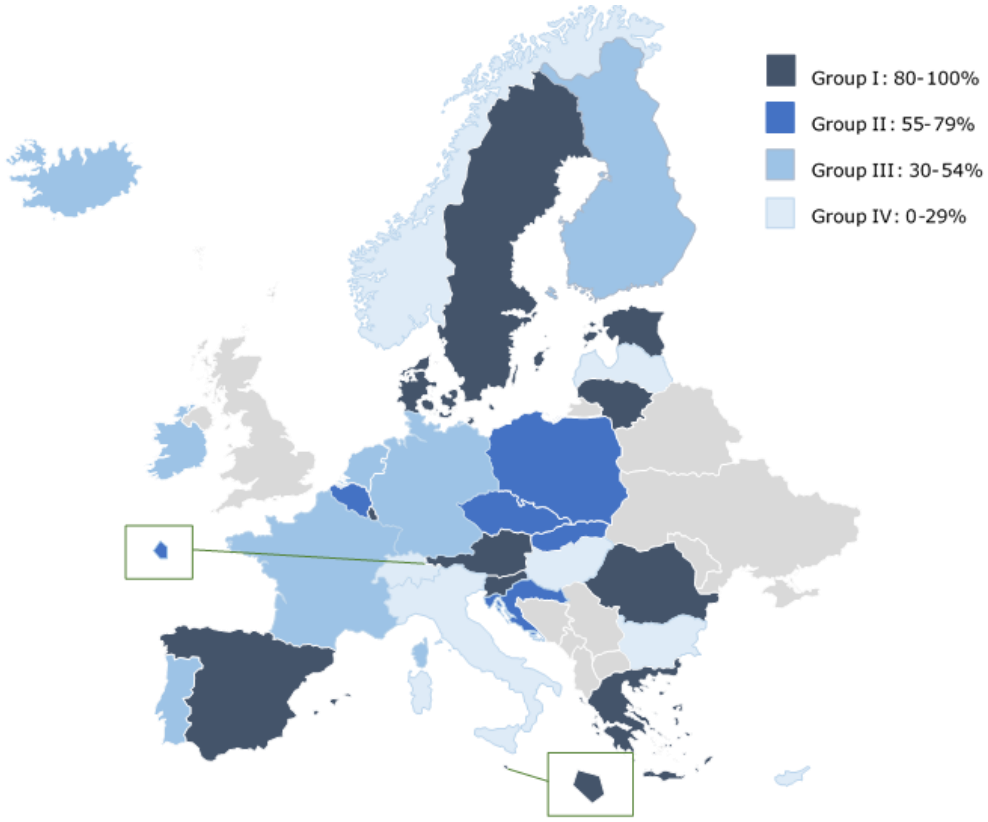


Conformity of metadata

As regards the indicators related to the conformity of metadata for spatial data sets and spatial data services, the values are heterogeneous 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 17).

[77] 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.

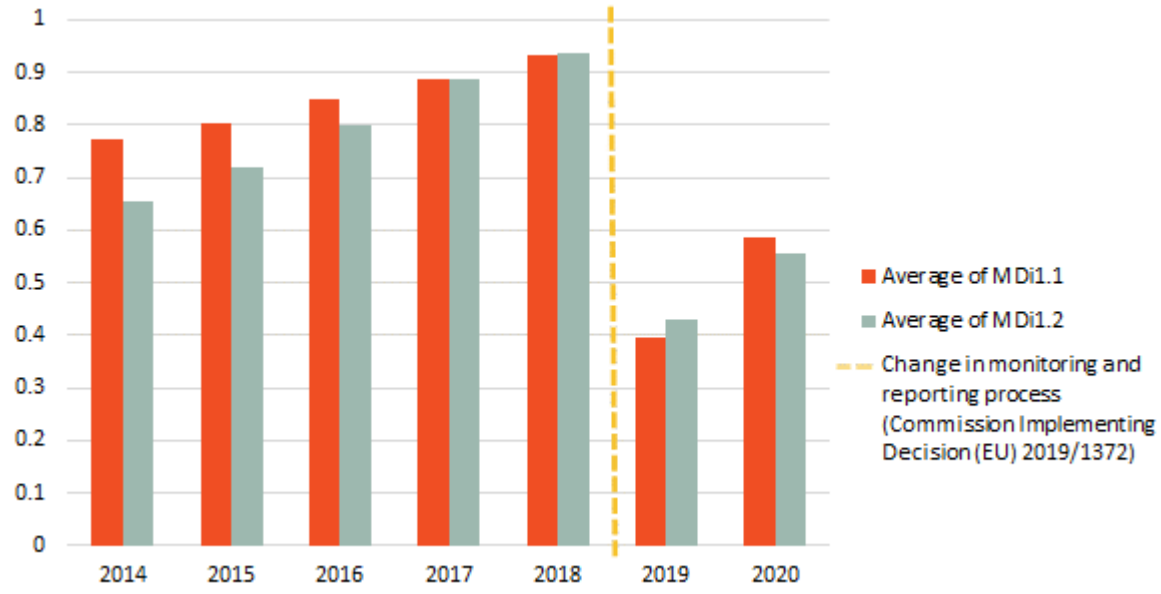
Figure 17 INSPIRE implementation based on the INSPIRE monitoring indicators related to the conformity of metadata (MDi.1.1, MDi1.2), 2020



As can be seen in the graph presenting the implementation status from 2014 and 2020 (see Figure 18), 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 18 Conformity of metadata with Regulation (EC) No 1205/2008[78]

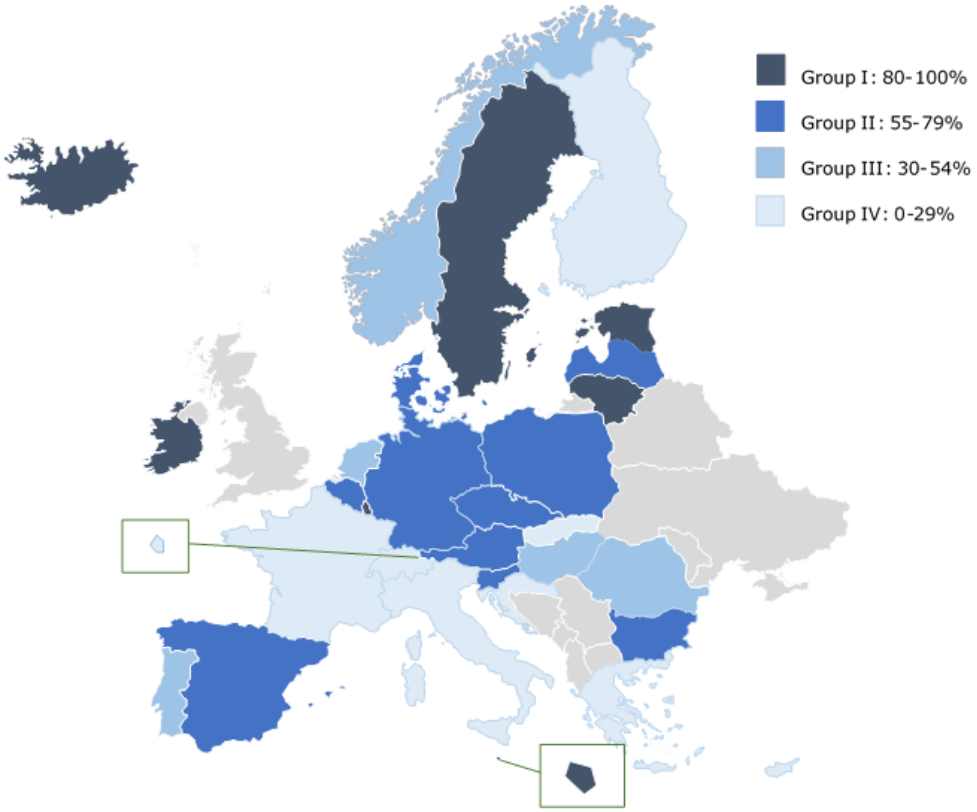


Conformity of spatial data sets

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 ts 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 (Figure 19), the performance of countries is very heterogeneous. 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.

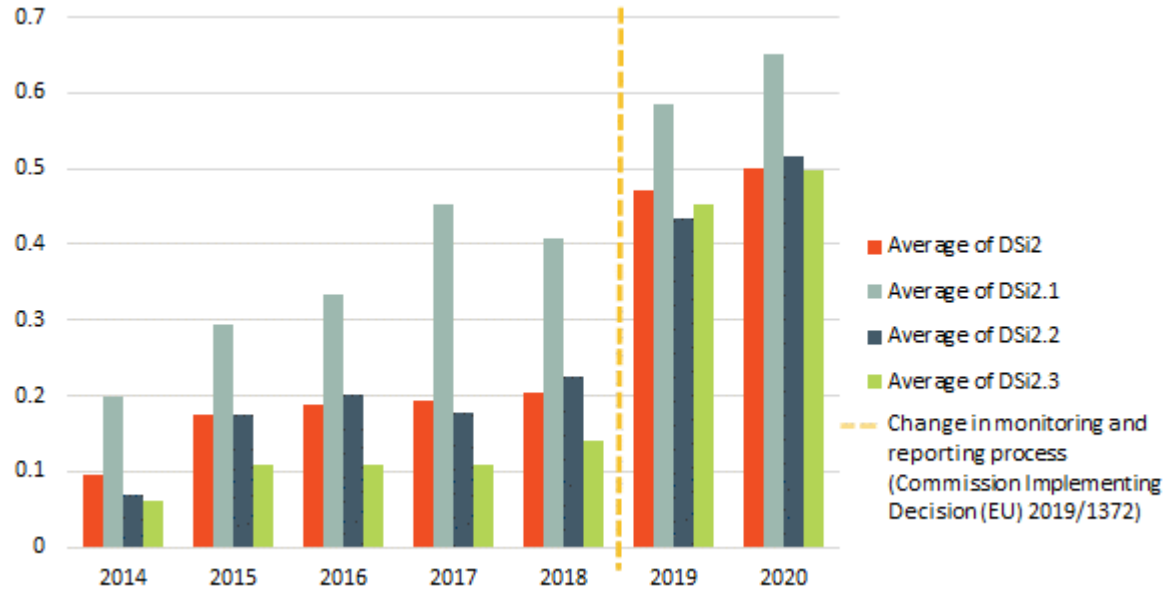
[78] The indicator MDi1.1 denotes the percentage of metadata for spatial data sets conformant with Commission Regulation (EC) No 1205/2008 as regards metadata, while the indicator MDi1.2 presents the percentage of metadata for spatial data services conformant with Commission Regulation (EC) No 1205/2008 as regards metadata.

Figure 19 INSPIRE implementation based on the INSPIRE monitoring indicators related to the conformity of spatial data sets (DSi2, DSi2.1, DSi2.2, DSi2.3), 2020



The graph below (Figure 20) 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 20 Conformity of spatial data sets[79]



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 that 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.[80]

As illustrated in the map below (Figure 21), the performance of countries is quite heterogeneous, 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

[79] 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.

[80] Minghini M., Cetl V., Ziemba L., Tomas R., Francioli D., Artasensi D., Epure E., Vinci F. - Establishing a new baseline for monitoring the status of EU Spatial Data Infrastructure, Experiences and conclusions from INSPIRE 2019 monitoring and reporting, EUR 30513 EN, Publications Office of the European Union, Luxembourg 2020, ISBN 978-92-76-27384-4, doi:10.2760/296219, JRC122351

(NSi2.2). This means that around half of available data sets were not yet accessible across the EU Member States and EEA/ EFTA countries.

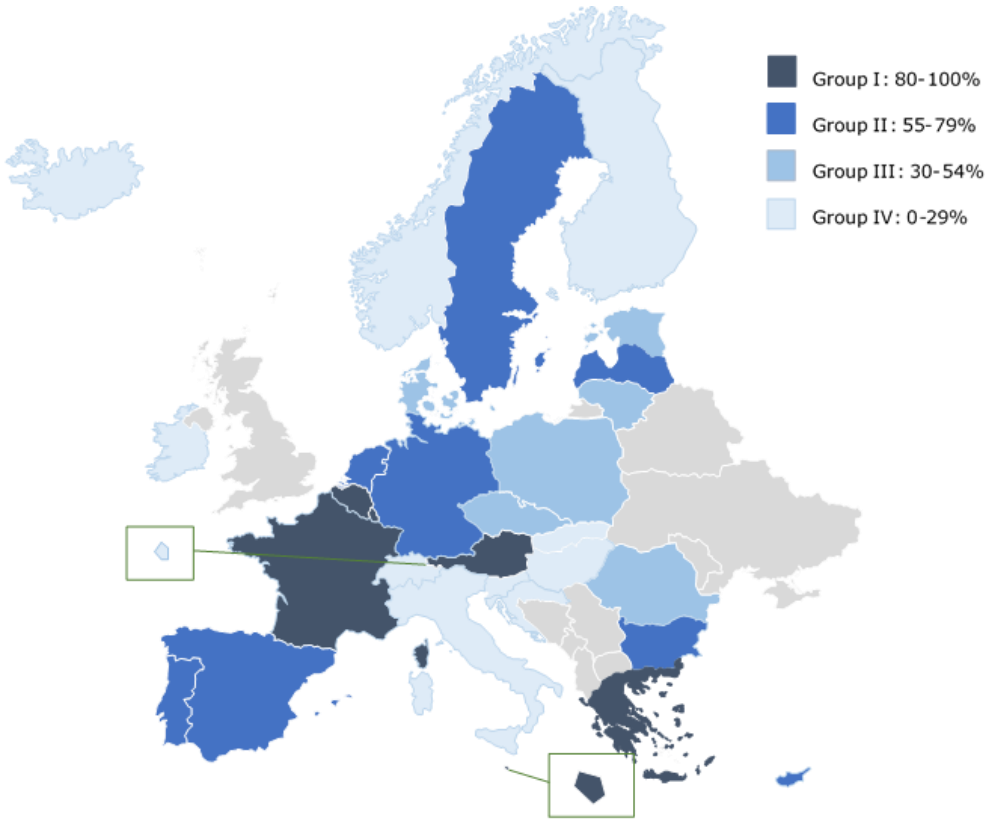
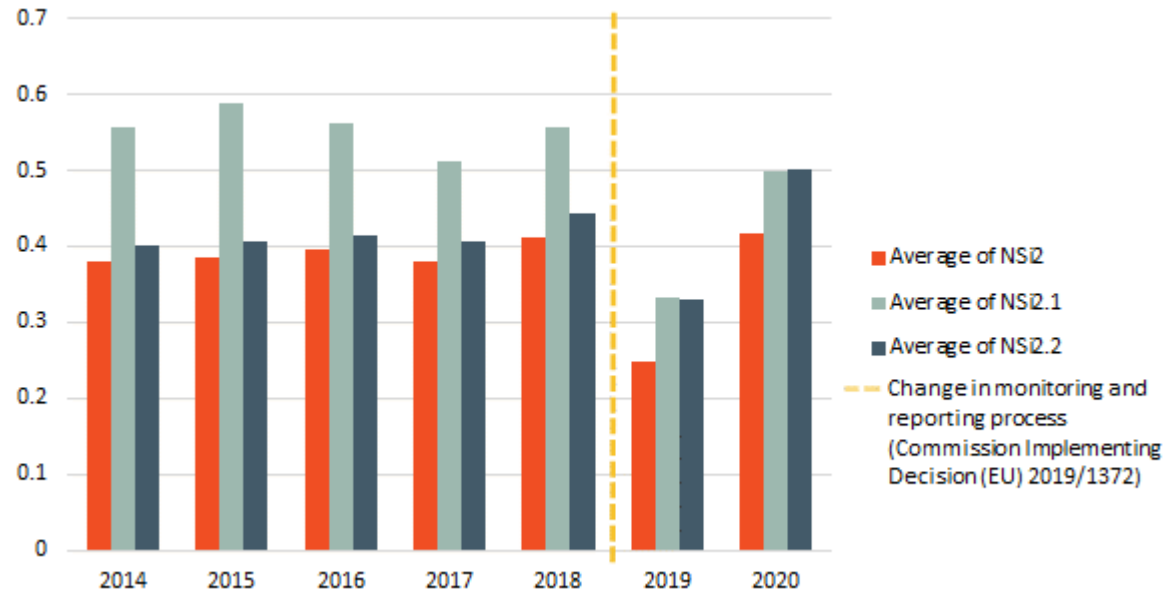


Figure 21 INSPIRE implementation based on the INSPIRE monitoring indicators related to the accessibility of spatial data sets through view and download services (NSi.2, NSi2.1, NSi2.2), 2020

The graph below (Figure 22) 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 22 Accessibility of spatial data sets through view and download services[81]



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.[82] With the exception of NSi4.4 (related to the conformity of transformation services), the values of all monitoring 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 (Figure 23), with overall average values of four indicators spanning from 80% to 100%.

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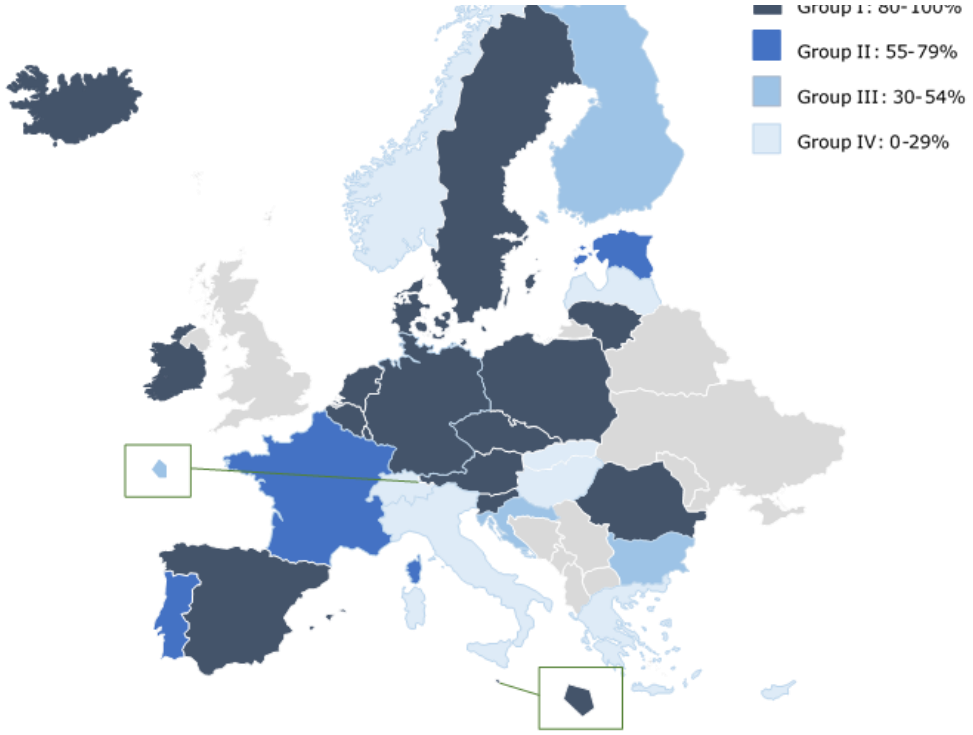
[81] NSi2: The percentage of spatial data sets that are accessible through view and download services; NSi2.1: The percentage of spatial data sets that are accessible through view services; NSi2.2: The percentage of spatial data sets that are accessible through download services.

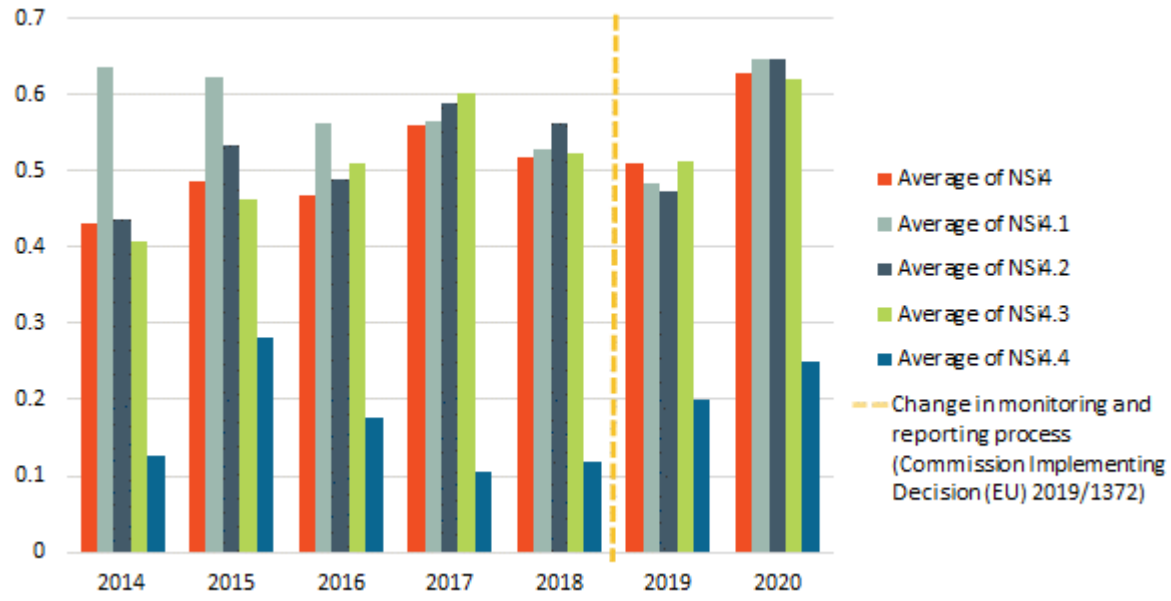
[82] Minghini M., Cetl V., Ziemba L., Tomas R., Francioli D., Artasensi D., Epure E., Vinci F. - Establishing a new baseline for monitoring the status of EU Spatial Data Infrastructure, Experiences and conclusions from INSPIRE 2019 monitoring and reporting, EUR 30513 EN, Publications Office of the European Union, Luxembourg 2020, ISBN 978-92-76-27384-4, doi:10.2760/296219, JRC122351

Figure 14 INSPIRE implementation based on the INSPIRE monitoring 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 24), 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 24 Conformity of the network services[83]



[83] 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.