

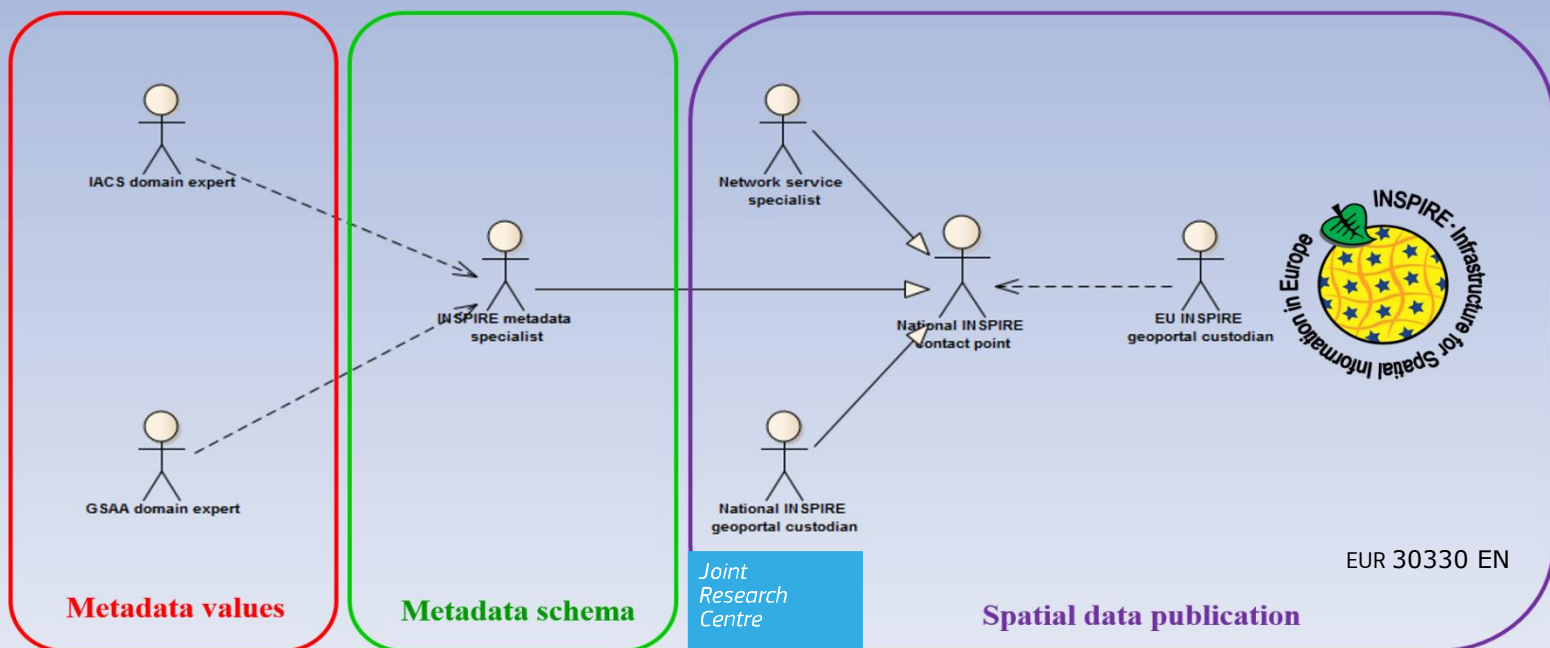


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Technical Guidelines on IACS Spatial Data Sharing Part 1 – Data discovery

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Executive summary

The sound and transparent management of the Common Agricultural Policy (CAP) is ensured through IACS, the Integrated Administration and Control Systems, which is set up and run by the Member States (MS). This system is composed by different databases (datasets), among them the LPIS (Land Parcel Identification System) and the GSAA (Geo Spatial Aid Application, i.e. information from the beneficiaries of CAP). The evolution of the CAP, notably the necessity to assess the environmental and climate performance, requires more collaboration with different communities (e.g. statistics, forestry, agriculture, climate). Interoperability between the systems and access to the data are the key enablers of this process. With views of building a European data economy as part of the Digital Single Market strategy, the European Commission solicits to share the spatial information residing in the IACS.

According to the guidance of the legal service of DG AGRI, the geospatial information included in the IACS of the MS has to be shared according to INSPIRE. The knowledge and the physical infrastructure resulting from the implementation of the INSPIRE directive give an opportunity for the IACS community to get involved in the Common European Data Space - a seamless digital area, which enables the development of new products and services based on data.

Data sharing has different stages. First, data should be discoverable, which is supported by metadata and network services. Second, the reuse of data can be further facilitated by interoperability of systems and when appropriate, by data harmonisation. This document deals with discovery of datasets, as it has been shaped by the consultation with the MS in course of surveys, document reviews, workshops and the pilot projects implemented in five MS. Discovery of distributed digital datasets on the Internet is facilitated by a single and specialized access point. In INSPIRE, the EU INSPIRE geportal plays this role, communicating with the portals (or the discovery services) of the MS.

Using the INSPIRE infrastructure and knowhow saves resources for the IACS community and contributes to interoperability with the environmental domain. The environmental ambition will substantially increase in the next programming period of CAP (2021-2027). A specific provision, Art. 65 of the Horizontal Regulation (a Commission proposal not yet adopted at the moment of drafting this document) foresees the obligation to share IACS data in context of the INSPIRE Directive. In order to speed up this process, the Paying Agencies (PAs) are strongly encouraged, to consult with the bodies, responsible for the national implementation of INSPIRE, in order to clarify how to publish LPIS and GSAA metadata using the local INSPIRE infrastructure. A PA may choose to operate an in-house discovery service, which communicates with the national INSPIRE portal, or can send metadata files to the operators of the national INSPIRE portal.

Independently from the chosen collaboration model, the PA has to ensure the production and updating of the discovery metadata that are compliant with INSPIRE. In the frame of the LPIS quality assurance, the LPIS community has already gained experience with metadata production and transfer. The common set of geographic information standards used in LPIS and INSPIRE further underpins the collaboration.

In order to facilitate the discoverability of the LPIS or the GSAA datasets at European level, a set of agreed metadata values, such as common keywords, controlled vocabularies, and other conventions are needed. As a result of the consultation with the MS, these commonly agreed elements are also included in this technical guidance (TG). The shared metadata values contribute to a Pan-European product branding of LPIS and GSAA and provide visibility to the PAs and to the CAP.

Foreword: How to read this document?

This Technical Guideline (**TG**) follows the assumption that IACS spatial data sharing will be implemented by a collaborative effort of the Paying Agencies and the national INSPIRE structures. Therefore, this document explains the domain specific considerations of IACS in the context of INSPIRE, but does not deal with the general requirements, which are set by the INSPIRE implementing rules and guidelines. If a PA decides to proceed alone, the following documents shall also be taken into account:

- INSPIRE Metadata Implementing Rules: Technical Guidelines Based on EN ISO 19115 and EN ISO 19119 (INSPIRE Metadata Drafting Team 2013)¹
- Technical Guidance for the Implementation of INSPIRE Discovery Services” (INSPIRE IOC Task Force for Network Services 2011)

As a technical guideline, this document is addressed to an expert-audience and contains detailed technical information. Directors and managers may need a quick way to quantify the scale and understand the impact of the tasks needed for the implementation of IACS spatial data sharing. Besides the Executive summary they may profit from the Section 4, which describe the data discovery architecture and the workflows in general.

The addressees of Section 5 are thematic experts, who have a deep knowledge of LPIS and GSAA. They are the best placed to define the values of the proposed metadata elements. This section gives sufficient insight in the INSPIRE metadata schema and provides considerations for defining the metadata values. The responsibility for the correctness of the metadata values stays with the LPIS/GSAA thematic experts.

Collaboration with INSPIRE experts helps to easier understand the INSPIRE discovery metadata schema and is useful either in learning the usage of metadata editor (if available) or in encoding the metadata values in *xml*. INSPIRE experts who help in IACS data sharing may profit of the unambiguous statements of **requirements** and the **recommendations** of Section 5. They may also appreciate the table view of all metadata elements in Annex C. An example of an xml file (with values) will be provided at a later phase.

¹ Full bibliographic references are given at the end of the document

Acknowledgement

This document was prepared by the Joint Research Centre of the European Commission with active participation of the domain experts from the Paying Agencies of the Member States and INSPIRE experts of the Commission. A consensus building process was started by an initial survey on data discovery, which was filled by 29 respondents. The participants of the metadata pilots came from Bulgaria, Czech Republic, Denmark, Slovenia and Spain. The experience of the pilots as well as the result of the survey was reflected in the draft technical guidelines. This draft was reviewed by Tine Frederiksen, Kateřina Hátlová Giacomo Martirano, and Lucie Šavelková.

The second version of the guideline was reviewed by the IACS domain experts from Austria, Belgium (Wallonia and Flanders), Czech Republic, Denmark, Estonia, France, Finland, Luxembourg, Netherlands, Poland, Portugal, Sweden, and Slovenia that provided almost 80 comments. The experts of these MS have fundamentally contributed to the improvement of the document. The authors would like to thank them for their work. Mohamed El Aydam and Piotr Wojda (DG AGRI D.3) helped in policy aspects, while Robert Tomas and Vlado Cetl (JRC B.3) provided consultancy on the EU INSPIRE geoportal, architecture and metadata.

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Abstract

The demand for sharing spatial information residing in the IACS systems of the Member States has increased in many policy domains. An indispensable condition of data sharing is the discoverability of data. This guideline explains the technical background of data discovery within the INSPIRE infrastructure, including the system architecture, spatial data discovery services, dataset and service metadata and the role of the INSPIRE geoportal. In order to improve the discoverability of the Land Parcel Identification and the Geospatial Aid Application datasets at European level, harmonized keywords have been introduced. The implementation of the data sharing process by the agricultural Paying Agencies is supported by technical requirements, recommendations and practical examples.

1 Structure of the document and notation

For a better overview, this document applies the notation successfully used in INSPIRE. First, there are generic explanatory paragraphs that outline the context and explain the possible technical solutions. When needed, figures and tables are included. These explanatory parts underpin the main conclusions that are presented as TG (Technical Guidelines) Requirements and TG Recommendations.

TG requirements are indispensable provisions to fulfil the Commission Regulation (EC) No 1205/2008 of 3 December 2008 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata (European Commission 2008) and the Commission Regulation (EU) No 1311/2014 (European Commission 2014) amending Regulation (EC) No 976/2009 as regards the definition of INSPIRE metadata (a.k.a. INSPIRE metadata implementing rules). In addition, there are some more LPIS/GSAA specific requirements that contribute to the European identity and visibility of these datasets. **The implementation of TG requirements is mandatory.** These elements are the results of the consensus building process (survey, pilots, commenting) within the IACS community.

Without the TG requirements publishing and finding LPIS and GSAA in the INSPIRE infrastructure is not possible. The verbal form of requirements is “shall” and have a specific notation as follows:

TG Requirement X. Notation and role

TG requirements are those functional elements that shall be fulfilled by the data/metadata providers in order to share spatial information according to INSPIRE.

The recommendations are non-essential provisions that converge the technical solutions of the MS and help the potential users to find and retrieve the data using the INSPIRE infrastructure. **The implementation of the TG recommendations is not mandatory** but would considerably increase the efficiency of accessing the datasets (from an EU user point of view). The verbal form of recommendations is “should” and follow the following notation:

TG Recommendation Y. Notation and role

TG recommendation are those functional elements that help the uniform implementation of LPIS/GSAA data sharing across Europe.

The provisions of the technical guidelines are accompanied by examples both in natural language (*indented, with italics*) and in XML. The latter are framed.

2 Introduction

From a computational point of view **data sharing is the ability to access and use the same data resource by multiple applications or users**. This definition also implies that data are used for different purposes to that they have been originally created for. Data sharing leads to particular challenges:

1. The potential (re)users have to get the knowledge about the existence of data and the conditions of use;
2. Users need to understand the nature of data and their fitness for the purpose;
3. Users require an easy access to data, which includes appropriate technical solutions through the Internet and collaborative agreements of the parties² behind the data service.

When these conditions are fulfilled, the task of data sharing, in strict sense, is resolved. However, in course of reusing the data additional challenges may arise. The technical specifications of data sources are optimised according to the original tasks and the systems that they were designed for. Consequently, problems of interoperability should be resolved.

“Interoperability means the possibility for spatial data sets to be combined, and for services to interact, without repetitive manual intervention in such way that the result is coherent and the added value of the datasets and services is enhanced” (European Parliament and European Council 2007).

The notion of spatial data sharing is tightly connected with **spatial data infrastructures** (SDIs), which provide not only the technical means, organizational arrangements, but also capacity building for data sharing and collaboration of the interested parties. SDIs can be set up at various level both in geographic (e.g. regional, national, European, global) and thematic sense (e.g. environment, agriculture, forestry, statistics). An SDI is not complete without a **single access point**, where users can find all the services and datasets. Such access points are commonly referred to as **geoportals**, which can be set up at every level of SDI and can be connected with each other in a cascading way; i.e. from EU to MS and then to the regions, etc..

The guiding principle of SDIs is the concept of **reuse**. It equally applies to entire datasets, data components, specifications and other technical solutions. SDIs greatly benefit from existing standards as they provide solutions that have been agreed by competent organisations (formal standards) or user communities (de facto standards). The standards used in the geospatial community are created and maintained by the Technical Committee 211 (TC 211) of the International Standards Organisation (ISO) and by the Open Geospatial Consortium (OGC).

The rationale behind selecting INSPIRE as a technical framework for IACS data sharing is multifold:

1. INSPIRE is operational and accumulates long-standing experience and collective knowledge;
2. Spatial data of IACS can be fit in the thematic scope of INSPIRE;
3. Some MS already share IACS/LPIS data under INSPIRE;
4. Similarity of the governance model in the two systems;
5. The technical architecture of IACS is fully compatible with INSPIRE

INSPIRE is a prominent example of a legally mandated infrastructure. The INSPIRE Directive of the European Parliament and the Council (2007/2/EC) sets up an infrastructure for spatial information in Europe to support environmental policies or activities that may have an impact on the environment (Tóth et al. 2012). The history of INSPIRE dates back around 20 years. It has matured based on intensive consensus building, involving best expertise from the EU and beyond, as well as on continuous improvements of its technical components.

The European governance model of INSPIRE and IACS (LPIS, GSAA) is very similar in the sense that no pan-European datasets exist. Data reside at the local sources; data providers fully control the access to their data. They ensure data updates and provide the necessary service infrastructure. This distributed approach allows applying the local rules that may include, for example, granting non-discriminatory access rights according to the various types of

² This is especially relevant for spatial data infrastructure. Data owners may provide services directly to the end users, but also may collaborate with other organisations that set up the necessary IT infrastructure. In addition, coordination bodies are also needed that are often responsible for the SDI strategy.

the users, applying licenses or, if the local regulations foresee, collecting payments. The EU plays a coordination role, in order to help the implementation and to agree on future developments.

INSPIRE provides a unique access point, the EU INSPIRE geoportal, to the spatial datasets and spatial data services operated by public authorities of the MS. Currently³ there are more than 350,000 metadata records, out of which approximately 190,000 relate to data resources. Nowadays 149 datasets or services carry the LPIS and 17 the GSAA label in the INSPIRE geoportal. However, this number may be not correct. In absence of common agreements, not all the data providers applied these labels, while others have assigned datasets (e.g. orthoimagery) that is an input, but not an LPIS dataset.

The scope of INSPIRE is defined by the so-called data themes that are presented in *Table 1*. It is easy to notice, that some of them include concepts similar to LPIS or GSAA. Based on the results of the survey, the IACS community prefers publishing their data under Land cover, Land use, Cadastral parcels, Agricultural facilities and/or Area management zones.

Table 1. Data themes of INSPIRE

The data themes of INSPIRE are divided in modular blocks. “Annexes I and II focus on reference data, while Annex III focuses on data for environmental analysis and impact assessment.	
Annex I	Annex III
1. Coordinate reference systems	14. Statistical units
2. Geographical grid systems	15. Buildings
3. Geographical names	16. Soil
4. Administrative units	17. Land use
5. Addresses	18. Human health and safety
6. Cadastral parcels	19. Utility and governmental services
7. Transport networks	20. Environmental monitoring facilities
8. Hydrography	21. Production and industrial facilities
9. Protected sites	22. Agricultural and aquaculture facilities
•	23. Population distribution – demography
•	24. Area management/restriction/regulation zones & reporting units
•	25. Natural risk zones
Annex II	26. Atmospheric conditions
10. Elevation	27. Meteorological geographical features
11. Land cover	28. Oceanographic geographical features
12. Ortho-imagery	29. Sea regions
13. Geology	30. Bio-geographical regions
	31. Habitats and biotopes
	32. Species distribution
	33. Energy Resources
	34. Mineral resources

The PA of the MS were ones of the early adopters of the e-Government solutions that made the aid application process electronic, using various services on the Internet. Some of these services are based on spatial information, which help the farmers to search, visualise, locate, and sometimes delineate agricultural parcels that they use. Farmers also may inquire information, which is linked through object referencing to the parcels. The reference parcels of the LPIS subsystem are the most frequently used features for such referencing. For easier orientation the LPIS is usually visualised together with orthoimagery.

³ On the day of the last revision of the draft – 2020-06-04.

Meanwhile discovery and view services are available in most of the cases for the wider public, the accessibility to the data behind varies from one MS to another. Even within a MS the access rights may depend on the role of the users.

EXAMPLE: In the Czech Republic the users are classified in three different groups, ranging from general public, through public authorities to the interested farmers. Research institution can apply for additional rights – as compared to the general public – on case by case basis.

This TG does not deal with questions of licencing, digital right management, and digital payments. If such arrangements apply in a MS, our assumption is that they are implemented locally by the data provider or in the frame of the SDI. The guidelines does not address pure IT tasks of the data sharing infrastructure either.

3 Scope of IACS-INSPIRE spatial data sharing

DG AGRI D3 established a preliminary list⁴ of IACS spatial information to be shared based on the user requirement survey among the services of the Commission and the outcome of the technical meetings with four MS (Czech Republic, Denmark, Slovenia and Spain) and JRC D5. The preliminary list, included in *Table 2*, gives the starting point of data sharing work, implying that the LPIS and the geospatial aid application (GSAA) are in the targets of the exercise.

*Table 2. List of IACS spatial information elements foreseen for sharing (as revised by the legal service of DG AGRI on 20/11/2019)*⁵

High level user requirement	Detailed need	Corresponding technical concepts
Stable information (LPIS)	A stable identification of reference parcels	Reference parcel feature type with <ul style="list-style-type: none"> - Unique identifier - Representation geometry (polygon)
	The Maximum Eligible Area (MEA) per reference parcel (i.e. the basis for eligibility for any scheme)	Reference parcel feature type with <ul style="list-style-type: none"> - Maximum eligible areas (per support scheme) Support scheme code list
	Inventory of stable ecological focus areas (EFA-layer)	Ecological focus area feature type with <ul style="list-style-type: none"> - Unique identifier - Representation geometry - Equivalent area Ecological focus area code list
	Land cover classification	Agricultural area feature type with <ul style="list-style-type: none"> - Representation geometry (polygon) Agricultural area code list (arable, permanent crop, permanent grassland)
	Other area-related information relevant for eligibility: e.g. areas with natural/specific constraints, Natura 2000 areas, Water Frame Directive, etc. ⁶ .	IACS is normally a user of this information, which is imported from third party sources. The data sharing obligation, according to INSPIRE, stays with the data owner/custodian. However, for historical references the PAs may store a specific version of third party data, or can save and store the result of operations (e.g. intersection of RPs with Natura 2000, to track the eligibility of 2 nd pillar supports).
Yearly information provided through the beneficiary declaration (GSAA)	Boundaries and areas;	(Geospatial) Aid application feature type
	The uses (by crop or crop group as defined by MS): <ul style="list-style-type: none"> - permanent grassland (geo-localised); - the uses on arable land for crop diversification (>10ha); 	<ul style="list-style-type: none"> - with crop groups or Crop type code list
	Individual Ecological Focus Areas;	Ecological focus area feature type with <ul style="list-style-type: none"> - Unique identifier - Representation geometry - Equivalent area Ecological focus area code list
	Area-related rural development measures	Code list of rural development measures linked to the aid application or the agricultural holding feature type.

⁴ The final list will be provided by DG AGRI in due time.

⁵ The data proposed for sharing comes from the legislation, in particular IA 640/2014 for LPIS (art 5) and 809/2014 for the GSAA.

⁶ Provided that the PAs or the LPIS custodians are the owners (the exclusive source) of these datasets.

The information requirements listed in *Table 2* are those elements that are conceptual parts of every IACS implementation. This table also presents an initial conceptual mapping⁷ to the IACS information classes and their attributes.

For underpinning administrative processes, MS may include auxiliary data, which is not necessarily collected for IACS, but can be imported from third party sources. Such information may range from orthoimagery and land tenure rights, Natura 2000, or nitrate sensitive areas, etc. According to the principle of INSPIRE, the data sharing obligation applies to data owners or custodians, but not to the users. Consequently, **when IACS is a user of third party spatial data** (i.e. data has been imported), **the paying agencies (PAs) are not obliged to share them**. The sharing obligation stays with the data source.

In case a PA decides to collect additional spatial information within the scope of the INSPIRE Directive by its own capacity, the provisions of INSPIRE will apply and data sharing has to be ensured according to the provisions of INSPIRE.

⁷This mapping will be revised in Part II (Interoperability) of the TG, based on the outcome of the forthcoming pilots.

4 Discovery infrastructure and workflows

4.1 INSPIRE architecture

The architecture of INSPIRE, as seen in *Figure 1*, is service oriented⁸, which means that the access to spatial data and metadata occurs via spatial data services. These services are implemented as web services.

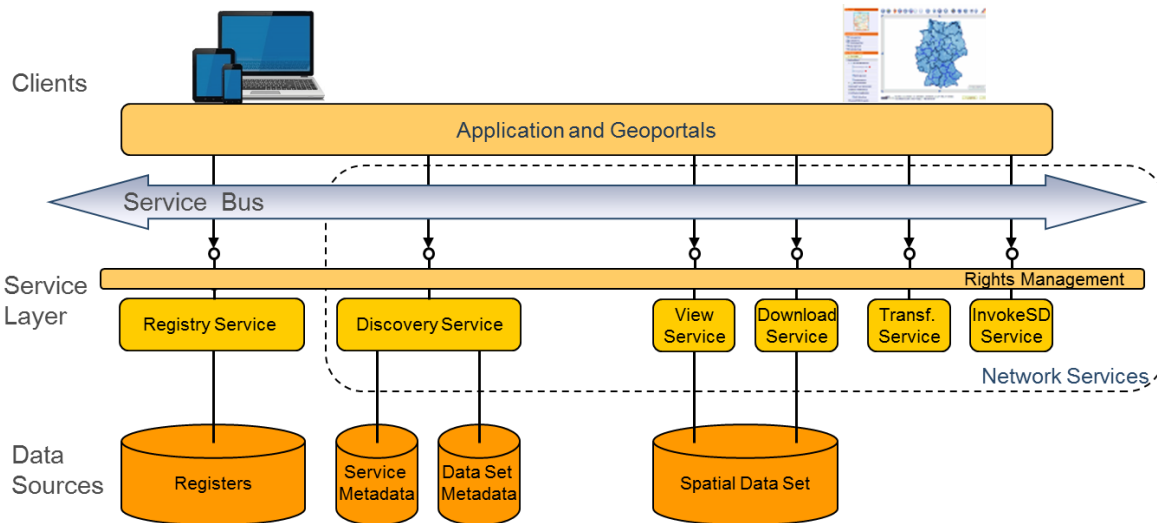


Figure 1. Simplified overview of INSPIRE architecture

The core resource of INSPIRE is the actual content, i.e. the spatial data⁹, which, according to INSPIRE is defined as any data with a direct or indirect reference to a specific location or geographic area. Spatial data are usually included in **spatial data sets**. ISO TC 211 defines spatial datasets as identifiable collections of spatial data. When more spatial datasets share the same specification, they can be packaged in **spatial dataset series**. **Metadata** are needed to find, access, interpret or use the data. Data sharing is enabled by the **discovery, view, transformation, download** and **invoke network services**, which are specified in the INSPIRE Directive and the related implementing rules.

Registers are important artefacts for establishing and operating the infrastructure. They play a special role in data harmonisation (e.g. feature concept dictionaries, and code lists) and in system interoperability (e.g. registers of name places, coordinate reference systems, etc.). Registers have a clear and well-defined governance model (i.e. who has the right to change/introduce new values). Every item in the register is associated with a unique, unambiguous and permanent identifier. The register contents are made available in form of a registry¹⁰. Regular users of the infrastructure usually do not deal with register and registries.

A Europe-wide data sharing requires a single access point (central client), which communicates with the discovery services of the members states. This central client is the **EU INSPIRE geoportal**. The discovery services operated in the MS retrieve metadata that describe the datasets (resources) and transmit them to the central client. In principle, data queries (data discovery) launched at the EU INSPIRE geoportal enable queries all over the European spatial data infrastructure.

The INSPIRE technical architecture is suitable to enable IACS/LPIS data sharing at European level, as it

- Is a distributed system (i.e. no central storage of data exists; data reside at the data custodians of the MS, who exercise full control of the data),

⁸ For detailed explanation please refer to the Technical guidelines for the implementation of the INSPIRE Discovery Service (INSPIRE IOC Task Force for Network Services 2011).

⁹ The use of the word "spatial" in INSPIRE is unfortunate as the meaning goes beyond the meaning of "geographic" – which is understood to be the intended scope. Therefore, "spatial data" is understood as a synonym for the term "geographic information" as used in the ISO 19100 series of International Standards.

¹⁰ In the geo-community the term "catalogue" is also used quite often. For the purpose of this document, we will make the following difference between a catalogue and a registry: a registry (and its register contents) is a specific type of catalogue that conforms to ISO 19135.

- Includes the same components that are also present in IACS/LPIS.

In IACS, there are network services in use in the aid application process, metadata is used for exchanging information with the services of the Commission, and right management is part of everyday practice of data custodians. However, sharing IACS data using the INSPIRE infrastructure requires a number of measures that are discussed in Section 4 of this TG.

4.2 Role of geoportals

There are two implementation modalities of distributed search in a service-oriented infrastructure. INSPIRE follows the server-controlled scenario. In order to publish metadata in the European infrastructure, the **EU INSPIRE geoportal** communicates with one or more servers in an MS, which play the role of **national or regional geoportals**. From point of view of LPIS/GSAA data custodians this solution is beneficial when

- The PA/LPIS custodian has not yet set up a discovery service and does not plan to do so,
- IACS/LPIS spatial data has been already integrated in the national/regional SDI
- Discovery service operated by the LPIS/GSAA data custodians has been already registered to the national (regional) geoportal and
- Conditions for establishing a fruitful collaboration with the national INSPIRE bodies are given.

In the client-controlled approach the central client, i.e. the INSPIRE geoportal directly communicates with the discovery services of the data providers (i.e. LPIS/GSAA custodians). This means that there is no intermediate centralisation before the information arrives to the EU INSPIRE geoportal. This architecture can be followed in exceptional circumstances only. In such cases LPIS/ GSAA custodian has to set up an INSPIRE compliant discovery service fulfilling the requirements of the Technical guidelines for the implementation of the INSPIRE Discovery Service (INSPIRE IOC Task Force for Network Services 2011).

TG Recommendation 1. Preferred architecture for data discovery

The LPIS/GSAA data custodians should publish metadata through the national/regional INSPIRE geoportal.

TG Recommendation 2. Discovery service operated by the Paying Agency

The Paying Agency should set up a discovery service.

TG Requirement 1. Registration of the discovery service of the Paying Agency

When the paying Agency operates a discovery service, the service shall be registered at the national INSPIRE geoportal, or, exceptionally, in the absence of a national geoportal, at the EU INSPIRE geoportal.

In the server -controlled architecture it is possible that the PA/LPIS custodian does not operate a discovery service, but defines another way of transmitting (e.g. uploading) metadata to the national/regional INSPIRE server. According to the results of the survey published in the proceedings of the INSPIRE geoportal workshop (Tomas 2019), only 20 respondents of 31 have their discovery services harvested in the national/regional geoportal. The majority creates metadata manually, usually at centralised level using a tool provided by the responsible bodies of INSPIRE.

TG Requirement 2. Transmission of metadata in absence of discovery services

When the LPIS/GSAA data custodian does not operate a discovery service, it shall ensure the timely transmission of metadata to the national (regional) geoportal.

The INSPIRE geoportal harvests the discovery (catalogue) services of the MS according to the “push” mechanism. Therefore, transmitting metadata to the national/regional INSPIRE geoportal ensures discovery at European level.

Under the push mechanism, when a change occurs in the metadata, the custodian of the local discovery service has to initiate the harvest process. This workflow gives more control to the data owners, which results in a full alignment with the workflows and consequently, in better metadata quality.

4.3 Workflows

TG Recommendation 3. Collaboration with INSPIRE

Before launching a data sharing workflow, the national (regional) INSPIRE contact point should be consulted about the available infrastructure, tools, know-how and experts that can be called upon by the LPIS/GSAA custodians.

An important tool for producing conformant to INSPIRE metadata are the metadata editors. Such editors are available in the national/regional INSPIRE infrastructure, or can be obtained from the open source¹¹ or commercial software providers. Conformity of metadata can be checked by the appropriate INSPIRE validator¹². The tool checks any xml metadata file against the INSPIRE Profile based on EN ISO 19115 and EN ISO 19119.

The workflows for publishing metadata files for the LPIS and GSAA datasets are very similar. This high level use case includes either the “Create new metadata” or the “Propagate data updates to the metadata” low level use cases as shown in *Figure 2*. The descriptions in Sections 4.3.1-4.3.3 are provided on the example of LPIS. If specific considerations to GSAA apply, they are explained in the text.

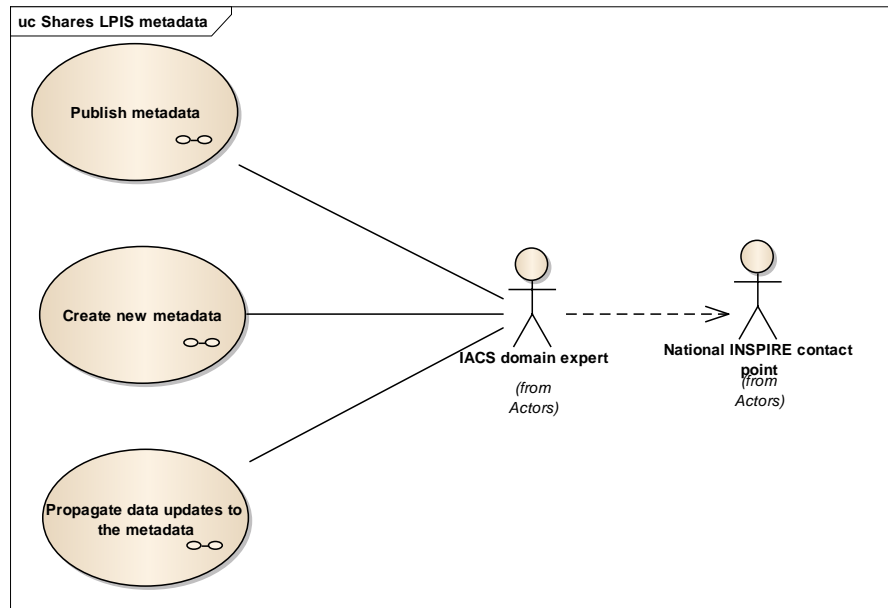


Figure 2. Use cases of IACS data sharing under INSPIRE

4.3.1 Publish metadata

The metadata produced by the LPIS and GSAA custodian has to be published in the INSPIRE infrastructure. The main question is if the metadata file can be transmitted automatically by the discovery network services, or should be sent to the national INSPIRE geoportal in a manual way. The national/regional geoportal ensures automatic publication in the EU INSPIRE geoportal by initiating (pushing) the harvesting mechanism of the latter.

The steps of metadata publishing are shown in *Figure 3* and are described in *Table 3*.

¹¹ See examples in <https://inspire-reference.jrc.ec.europa.eu/vocabularies/tags/metadata-editor>

¹² <http://inspire.ec.europa.eu/validator/#start-tests?ids=EIDec7323d5-d8f0-4cfe-b23a-b826df86d58c>

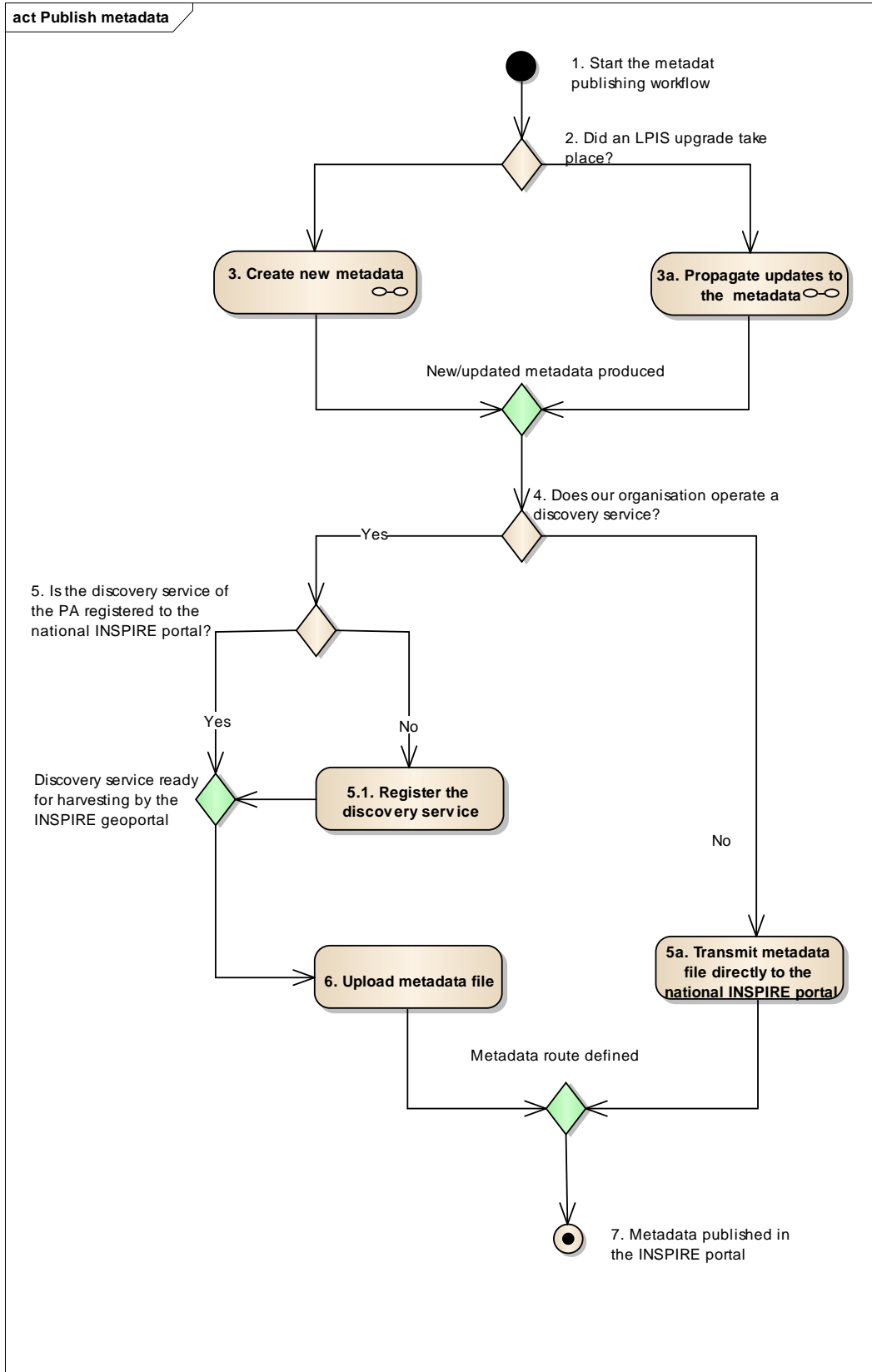


Figure 3. Activity diagram of publishing LPIS metadata in the national/regional INSPIRE geoportal

Table 3. Steps of publishing LPIS metadata on the national/regional geoportal

Name	Notes
1. Start metadata publishing workflow	<p>Main step 1 Before producing the metadata file the data custodian has to</p> <ul style="list-style-type: none"> — Study the requirements of the related technical guidelines (INSPIRE and IACS spatial data sharing - Part 1) — Check the properties of the LPIS dataset, especially if there was an upgrade or update
2. Did an LPIS upgrade take place?	<p>Main step 2 If metadata is produced for the first time, or when an upgrade has taken place, the full set of metadata values has to be produced or revised. In case of updates, it is sufficient to update the impacted metadata values.</p> <p><i>Example: Critical defects of LIPS has been corrected and as a consequence, the dataset has become conformant with Art. 6 of Regulation (EU) 640/2014. In this case, the Conformity value referring to this regulation or the related technical guidelines can be set to "true".</i></p>
3. Create new metadata	<p>Main step 3 Low level use case describing the creation of new metadata. For details see section 4.3.2.</p>
3a. Propagate updates to the metadata	<p>Alternative step 3a Low level use case describing the metadata updating process. For details see section 4.3.3</p>
New/updated metadata produced	The metadata file has been created and is ready for publishing.
4. Does our organisation operate a discovery service?	<p>Main step 4 Depending on the availability of in-house discovery services the transmission of metadata to the INSPIRE portal can follow two scenarios:</p> <ol style="list-style-type: none"> 1. Automatic transmission via the discovery services of the data custodian, which communicates with the national/regional geoportal. 2. Manual transmission (e.g. via email)
5. Is the discovery service of the PA registered to the national INSPIRE portal	<p>Main step 5 If a discovery service is operated by the data custodian, check whether it has been registered to the INSPIRE portal.</p>
5.1. Register the discovery service	<p>Main step 5.1 In case when the discovery service of the data custodian has not been registered at the national/regional geoportal, this step has to be performed.</p>
6. Upload metadata file	<p>Main step 6 The metadata values in the metadata files are automatically uploaded (harvested) by the national/regional INSPIRE geoportal.</p>
5a. Transmit metadata file directly to the INSPIRE portal	<p>Alternative step 5a Upload the ready metadata file directly on the national/regional INSPIRE geoportal. If such possibility does not exist, send the file directly to the responsible person or contact point.</p>
Metadata route defined	Transmission route of metadata has been defined.
7. Metadata published in the INSPIRE portal	<p>Main step 7 Metadata has been published in the national/regional geoportal, from with the EU INSPIRE geoportal can harvest the metadata and will publish it for pan-European access.</p>

4.3.2 Create new metadata

Creating a metadata file has to precede the publication in the INSPIRE infrastructure each time, when a completely new LPIS or GSAA product is delivered. A product is “completely new”, when the technical specifications, the input data, or the survey methodology have changed and the previous dataset has been archived. In case of GSAA, each claim year produces a new dataset, as farmers provide a new declaration.

In case of LPIS, a new dataset results, for example, from upgrading. An upgrade is defined as the “process of adapting the information system to the changes of the legal requirements or to the development of reference standards” (European Commission 2015). The step by step description of metadata creation for LPIS is presented in *Figure 4* and described in *Table 4*.

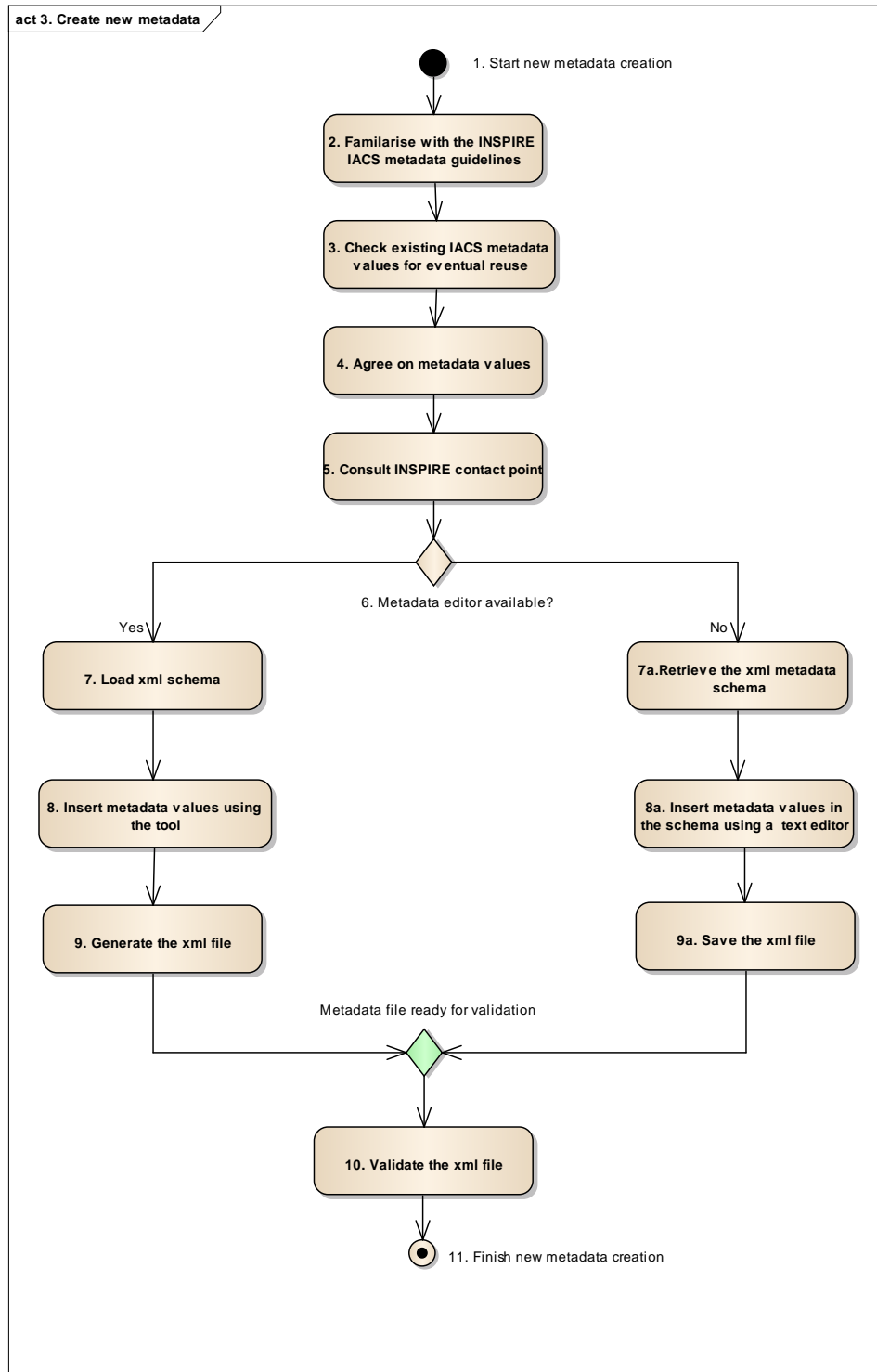


Figure 4. Initial metadata creation for LPIS data sharing according to INSPIRE

Table 4. Steps of initial metadata creation for LPIS data sharing according to INSPIRE

Name	Notes
1. Start new metadata creation	<p>Main step 1</p> <p>After clarifying the status of an upgrade the properties of the datasets are collected as input for the metadata creation process.</p> <p>NOTE. This is also a workflow for the initial (first time) creation of metadata.</p>
2. Familiarise with the INSPIRE-IACS metadata guidelines	<p>Main step 2</p> <p>In order to produce proper metadata values, the LPIS domain expert has to be aware of the TG requirements.</p>
3. Check existing IACS metadata values for eventual reuse	<p>Main step 3</p> <p>Some metadata values might have been created in course of Model Test Suite (MTS) in frame of LPIS QA. Other metadata values may come from other national initiatives, especially from participation in national/regional e-Government initiatives. If so, check if those values can be reused for INSPIRE.</p> <p><i>EXAMPLE. The description of IXIT in the MTS give a good bases for the lineage metadata element.</i></p>
4. Agree on metadata values	<p>Main step 4</p> <p>The LPIS domain expert who is in charge for producing the metadata values should check his/her draft proposal in-house (own organization) and possibly with an INSPIRE metadata expert.</p> <p><i>EXAMPLE: A meaningful title of the dataset is important for the potential users, but also for the data custodian, as this name should accompany the dataset through its various editions. On the other hand, it should be also checked, if that name is still vacant - i.e. no other dataset is published under that title.</i></p>
5. Consult INSPIRE contact point	<p>Main step 5</p> <p>If this step has not been yet done, it is the time to consult with the INSPIRE contact point who can give information about the availability of an INSPIRE metadata editor.</p>
6. Metadata editor available?	<p>Main step 6</p> <p>Depending on the availability of a metadata editor the production of the metadata file can be automatic or manual. Metadata editors are available in the NSDI, or can be obtained from the open source or commercial software providers.</p>
7. Load xml schema	<p>Main step 7</p> <p>Load the INSPIRE metadata schema in the editor.</p>
8. Insert metadata values using the tool	<p>Main step 8</p> <p>Insert the agreed metadata values in the tool.</p>
9. Generate the xml file	<p>Main step 9</p> <p>Generate the xml file.</p>
7a.Retrieve the xml metadata schema	<p>Alternative step 7a</p> <p>Retrieve INSPIRE xml metadata schema (empty metadata file) for manual editing.</p>
8a. Insert metadata values in the schema using a text editor	<p>Alternative step 8a</p> <p>Insert LPIS metadata values directly in the xml file, using, for example a text editor.</p> <p>NOTE: Manual editing should be avoided as much as possible. If no metadata editor is available in the national/regional SDI, data custodian can use open source or commercial editors.</p>

9a. Save the xml file	Alternative step 9a Save the xml file for attaching to an email /downloading by the national/regional INSPIRE geoportal custodian.
Metadata file ready for validation	
10. Validate the xml file	Main step 10 Validate the xml file using the INSPIRE validator: http://inspire.ec.europa.eu/validator/
11. Finish new metadata creation	Main step 11 Validated metadata file is ready for publication.

4.3.3 Propagate data updates to metadata

In order to keep the LPIS dataset up to date, the eventual changes in the land should be taken into account, as well as the discovered technical errors should be corrected. These interventions may have an impact on the properties of the dataset as a whole, which should be properly propagated to the metadata.

Updates may have an impact mainly on the Conformity and the Lineage metadata elements. It is a good practice to look at the results of LPIS QA and change the values of Conformity against Regulation (EU) 640/2014, depending on the final result of the assessment. The content of Lineage may be changed upon finishing the yearly update cycle, referring to the methods applied and the extent of the dataset involved in the process.

TG Requirement 3. LPIS metadata updates

The impact of LPIS updates and upgrades shall be reflected in the LPIS dataset level metadata and shall be propagated to the INSPIRE geoportal.

The workflow presented below is less applicable to the GSAA dataset, as the farmers change the cultivated crops from one year to another. However, the values of the more stable metadata elements (title, abstract, spatial representation, etc.) may be recycled.

The workflow for propagating changes to LPIS metadata is shown in *Figure 5* and is describe in *Table 5*.

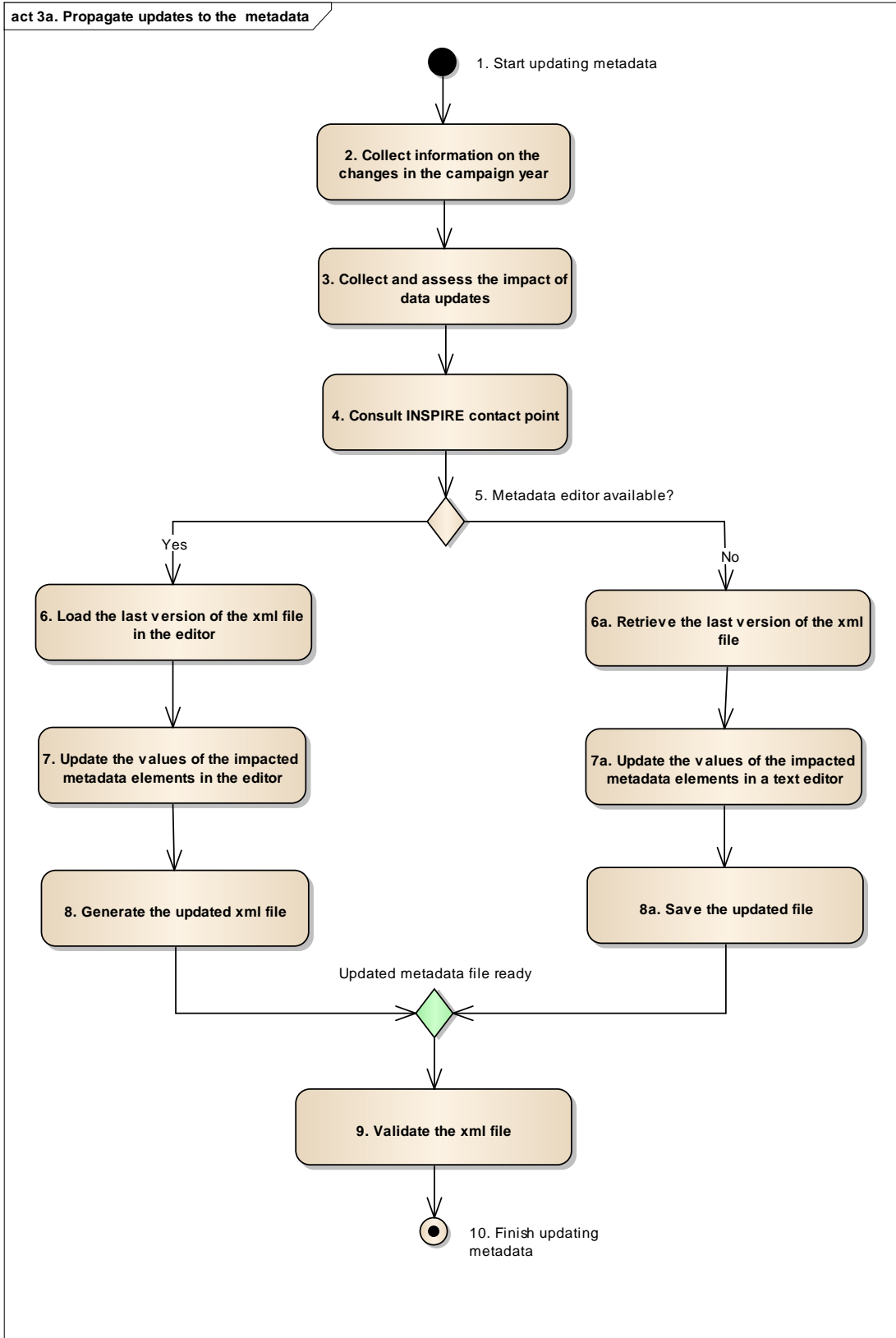


Figure 5. Activity diagram of propagating the data changes (updates) to the metadata

Table 5. Steps of propagating changes to the LPIS metadata file

Name	Notes
1. Start updating metadata	
2. Collect information on the changes in the campaign year	<p>Main step 1 Check the change log or inquiry about the eventual updates of the LPIS dataset. These updates may involve</p> <ul style="list-style-type: none"> — The correction of the geometry of the reference parcels (merging, division, correction of the coordinates of the boundaries) — Changes related to the land cover types (including changes of pro-rata) — Elimination of critical defects — Correction of the attributes of the reference parcels, etc.
3. Collect and assess the impact of data updates	<p>Main step 2 Assess the impact of changes on the metadata values. A non-exhaustive list of impacts:</p> <ul style="list-style-type: none"> — Date of last revision — Temporal extent — Conformity in sense of Art. 6 of Regulation 640/2014 (may improve) — Lineage: if substantial changes, it should be mentioned together with the update methodology.
4. Consult INSPIRE contact point	<p>Main step 4 Check with INSPIRE contact point if changes in terms of available INSPIRE tools and services have taken place. (Do not produce new metadata file manually or with outdated tools when there is a better solution.)</p>
5. Metadata editor available?	<p>Main step 5 Decide if the updated metadata file can be generated by a metadata editor, or should be edited manually. Metadata editors are available in the NSDI, or can be obtained from the open source or commercial software providers.</p>
6. Load the last version of the xml file in the editor	<p>Main step 6 If the national INSPIRE infrastructure is used, it is supposed that the metadata editor loads in the last version of the file.</p>
7. Update the values of the impacted metadata elements in the editor	<p>Main step 7 The majority of metadata values should not be updated, only those, that have been identified in step 2. NOTE: Manual editing should be avoided as much as possible. If no metadata editor is available in the national/regional SDI, data custodian can use open source or commercial editors.</p>
8. Generate the updated xml file	<p>Main step 8 The xml metadata file with updated values should be generated for publishing.</p>
6a. Retrieve the last version of the xml file	<p>Alternative step 6a Clarify with the INSPIRE contact point where the last version of the xml file can be retrieved from.</p>
7a. Update the values of the impacted metadata elements in a text editor	<p>Alternative step 7a Edit the impacted metadata values directly in the metadata file.</p>
8a. Save the updated file	<p>Alternative step 8a Save the file for sending to the national/regional INSPIRE geoportal</p>
Updated metadata file ready	Metadata file is ready for publishing in the INSPIRE infrastructure.

9. Validate the xml file	Main step 9 Validate the xml file using the INSPIRE validator: http://inspire.ec.europa.eu/validator/
10. Finish updating metadata	

4.4 Metadata elements and values

Besides the discovery services and geoportals, the other indispensable elements for data sharing are the metadata. According to INSPIRE, metadata means information describing spatial data sets and spatial data services, which makes them possible to discover, inventory and use (European Parliament and European Council 2007).

There are two types of metadata. The first helps the users find the data. They are shortly called as **discovery metadata**. The other type is called **metadata for evaluation and use**. As the name implies, the latter inform the potential users whether the data is fit for their purposes. In the realm of INSPIRE the metadata for discovery are the subject of the metadata implementing rule and of the related technical guidelines, while metadata for evaluation and use came from the data specification process of the themes.

The INSPIRE metadata for discovery is based on ISO 19115 Geographic information- Metadata standard (ISO/TC 211 2003). However, a metadata set conforming to ISO 19115 does not guarantee conformity with INSPIRE, as the latter is more demanding for some metadata elements, such as Geographic location, Lineage, Metadata language, Keyword, Conformity, etc.

The use of the Technical Guidance for the implementation of INSPIRE dataset and service metadata (INSPIRE MIG subgroup for action MIWP-8 2017) ensures that the metadata created under INSPIRE is not in conflict with ISO 19115. However, full conformance to ISO 19115 implies the provision of additional metadata elements which are not required by the INSPIRE Implementing Rule on Metadata.

In INSPIRE, metadata descriptions are applied both to **datasets** and **spatial data services**. In frame of IACS data sharing the data custodians have to describe, in first order, their LPIS and GSAA datasets. However, users can access the data through various spatial data services (e.g. view, WMS, WFS, download). Therefore, these resources should be also made visible in the infrastructure with appropriate metadata. Unless otherwise not indicated, the metadata elements in section 5 are applicable both for datasets and spatial data services. The applicability at dataset level also means that **no metadata should be given on the individual reference parcels, on the individual GSAA polygons or other feature types** of these datasets.

The LPIS community introduced an INSPIRE metadata profile for exchanging information in the frame of Model Test Suite (MTS) (Devos et al. 2016) in the frame of LPIS quality assurance (LPIS QA) process. This experience is a strong starting point not only for the metadata content, but also for encoding and exchanging metadata in Extensible Markup Language (XML). The values of the metadata elements of MTS can be directly reused as INSPIRE metadata. The mapping between the MTS and the INSPIRE metadata elements are given in Annex B.

In addition to the eight metadata elements adopted by the MTS of LPIS QA, another element, the so-called *ixitQualifier*, is also in use. It provides structured information, which can be inserted in the textual description of the lineage metadata element of INSPIRE. Details are included in section 5.1.14.

The mandatory **discovery metadata** elements of INSPIRE are given in Annex C of this document. Mandatory elements may have the following multiplicity:

- 1, means that the metadata can take exactly one value
- 1..* means that the metadata has at least one value, (but also may have more)
- 0..* means that in case when a condition is fulfilled, the metadata element has at least one value. Otherwise, it may be empty.

In order to exchange metadata, INSPIRE requires the use of XML encoding. XML is familiar to the LPIS community, as it has been in use, together with GML, for information exchange in LPIS QA. Annex C presents all mandatory metadata elements according to ISO 19115, together their XML path according to ISO 19139 standard (ISO TC 211 2007).

The metadata about the LPIS and GSAA datasets should faithfully reflect their properties and should be kept up to date. When changes occur in these datasets, the custodian should carefully investigate their impact on the metadata. If needed, metadata should also be updated as described in section 4.3.3.

5 INSPIRE metadata profile for sharing spatial information of IACS

For interoperability with INSPIRE a compliant metadata profile should be developed both for the LPIS and the GSAA datasets. A profile is compliant to a reference schema, when none of the rules of the reference schema is broken and its mandatory elements are present. Extensions are allowed unless the new elements do not override the definition, properties and constraints of the reference schema. In the following sections the elements of the INSPIRE metadata schema are discussed, which should be applied both to the LPIS and GSAA datasets. In Annex C these metadata elements are presented according to the structure of ISO 19115.

TG Requirement 4. Application of the TG Requirements of the INSPIRE metadata guidelines

In order to share the spatial data of IACS under INSPIRE all the TG requirements of the “Technical Guidance for the implementation of INSPIRE dataset and service metadata based on ISO/TS 19139:2007” shall be fulfilled.

TG Recommendation 4. Application of the TG recommendations of the INSPIRE metadata guidelines

In order to share the spatial data of IACS under INSPIRE the TG recommendations of the “Technical Guidance for the implementation of INSPIRE dataset and service metadata based on ISO/TS 19139:2007” should be followed.

For a better identification of IACS spatial data in the European INSPIRE geoportal, the harmonisation of some metadata values is necessary. In the following sections we discuss these metadata elements in detail and propose mandatory and recommended values for them.

5.1 Metadata for discovery

5.1.1 Resource title (C.2.1)

The resource title is mandatory for datasets, dataset series and services. In case of LPIS the resource title of a dataset should relate to an LPIS lot, if lots are applicable in the country. The reason is that the lot has a unique data product specification and geographic extent, which can be described by a single metadata file. When the LPIS is homogenous all over the country/region, there is no need to indicate the lot in the title.

Any newly produced or upgraded LPIS dataset should be distinguished with an unambiguous title. For sake of clarity, the title shall provide a reference to the MS and if applicable, to its region. If needed, the LPIS owner/custodian may add other information to the title.

EXAMPLE: Land Parcel Identification System of Hungary

TG Requirement 5. Resource title of LPIS

An unambiguous title shall be given either to an LPIS dataset, or to a series of LPIS datasets that contains the name of the Member State. When applicable, the title shall also contain the name of the lot and a reference to the region.

The geospatial aid application of the farmers within the same claim year should be published in a single dataset or in a single dataset series.

TG Requirement 6. Resource title of GSAA

A unique and unambiguous title shall be given either to the GSAA dataset within a campaign year, or to the series of the GSAA datasets. The title of a single dataset shall refer to the claim year, to the Member state and if applicable, to the region.

The title can be given in any language; consequently the national language can be used as default. When data custodians wish to support multilingualism, they can make use of the localised character set property of the xml schema, as shown in section 5.1.19. The EU INSPIRE geoportal provides automatic translation of the resource title in English. In order to distinguish the LPIS and GSAA datasets of the Different MS, a reference to the MS and if applicable to its region has to be given.

EXAMPLE: XML encoding of LPIS title

```
<gmd:identificationInfo>
  <gmd:MD_DataIdentification>
    <gmd:citation>
      <gmd:CI_Citation>
        <gmd:title>
          <gco:CharacterString>Land Parcel Identification System Denmark INSPIRE</gco:CharacterString>
        </gmd:title>
      </gmd:CI_Citation>
    </gmd:citation>
  </gmd:MD_DataIdentification>
</gmd:identificationInfo>
```

5.1.2 Resource abstract (C.2.2)

The resource abstract is a short narrative describing the content and the main properties of the dataset or the service. In case of historic data, the abstract should also refer to the validity period, i.e. the time when the dataset was in official use.

TG Recommendation 5. Content of the abstract of historic data

The abstract of historic datasets should refer to the validity period.

TG Recommendation 6. Content of the resource abstract of dataset series

The description of an LPIS or GSAA dataset series should refer to the dates or creation years of the datasets included in the series.

TG Recommendation 7. Legal references in the abstract

The abstract of the LPIS and GSAA datasets should contain references to the national and European law under which the datasets have been created.

5.1.3 Resource Type (C.2.3)

The possible values for both LPIS and GSAA are either dataset, or series. This metadata element for the services takes the "service" value. The data custodians, preferably with the involvement of the national/regional INSPIRE bodies, should carefully assess which solution fits best in their workflows and also should consider the feasibility from point of view of the spatial data services.

In case of the download service the limiting factor is the size of the files, while in case of view services the number of the layers that should be displayed simultaneously. When the dataset series option is used, one metadata file may be sufficient for the entire series. However, a special attention should be paid to the values in the identification information section of the service metadata, which should point on one hand to the common metadata file, while on the other hand to the identifiers of the datasets that the service operates on. Annex E gives further input on the selection of the dataset or the series solution.

5.1.4 Resource locator (C.2.4)

This metadata element provides information about the spatial data services that makes the data resource accessible. The URL provided in this metadata element may point to a download service, Web Map Service (WMS), Web Feature Service (WFS), view service, etc. It should not point to a general information web page of the operating

or other organization. Paying agencies may set up their own spatial data services, but also can use those operated in the NSDI.

TG Requirement 7 Resource locator

The resource locator metadata shall point to a spatial data service.

5.1.5 Unique resource identifier (URI) (C.2.5)

This metadata applies to datasets and dataset series only. The data custodian should consult the INSPIRE contact point or the responsible parties of the NSDI how to ensure the uniqueness of the identifiers in the country and the European infrastructure. Usually the uniqueness is solved by a namespace and a code.

Example: <http://geoportail.wallonie.be/ressources/id/bf12c40c-40cd-4b33-adbc-c5fa9d529ced>

5.1.6 Coupled resources (C.2.6)

This metadata element is applicable to spatial data services only. This metadata indicates which dataset(s) the spatial data service is operating on. The targeted spatial data sets are referenced through their URI.

5.1.7 Resource language (C.2.7)

Assuming that both LPIS and GSAA datasets have textual information (as minimum, the name of the attributes) the resource language has to be indicated. Otherwise, no specific consideration to LPIS or GSAA apply.

5.1.8 Topic category (C.2.8)

The topic category helps the potential users to understand the thematic content of the dataset or the dataset series. The value type of this metadata element in INSPIRE is an enumeration, which means that this metadata element can take a value from a closed list. The allowed values are listed in Part D.2 of Commission Regulation No 1205/2008 (European Commission 2008)

In order to harmonise the topic category values for the LPIS and GSAA datasets, a survey was conducted in March of 2019. Based on its outcome, this TG proposes requirements and recommendations.

TG Requirement 8. Topic category of LPIS and GSAA

The LPIS and GSAA datasets and series published under INSPIRE shall be assigned to the “farming” topic category.

If relevant, data providers may consider the Planning/Cadastre topic category too.

5.1.9 Spatial data service type (C.2.9)

No specific considerations to LPIS or GSAA apply. In case of doubts, PAs are requested to consult responsible parties for INSPIRE or NSDI.

5.1.10 Keyword value (C.2.10)

Keywords help the users to find the data that they are looking for. Therefore, keywords should be meaningful and well known. Controlled vocabularies standardise and disseminate keywords to the targeted audiences. From the point of view of IACS the most relevant vocabularies are GEMET, which is adopted by INSPIRE and AGROVOC, maintained by UN FAO. **In addition to controlled vocabularies, free keywords can be also used**, as the multiplicity of the keyword metadata element is one to many (1..*).

TG Requirement 9. INSPIRE data theme for LPIS

The LPIS data published under INSPIRE shall be assigned to the “Land cover” INSPIRE data theme.

TG Requirement 10. INSPIRE data theme for GSAA

The GSAA data published under INSPIRE shall be assigned to the “Land use” INSPIRE data theme.

Since the multiplicity of this metadata element is one to many (1..*), further values can be assigned. An LPIS dataset, if the characteristics of the national implementation require so, can be also tagged by the “Land use” keyword too. Likewise, the GSAA dataset can supply land cover data too, such as crop types or certain EFA elements. The outcome of the IACS data discovery survey suggested the applicability of the following keywords too:

- Agricultural and aquaculture facilities
- Area management/restriction/regulation zones and reporting units
- Cadastral parcels (if applicable),
- Environment.

TG Requirement 11. Mandatory keyword from GEMET

When publishing LPIS or GSAA data under INSPIRE, the keyword “Common Agricultural Policy” shall be used.

TG Recommendation 8. Other LPIS keywords from GEMET

When publishing LPIS data under INSPIRE, at least one of the following keywords should be used: “agriculture” and/or “agricultural land”.

TG Recommendation 9. Other GSAA keywords from GEMET

When publishing GSAA dataset under INSPIRE, the following keyword should be used: “agriculture”.

TG Recommendation 10. LPIS keyword from AGROVOC

When publishing an LPIS dataset under INSPIRE, at least the following keyword should be used: “land”.

TG Recommendation 11. GSAA keyword from AGROVOC

When publishing a GSAA dataset under INSPIRE, at least the “farmland” keyword should be used.

TG Requirement 12. Other mandatory keywords for LPIS

When publishing LPIS data under INSPIRE, the keywords “LPIS” and “IACS” shall be used.

TG Recommendation 12. Other keywords for LPIS

When publishing LPIS data under INSPIRE, the keywords “Reference parcel” “Ecological focus area” and/or “Agricultural area” should be also used.

TG Requirement 13. Other mandatory keywords for GSAA

When publishing GSAA data under INSPIRE, the keywords “GSAA” and “IACS” shall be used.

5.1.11 Originating controlled vocabulary (C.2.11)

In addition to GEMET, the AGROVOC of UN FAO may be also used as indicated in the previous sub-section.

5.1.12 Geographic bounding box (C.2.12)

No specific considerations to LPIS or GSAA apply.

5.1.13 Temporal references (C.2.13-C.2.16)

According to INSPIRE, at least one of the following values should be used:

- temporal extent of the described resource,
- date of publication,
- date of last revision or,
- date of creation.

The temporal extent extends the values of ISO, which are maintained in the following register (look for the CI_DateTypeCode section):

<https://standards.iso.org/iso/19139/resources/gmxCodellists.xml>

In the realm of LPIS the two main events that have an impact on the life cycle of the dataset - and thus on the values of temporal references - are the upgrades and updates. In technical terms an upgrade is a production of an LPIS dataset according to new specifications. The ISO 191150 metadata element that describe the best the temporal property of this event is the date of creation.

Considering that an LPIS dataset after an upgrade remains stable for several years in terms of the business rules and technical specifications, specifying an exact day (day-month-year) may add less value. However, the year of creation may distinguish between the various “editions” of the dataset and for the quick orientation of the users should be well visible. Naturally, if the PA/LPIS custodian decides to publish the exact day, it should be implemented as value of the “date of creation” metadata element.

The “date of creation” metadata is indispensable when, for example, the PA decides on voluntary basis, to publish more than one GSAA datasets within the same campaign year (e.g. one when parcels are declared, another when they are verified at the end of the campaign year).

TG Recommendation 13. Recommended value of the temporal reference of the LPIS and GSAA datasets

The temporal references of the LPIS and the GSAA dataset should include the date of creation.

The process of keeping LPIS data current is called update (European Commission 2015). The subject of updates are instances of the various feature types in the dataset, which can be created, deleted, or modified). In LPIS, the subject of updates are mostly the instances of the Reference parcel feature type.

In temporal terms this event can be best characterised by the date of last revision. Considering that the potential users need to know how current the data are, the date of last revision has to be included in the metadata file both of the LPIS and GSAA dataset.

TG Requirement 14. Mandatory value of the temporal reference type of the LPIS and GSAA datasets

The temporal references of the LPIS and GSAA datasets shall contain at least the date of last revision.

The impact of data updates on the metadata should be carefully assessed and when needed, the values of the metadata elements should be also updated as described in Section 4.3.3. Considering that an LPIS dataset is under a continuous update, a synchronised update of the metadata would be demanding. Therefore, LPIS custodians should find a reasonable frequency of updating the metadata, also considering the INSPIRE workflows in the country/region. This frequency should account the internal management and reporting cycle, but should not be longer than one year. The updated datasets together with the metadata should be made available within 6 months.

The LPIS QA workflow requires the implementation of the remedial action plan by the beginning of the campaign year; i.e. by 15 May or 15 June. Therefore, the updated LPIS QA that reflects all the changes in the previous campaign year should be published by 15 November or 15 December, respectively.

TG Requirement 15. Updating the value of the last revision metadata element for an LPIS dataset

Publishing an updated LPIS dataset in INSPIRE shall trigger updating the value of the last revision metadata element.

TG Requirement 16. Minimum frequency of publishing the updated LPIS datasets

The updated LPIS datasets together with the updated metadata shall be published in INSPIRE at least once, within 6 month from the start of the campaign year.

Even though the majority of users are interested in current data, there are use cases that require time series of LPIS data.

EXAMPLE: Detection of land use changes for accounting and reporting greenhouse gas emissions and removals under LULUCF requires the analysis of time series of data.

Following a step-wise approach of spatial data sharing, the data owners have to ensure the publication of the most current dataset and are encouraged to provide historic (past) versions too. The step-wise implementation is at the same time and incremental approach too. Therefore, publishing a new version of a dataset should not result in withdrawing the previous ones from the INSPIRE infrastructure.

TG Recommendation 14. Accessibility of historic LPIS and GSAA datasets

The accessibility of historic versions of LPIS and GSAA datasets in INSPIRE should be maintained.

As compared to LPIS, the GSAA dataset has a simpler life cycle. Even though it has an initial version, which is provided to the farmers at the beginning of the declaration process, the agricultural parcels become the official base of the payments at the end of the campaign year. Therefore, from the point of the users the most important temporal reference is the last revision.

TG Requirement 17. Value of the last revision of GSAA dataset

The value of the last revision of a GSAA dataset shall correspond to the date within the campaign year, when the last change is validated.

TG Requirement 18. Minimum frequency of publishing the GSAA dataset

The annual GSAA dataset shall be published in INSPIRE within 6 month from the validation of the last change in the dataset.

Paragraphs from **TG Requirement 14** to **TG Requirement 18** address the temporal references relevant for datasets. In case of dataset series, the temporal reference should be described in one common metadata record for all datasets. With a single day of creation/publication this cannot be resolved. Even though it is not in line with ISO 19115, INSPIRE suggests using the temporal extent as a temporal reference. When datasets are collected in time series (e.g. GSAA of several years), the temporal extent may provide meaningful information.

5.1.14 Lineage (C.2.17)

The standardised presentation of lineage in IXIT introduced in the MTS can directly provide input for the LPIS lineage metadata element. It includes information on the data sources used for the creation of LPIS, roles of different stakeholders involved, and the way how the key features and relevant attribute values are collected. Naturally, the information should be given in the language of the metadata selected for the dataset, avoiding codes.

Another important information to report in the lineage is the concept and approach applied by the EU MS to define agriculture land, to categorize the various land cover/land use (LC/LU) types and quantify the corresponding land-related parameters (for ex. the percentage of non-agricultural features within pro-rata grasslands). In this case, the EU MS should provide reference to the list of LC and LU types, as given in the “eligibility profile” reported in the LPIS QA and expressed in FAO LCCS¹³ terms.

TG Recommendation 15. Content of the lineage metadata element for LPIS

In the lineage metadata element of an LPIS dataset the elements of IXIT should be used as free text, without codes. Reference should be also given to the applicable eligibility profile.

In addition to the information contained in IXIT, other content can be also added, according to the best national practices or the national INSPIRE requirements. For example, it is good to refer to the input data (imagery type), the method of eventual updates, or in case of EFA elements, to the type of spatial geometries used. When reduced spatial geometries (curves or points instead of surfaces) are used, it is good to mention how these geometries were obtained.

In the lineage description of the GSAA dataset it is important to underline that this spatial dataset has been collected by non-professional GIS users (i.e. by the farmers). A reference should be also made to the eventual consistency/quality checks and verification performed by the competent authorities of the MS.

TG Recommendation 16. Content of the lineage metadata element of GSAA

The lineage element of the GSAA dataset should refer to the origin of the data, the data collection method and the eventual quality and consistency checks by the competent authorities.

Similar information should be provided in the lineage metadata element of the dataset series. A special attention should be given to the information on currency and validity of data in every dataset within the series.

5.1.15 Spatial resolution (C.2.18)

No specific considerations to LPIS or GSAA apply. However, it is good to remember that the equivalent scale required for LPIS is 1:5000 as minimum.

¹³ FAO Land Cover Classification System

5.1.16 Conformance (C.2.19-C.2.20)

Conformance to a standard or a specification is an important piece of information for the professional users. Conformance statements consists of three parts – the first cites the standard or the specification against which conformance testing has been performed. The second explains the meaning of conformance, while the third provides the value, if the dataset is conformant, not conformant, or the conformance is not evaluated. It is possible to declare conformance to more than one specification. **INSPIRE requires** at least one **conformance statement**, which indicates the result of evaluation **in sense of Commission Regulation (EU) 1089/2010** (European Commission 2010). If an LPIS or GSAA dataset is not harmonised (mapped to) an INSPIRE theme, the value of the degree according to this regulation will be “Not conformant”.

In the frame of LPIS QA, a strict internal conformance testing procedure takes place. The aggregated conformance result according to conformance class 1¹⁴ can be also published in INSPIRE. An example of the citation is below:

EXAMPLE: Guidance document on the land parcel identification system (LPIS) under Art. 5, 9 and 10 of Commission Delegated Regulation (EU) No 640/2014

TG Recommendation 17. Publishing conformance evaluated according to Commission Delegated Regulation (EU) No 640/2014

The degree of conformance evaluated according to the LPIS QA methodology should be published in INSPIRE.

EXAMPLE: conformance statement under Art. 5, 9 and 10 of Commission Delegated Regulation (EU) No 640/2014

```
gmd:report>
  <gmd:DQ_DomainConsistency>
    <gmd:result>
      <gmd:DQ_ConformanceResult>
        <gmd:specification>
          <gmd:CI_Citation>
            <gmd:title>
              <gmx:Anchor xlink:href="https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32014R0640%22 "> COMMISSION
DELEGATED REGULATION (EU) NO 640/2014</gmx:Anchor>
            </gmd:title>
            <gmd:date>
              <gmd:CI_Date>
                <gmd:date>
                  <gco:Date xmlns:gco="http://www.isotc211.org/2005/gco">2014-03-11</gco:Date>
                </gmd:date>
                <gmd:dateType>
                  <gmd:CI_DateTypeCode codeListValue="publication"
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmxCodeLists.xml#CI_DateTypeCo
de">publication</gmd:CI_DateTypeCode>
                </gmd:dateType>
              </gmd:CI_Date>
            </gmd:date>
          </gmd:CI_Citation>
        </gmd:specification>
        <gmd:explanation>
          <gco:Characterstring>Conformance according to Art. 5, 9 and 10 of the regulation (conformance class 1)</gco:Characterstring>
        </gmd:explanation>
        <gmd:pass>
          <gco:Boolean xmlns:gco="http://www.isotc211.org/2005/gco">>true</gco:Boolean>
        </gmd:pass>
      </gmd:DQ_ConformanceResult>
    </gmd:result>
  </gmd:DQ_DomainConsistency>
</gmd:report>
```

5.1.17 Conditions applying to access and use (C.2.21 – C.2.22)

To this family the following metadata elements belong:

¹⁴ See details: https://marswiki.jrc.ec.europa.eu/wikicap/index.php/ETS_Conformance#Conformance_class_1

- Conditions applying to access and use [0..*]
- Conditions applying to access and use (other constraints) [0..*]
- Conditions applying to use [0..*]
- Limitation on public access [0..*]
- Limitation on public access (other constraints) [0..*]

Even though no specific requirement applies to IACS, in course of creating the metadata it is important to pick that combination of the elements above, which describes in the simplest and the best way the local rules of access and use. As these metadata elements may take more than one value, it is possible to include different groups of users with different access and use rights. It is advised to discuss the best combination of these metadata elements with the INSPIRE or the NSDI contact point.

Note that the **eventual limitations in access or use do not exempt the data custodian from publishing metadata** in the INSPIRE infrastructure. If limitations apply, they should be non-discriminatory (i.e. access rights should be established for types/groups of users in advance, not on case by case basis). Further aspects of limitations and data sharing are provided in Art. 13 and Art. 17 of the INSPIRE Directive (European Parliament and European Council 2007).

5.1.18 Responsible party (C.2.23-C.2.25)

The information about the responsible party (data custodian) should be described with the following metadata elements:

- Responsible party
- Responsible party role
- Metadata point of contact

All these metadata elements are mandatory. Even though no specific conditions to LPIS or GSAA apply, we remind that the point of contact should not be a physical person, but an organisation with a functional email box.

TG Recommendation 18. Responsible party for LPIS and the GSAA metadata

The responsible party for production of the metadata for the LPIS and GSAA datasets should be the custodians of the LPIS and GSAA datasets. The point of contact should be presented in form of a functional email box.

5.1.19 Metadata about the metadata (C.2.26 – C.2.27)

The metadata about the datasets should be described by two metadata elements:

- Metadata date and
- Metadata language.

No specific conditions for LPIS or GSAA datasets apply. It should be noted that metadata can be given in any official language of the EU. The European INSPIRE geoportal provides translation services in case of some metadata fields. The number of translated fields will be incrementally extended in the future.

In case data custodians wish to publish metadata in two (or more) languages, they may make use of the localised character strings.

EXAMPLE: Use of localised character string

```
<gmd:keyword xsi:type="gmd:PT_FreeText_PropertyType" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <gco:CharacterString xmlns:gco="http://www.isotc211.org/2005/gco">Systém identifikace zemědělských parcel</gco:CharacterString>
  <gmd:PT_FreeText>
    <gmd:textGroup>
      <gmd:LocalisedCharacterString locale="#locale-eng">Identification system for agricultural parcels</gmd:LocalisedCharacterString>
    </gmd:textGroup>
  </gmd:PT_FreeText>
</gmd:keyword>
```

5.2 Metadata for evaluation and use

The metadata elements given in sections 5.1.1 - 5.1.19 are sufficient for data discovery in strict sense. However, users normally would like to find out, if the data is fit for their purposes and what technical (interoperability) obstacles they may face when using the data. The other group of metadata, the metadata for evaluation and use provides information on these aspects.

A common set of such metadata elements that is applicable to all INSPIRE themes are defined in Commission Regulation (EU) No 102/2011 on interoperability of spatial data sets and services (European Commission 2011). These common metadata elements are:

- coordinate reference systems,
- temporal reference systems,
- encoding,
- character encoding,
- spatial representation type and
- topological consistency.

Topological consistency belongs to data quality elements. According to ISO 19157 (ISO TC 211 2013) a data quality element, even when published as metadata, should be described by the following elements and sub-elements

- Measure reference (name, identification and description),
- Evaluation method (type, description, procedure),
- Evaluation time,
- Evaluation result, (values)
- Value type and structure.

As **LPIS QA** delivers further information on the quality of the LPIS dataset, which is worthwhile to share with the users. The metadata elements that present the results of LPIS QA are included in sections 5.2.7 and 5.2.8. As **these metadata elements are not mandated by INSPIRE**, they do not appear among the discovery metadata elements in the EU INSPIRE geoportal. Users can access them by downloading the xml metadata file. The EU geoportal provides the link for this download.

5.2.1 Coordinate Reference System

As compared to INSPIRE, no specific conditions for the LPIS or GSAA datasets apply. The default value of the coordinate reference system corresponds to the national one, in which the LPIS and GSAA datasets are represented. However, in addition to the use of geographic (non projected, φ and λ) coordinates, INSPIRE foresees the following projection systems for cross border applications:

- ETRS89 Lambert Azimuthal Equal Area
- ETRS89 Lambert Conformal Conic
- ETRS89 Transverse Mercator

The two Lambert projection systems are suitable for small scale data, therefore, they are not fit for representing LPIS and GSAA datasets. The unique option for cross border applications, apart from projecting between the national systems of the neighbouring countries, is the Transverse Mercator projection.

Instead of producing an “INSPIRE” copy in the mandated coordinate reference systems, the LPIS/GSAA data custodian may opt for using a coordinate transformation service. Such service is usually operated by the national INSPIRE infrastructure. For details consult the INSPIRE contact point.

TG Recommendation 19. Coordinate transformation for INSPIRE

For coordinate transformation required in INSPIRE the LPIS/GSAA data custodian should consider the coordinate transformation services of the national INSPIRE infrastructure.

5.2.2 Temporal reference system

No specific conditions for the LPIS or GSAA datasets apply.

5.2.3 Encoding

No specific conditions for the LPIS or GSAA datasets apply.

It is worth noting that the LPIS community is familiar with the recommended encodings (GML, XML) of INSPIRE. Nevertheless, consult the INSPIRE or the NSDI contact point on the version of the encoding used.

5.2.4 Character encoding

No specific conditions for the LPIS or GSAA datasets apply.

5.2.5 Spatial representation type

No specific conditions for the LPIS or GSAA datasets apply. According to the current practice, all LPIS and GSAA implementations are based on the vector spatial representation type.

5.2.6 Topological consistency

Topological consistency is defined as “correctness of the explicitly encoded topological characteristics of a dataset” (ISO TC 211 2013). INSPIRE foresees to report topological consistency when a datasets follows the generic network model. Neither the LPIS, nor the GSAA apply this model, as the reference and the agricultural parcels are represented by surfaces (polygons).

Within the agricultural area the reference parcels must follow the rules of a full planar graph, which means that the polygons must not overlap and must not have gaps. In contrary cases slivers appear in the dataset. A sliver is an unintended area that occurs when adjacent surfaces are not digitized properly. The borders of the adjacent surfaces may unintentionally gap or overlap by small amounts to cause a topological error (ISO TC 211 2013). It should be noted that topological rules between different feature types should be handled according to the guidelines on Management of Layers in LPIS (Luketic, Milenov, and Devos 2015).

TG Recommendation 20. Reporting topological consistency

Explicitly encoded topological consistency of the LPIS dataset should be reported with the Number of invalid slivers data quality measure of ISO 19157.

Testing the geometry of the LPIS polygons is a recommended step of the MTS (see IXIT qualifier F) and of the LPIS update (see “Merge surveys” activity diagram). Therefore, the result of the validation can be reported under this metadata element.

For evaluating topological consistency no external data is needed. Therefore, the value of the evaluation method type will be “direct internal” as highlighted below.

EXAMPLE: Topological consistency – Number of invalid slivers

```
gmd:report>
  <gmd:DQ_TopologicalConsistency>
    <gmd:nameOfMeasure>
      <gco:CharacterString>Number of invalid slivers</gco:CharacterString>
    </gmd:nameOfMeasure>
    <gmd:evaluationMethodType>
```

```

    <gmd:DQ_EvaluationMethodTypeCode
codeList="http://standards.iso.org/iso/19139/resources/gmxCodelists.xml#DQ_EvaluationMethodTypeCode"
codeListValue="directInternal">directInternal</gmd:DQ_EvaluationMethodTypeCode>
    </gmd:evaluationMethodType><gmd:evaluationMethodDescription
xsi:type="gmd:PT_FreeText_PropertyType" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
    <gco:CharacterString>Slivers observed by automatic software validation.</gco:CharacterString>
    </gmd:evaluationMethodDescription>
    <gmd:dateTime>
    <gco:DateTime>2019-12-04</gco:DateTime>
    </gmd:dateTime>
    <gmd:result>
    <gmd:DQ_QuantitativeResult>
    <gmd:valueUnit xlink:href="http://www.opengis.net/def/uom/OGC/1.0/unity"/>
    <gmd:value>
    <gco:Record xmlns:xs="http://www.w3.org/2001/XMLSchema"
xsi:type="xs:integer">3</gco:Record>
    <gmd:valueUnit xlink:href="http://www.opengis.net/def/uom/OGC/1.0/unity"/>
    </gmd:value>
    </gmd:DQ_QuantitativeResult>
    </gmd:result>
    </gmd:DQ_TopologicalConsistency>
</gmd:report>

```

5.2.7 Standalone quality report

ISO 19157 – Geographic information – Data quality standard (ISO TC 211 2013) define the conceptual frame how the data quality elements should be described. The standard also requires a generic description of the data quality assessment framework in the so-called Standalone Quality Report metadata element. It should be noted that the standalone quality report is not part of ISO 19115:2003 standard, which is the basis of the INSPIRE metadata. Consequently, this report, if provided, does not appear in the INSPIRE geoportal. The users can get it if only they download the metadata file of the resource. However, the use of this element anticipates the usage of the latest edition (ISO 19115-1:2014) of the metadata standard. The information collected for this report can be also incorporated and made visible in the INSPIRE geoportal in the lineage metadata element.

Nevertheless the use of the standalone report is recommended, as the complexity of reporting the data quality results of LPIS QA can be reduced. Instead of presenting the sampling and the whole aggregation process with metadata elements, the free-text description of this report allows the users to understand the evaluation framework, as well as the results of the evaluation.

TG Recommendation 21. Use of the Standalone Quality Report for LPIS

The LPIS custodian should use the Standalone Quality Report as defined in ISO 19157 to present the specificities of the LPIS QA, comprising the sampling process and the aggregation of the data quality measures.

TG Recommendation 22. Reference to the Standalone Quality Report

Every metadata element describing the quality of LPIS shall refer to the Standalone Quality Report using the CI_Citation type.

Example. Reference to the Standalone Data Quality Report

```
<gmd:staloneQualityReport>
  <gmd:reportReference>
    <gmd:CI_Citation>
      <gmd:title xsi:type = "gmd:PT_FreeText_PropertyType" xmlns:xsi =
"http://www.w3.org/2001/XMLSchema-instance">
        <gco:CharacterString xmlns:gco = "http://www.isotc211.org/2005/gco">Standalone Quality
Report of the LPIS Quality Assessment 2019</gco:CharacterString>
      </gmd:title>
      <gmd:date>
        <gco:Date xmlns:gco = "http://www.isotc211.org/2005/gco">2019-06-30</gco:Date>
      </gmd:date>
      <gmd:dateType>
        <gmd:CI_DateTypeCode codeListValue = "publication" codeList =
"http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmxCodetlists.xml#CI
_DateTypeCode">publication</gmd:CI_DateTypeCode>
      </gmd:dateType>
    </gmd:CI_Citation>
    <gmd:abstract xsi:type = "gmd:PT_FreeText_PropertyType" xmlns:xsi = "http://www.w3.org/2001/XMLSchema-
instance">
      <gco:CharacterString xmlns:gco = "http://www.isotc211.org/2005/gco">This report contains
the results of the quality assessment of the LPIS for year 2018. The first conformance class of the LPIS is characterized by
three quality elements. These quality elements have been derived from direct inspection of a sample of reference parcels
(RPs) included in the LPIS.</gco:CharacterString>
    </gmd:abstract>
    <gmd:CI_OnlineResource>
      <gmd:linkage>
        <gmd:URL>https://www.geodata.info/srv/catalog.search;sedsionid=8BE554223A#/metadata/<
/gmd:URL>
      </gmd:linkage>
    </gmd:CI_OnlineResource>
  </gmd:reportReference>
</gmd:staloneQualityReport>
```

The data quality results of conformance class 2 serve for the internal purposes of the LPIS custodian. Therefore, the scope of reporting of data quality can be restricted to the elements of conformance class 1 (Art. 6 of R640/2014).

5.2.8 Thematic attribute accuracy

The quality evaluation in LPIS QA is based on inspecting the correctness of two attributes of the RP feature type: the maximum eligible area and the land cover classes contained in the RP. The inspection process, therefore, targets at assessing the thematic accuracy of the system. The results of the inspection of all data quality elements¹⁵ (QE1a, QE1b, QE2a, QE2c, QE3) can be reported under the “Thematic attribute accuracy” data quality element, which can be described both with a quantitative result and a conformance result. As these elements are evaluated by aggregating the DQ elements at RP level, the evaluation method type should be set to “indirect”.

¹⁵ In terminology of ISO 19157 these are (aggregated) data quality measures that together with the correspondent data quality unit (sampled reference parcels within the LPIS dataset) form the data quality element.

TG Recommendation 23. Reporting the data quality elements of LPIS QA

The results of data quality inspection under the LPIS QA should be reported under the DQ_QuantitativeAccuracy data quality element using the DQ_QuantitativeResult and the DQ_ConformanceResult data quality measures of ISO 19157.

Example. Reporting QE1a as quantitative result

```
<gmd:DQ_QuantitativeAttributeAccuracy>
  <gmd:nameOfMeasure>
    <gco:CharacterString>LPIS Quality Assurance Framework - Maximum eligible area</gco:CharacterString>
  </gmd:nameOfMeasure>
  <gmd:measureIdentifier>
    <gco:CharacterString>10201</gco:CharacterString>
  </gmd:measureIdentifier>
  <gmd:evaluationMethodType>
    <gmd:DQ_EvaluationMethodTypeCode
      codeList="http://standards.iso.org/iso/19139/resources/gmxCodeLists.xml#DQ_EvaluationMethodTypeCode"
      codeListValue="indirect">Indirect - aggregation, derivation from the direct external evaluation of the reference
      parcels</gmd:DQ_EvaluationMethodTypeCode>
    </gmd:evaluationMethodType>
    <gmd:measureDescription xsi:type="gmd:PT_FreeText_PropertyType" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
      <gco:CharacterString>Percentage of the eligible hectares as observed, with respect to all eligible hectares
      recorded.</gco:CharacterString>
    </gmd:measureDescription>
  <gmd:dateTime>
    <gco:DateTime>2018-01-30</gco:DateTime>
  </gmd:dateTime>
  <gmd:derivedElement>
    <gco:CharacterString>QE1a - percentage</gco:CharacterString>
    <gmd:result>
      <gmd:DQ_QuantitativeResult>
        <gmd:valueUnit xlink:href="http://www.opengis.net/def/uom/OGC/1.0/unity"/>unity</gmd:valueUnit>
        <gmd:value>
          <gco:Record xmlns:xs="http://www.w3.org/2001/XMLSchema" xsi:type="xs:double">99.95</gco:Record>
        </gmd:value>
      </gmd:DQ_QuantitativeResult>
    </gmd:result>
  </gmd:derivedElement>
</gmd:DQ_QuantitativeAttributeAccuracy>
```


Example. Reporting QE1a as conformance result

```
<gmd:derivedElement>
  <gco:CharacterString>QE1a - conformance</gco:CharacterString>
  <gmd:result>
    <gmd:DQ_ConformanceResult>
      <gmd:specification>
        <gmd:CI_Citation>
          <gmd:title xsi:type="gmd:PT_FreeText_PropertyType" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance">
            <gco:CharacterString xmlns:gco="http://www.isotc211.org/2005/gco">GUIDANCE DOCUMENT ON
THE LAND PARCEL IDENTIFICATION SYSTEM (LPIS) UNDER ARTICLES 5, 9 AND 10 OF COMMISSION DELEGATED
REGULATION (EU) NO 640/2014.</gco:CharacterString>
            </gmd:title>
            <gmd:CI_Date>
              <gco:Date xmlns:gco="http://www.isotc211.org/2005/gco">2018-07-07</gco:Date>
              <gmd:dateType>
                <gmd:CI_DateTypeCode codeListValue="publication"
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmxCodellists.xml#CI_Dat
eTypeCode">publication</gmd:CI_DateTypeCode>
                </gmd:dateType>
              </gmd:CI_Date>
            </gmd:CI_Citation>
          </gmd:specification>
          <gmd:pass>
            <gco:Boolean xmlns:gco="http://www.isotc211.org/2005/gco">>true</gco:Boolean>
          </gmd:pass>
        </gmd:DQ_ConformanceResult>
      </gmd:result>
    </gmd:derivedElement>
```

Annex A

References to technical specifications of SDI components that are relevant for management of IACS

INSPIRE Protected sites

<https://inspire.ec.europa.eu/id/document/tg/ps>

INSPIRE Elevation:

<https://inspire.ec.europa.eu/id/document/tg/el>

INSPIRE Orthoimagery

<https://inspire.ec.europa.eu/id/document/tg/oi>

INSPIRE Land cover

<https://inspire.ec.europa.eu/id/document/tg/lc>

INSPIRE Land use

<https://inspire.ec.europa.eu/id/document/tg/lu>

INSPIRE Soil

<https://inspire.ec.europa.eu/id/document/tg/so>

INSPIRE Agricultural and Aquaculture facilities

<https://inspire.ec.europa.eu/id/document/tg/af>

INSPIRE Area management/ restriction/ regulation zones and reporting units

<https://inspire.ec.europa.eu/id/document/tg/am>

INSPIRE Habitats and biotopes

<https://inspire.ec.europa.eu/id/document/tg/hb>

Annex B

Mapping of the metadata elements used in MTS to the INSPIRE metadata TG and to IACS data sharing TG

MTS metadata element	XML encoding	Multiplicity	Reference in the INSPIRE metadata TG	Section in this TG
resourceTitle	<i>gmd:citation/gmd:CI_Citation/gmd:title</i>	1	Section 2.3.1 Resource title TG Requirement C.8	Section 5.1.1 C 2.1
ixitQualifier	<i>cap:ixitQualifierType</i>	1	n.a.	Section 5.1.14 C 2.17
temporalExtent	<i>gmd:temporalElement/gmd:EX_TemporalExtent/gmd:extent</i> Child elements : <i>gml:TimeInstant/gml:beginPosition</i> <i>gml:TimeInstant/gml:endPosition</i>	1	Section 2.3.4 Temporal extent	Section 5.1.13 C 2.13-C 2.16
		1	TG Requirement C.14	
		0..1	TG Requirement C.14	
resourceLocator	<i>gmd:transferOptions/gmd:MD_DigitalTransferOptions/gmd:online/gmd:CI_OnlineResource/gmd:linkage/gmd:URL</i> May include child elements: <i>gmd:name</i> <i>gmd:description</i> <i>gmd:function</i>	0..1	Section 3.1.3.1 TG Requirement 1.8	Section 5.1.4 C 2.4
uniqueResourceIdentifier	<i>gmd:citation/gmd:CI_Citation/gmd:identifier/*gmd:code</i>	1..*	Section 3.1.2.1 TG Requirement 1.3	Section 5.1.5 C 2.5
lineage	<i>gmd:dataQualityInfo/gmd:DQ_DataQuality</i> Child element: <i>gmd:lineage/gmd:LI_Lineage/gmd:statement</i>	1	Section 3.1.4.3 TG Requirement 1.11 TG Recommendation 1.12 and 1.13	Section 5.1.14 C 2.13-C 2.16
spatialResolution	<i>gmd:abstract</i>	1	Section 4.1.2.1 TG Requirement 3.3	Section 5.1.15 C 2.18
responsibleParty	<i>gmd:pointOfContact/gmd:CI_ResponsibleParty.</i> Child elements <i>gmd:pointOfContact/gmd:CI_ResponsibleParty/gmd:organisationName</i> <i>gmd:pointOfContact/gmd:CI_ResponsibleParty/gmd:role/gmd:CI_RoleCod</i>	1..*	Section 2.3.3 and 4.4.2.2 TG requirement C10 and 6.4	Section 5.1.18 C 2.23-C 2.25
metadataPointOfContact	<i>gmd:pointOfContact/gmd:CI_ResponsibleParty</i> Child element <i>gmd:pointOfContact/gmd:CI_ResponsibleParty/gmd:contactInfo/gmd:CI_Contact/gmd:address/gmd:CI_Address/gmd:electronicMailAddresses</i>	1..*	Section 2.3.3 and 4.4.2.2 TG requirement C10 and 6.4	Section 5.1.18 C 2.26-C 2.27

Annex C

INSPIRE discovery metadata profile according to Regulation (EU) 1205/2008 for the LPIS and GSAA datasets. *Specific provisions of the LPIS and GSAA domains are in italics.* Other examples come from the technical guidelines of INSPIRE.

C.2.1 Resource title

Metadata element name	Resource title
Reference	Part B 1.1
Definition	Name by which the cited resource is known
ISO 19115 number and name	360. title
ISO/TS 19139 path	identificationInfo[1]*/citation*/title
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1]
Data type (and ISO 19115 no.)	CharacterString
Domain	Free text
Example	<i>Implementation (Lot) 1 - Land Parcel Identification System 2015</i>
Comments	<p><i>The resource title relates either</i></p> <ul style="list-style-type: none"> • <i>to a dataset, which is an identifiable collection of LPIS data that share the same specification, time of production/upgrading, production method, input data etc. If applicable, title should be assigned to a lot.</i> • <i>To a dataset series that share the same specification, production method, input data.</i> <p><i>It is recommended to add the year of creation (datasets) or the temporal extent (dataset series), as different editions of the LPIS datasets might be available and published.</i></p>

C.2.2 Resource abstract

Metadata element name	Resource abstract
Reference	Part B 1.2
Definition	Brief narrative summary of the content of the resource(s)
ISO 19115 number and name	25. abstract
ISO/TS 19139 path	identificationInfo[1]*/abstract
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1]

Data type (and ISO 19115 no.)	CharacterString
Domain	Free text
Example	<i>The agricultural parcels dataset provides the land use of agricultural and forest land in 2015, which are managed in frame of the Common Agricultural Policy. This public version has been anonymized; it does not contain personal information that could be used for the identification of the farmer. The polygons of the dataset locate agricultural land and the main crops cultivated on it. The boundaries of agricultural parcels have been delineated based on the eligibility conditions established by the Paying Agency. This map layer can be downloaded. It is accompanied by two files (.lyr), containing the legend of agricultural parcels and crops, respectively.</i>
Comments	

C.2.3 Resource type

Metadata element name	Resource type
Reference	Part B 1.3
Definition	Scope to which metadata applies
ISO 19115 number and name	6. hierarchyLevel
ISO/TS 19139 path	hierarchyLevel
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1]
Data type (and ISO 19115 no.)	MD_ScopeCode
Domain	CodeList (see annex B.5.25 of ISO 19115)
Example	<i>dataset</i>
Comment	<i>Even though the different editions of the LPIS and GSAA datasets could be collected in a dataset series, this solution is acceptable only when the various editions share the same properties, comprising conformance, type of orthoimagery input, etc..</i>

C.2.4 Resource locator

Metadata element name	Resource locator
Reference	Part B 1.4
Definition	Location (address) for on-line access using a Uniform Resource Locator address or similar addressing scheme

ISO 19115 number and name	397. linkage
ISO/TS 19139 path	distributionInfo/*/transferOptions/*/onLine/*/linkage
INSPIRE obligation / condition	Conditional for spatial dataset and spatial dataset series: Mandatory if a URL is available to obtain more information on the resources and/or access related services.
INSPIRE multiplicity	[0..*]
Data type (and ISO 19115 no.)	URL
Domain	URL (IETF RFC1738 and IETF RFC 2056)
Example	<i>http://geoservices.wallonie.be/arcgis/services/AGRICULTURE/SIGEC_PARC_AGR ANON__2015/MapServer/WmsServer?version=1.3.0%26service=WMS%26request=GetSchemaExtension"</i>
Comments	A Resource Locator could be described, moreover, by other additional elements as a Title, a Description and a Function. In that case, the Title and the Description shall be free text and the Function shall be filled by the CI_OnLineFunctionCode (ISO 19115 code list).

C.2.5 Unique resource identifier

Metadata element name	Unique resource identifier
Reference	Part B 1.5
Definition	Value uniquely identifying an object within a namespace
ISO 19115 number and name	365. identifier
ISO/TS 19139 path	identificationInfo[1]*/citation*/identifier
INSPIRE obligation / condition	Mandatory for dataset and dataset series
INSPIRE multiplicity	[1..*] for dataset and series
Data type (and ISO 19115 no.)	205. MD_Identifier
Domain	URI (IETF RFC 3986)
Example	<i>The Unique resource identifier semantically consisting of <u>namespace</u>: http://geoportail.wallonie.be/ressources/id/ and <u>identifier</u>: bf12c40c-40cd-4b33-adbc-c5fa9d529ced and is provided together in element <u>code</u>: http://geoportail.wallonie.be/ressources/id/ bf12c40c-40cd-4b33-adbc-c5fa9d529ced</i>
Comment	

C.2.6 Coupled resource

Metadata element name	Coupled resource
Reference	Part B 1.6
Definition	Provides information about the datasets that the service operates on.
ISO 19119 number and name	9 of table C.1. operatesOn
ISO/TS 19139 path	identificationInfo[1]*/operatesOn
INSPIRE obligation / condition	<ul style="list-style-type: none"> - Not applicable to dataset and dataset series - Conditional to services: Mandatory if linkage to datasets on which the service operates are available.
INSPIRE multiplicity	<p>[0] for datasets and series</p> <p>[0..*] for services</p>
Data type (and ISO 19115 no.)	36. MD_DataIdentification
Domain	A unique resource identifier or locator (URL) of the MD_DataIdentification object
Example	<i>xlink:href="http://geoservices.wallonie.be/arcgis/services/AGRICULTURE/SIGEC_PARC_AGRY_ANON_2015/MapServer/WmsServer?request=GetLegendGraphic%26version=1.3.0%26format=image/png%26layer=2"</i>
Comments	<p>The implementation of this element by reference means that the xlink:href element are pointing to a metadata record that contains a MD_DataIdentification object.</p> <p>The Unique Resource Identifier can be explicitly defined for the target dataset using the optional uuidref attribute.</p>

C.2.7 Resource language

Metadata element name	Resource language
Reference	Part B 1.7
Definition	Language(s) used within the datasets
ISO 19115 number and name	39. language
ISO/TS 19139 path	identificationInfo[1]*/language
INSPIRE obligation / condition	<ul style="list-style-type: none"> - Conditional for spatial dataset and spatial dataset series: Mandatory if the resource includes textual information. - Not applicable to services
INSPIRE multiplicity	<p>[0..*] for datasets and series</p> <p>[0] for services</p>

Data type (and ISO 19115 no.)	LanguageCode (ISO/TS 19139)
Domain	<p>Codelist (See ISO/TS 19139) based on alpha-3 codes of ISO 639-2. Use only three-letter codes from in ISO 639-2/B (bibliographic codes),</p> <p>The list of codes for the 24 official EU languages is:</p> <p>Bulgarian – bul Irish – gle Croatian – hrv Italian – ita Czech – cze</p> <p>Latvian – lav Danish – dan Lithuanian – lit Dutch – dut Maltese – mlt</p> <p>English – eng Polish – pol Estonian – est Portuguese – por Finnish – fin</p> <p>Romanian – rum French – fre Slovak – slo German – ger Slovenian – slv</p> <p>Greek – gre Spanish – spa Hungarian – hun Swedish – swe</p> <p>The list of all the codes is defined at http://www.loc.gov/standards/iso639-2/</p> <p>Regional languages also are included in this list.</p>
Example	eng
Comment	

C.2.8 Topic category

Metadata element name	Topic category
Reference	Part B 2.1
Definition	Main theme(s) of the dataset
ISO 19115 number and name	41. topicCategory
ISO/TS 19139 path	identificationInfo[1]*/topicCategory
INSPIRE obligation / condition	<ul style="list-style-type: none"> - Mandatory for datasets and dataset series - Not applicable to services
INSPIRE multiplicity	[1..*] for datasets and dataset series [0] for services
Data type (and ISO 19115 no.)	MD_TopicCategory
Domain	Enumeration (See B.5.27 of ISO 19115 or Part D 2 of [Regulation 1205/2008])
Example	<i>farming</i>
Comments	The topic categories defined in Part D 2 of [Regulation 1205/2008] are derived directly from the topic categories defined in MD_TopicCategoryCode (B.5.27 of ISO 19115)

C.2.9 Spatial data service type

Metadata element name	Spatial data service type
Reference	Part B 2.2
Definition	A service type name from a registry of services
ISO 19119 number and name	1 of table C.1. serviceType
ISO/TS 19139 path	identificationInfo[1]*/serviceType
INSPIRE obligation / condition	- Not applicable to datasets and dataset series - Mandatory for services
INSPIRE multiplicity	[1] for services [0] for datasets and dataset series
Data type (and ISO 19115 no.)	GenericName
Domain	Code list. See Part D 3 of [Regulation 1205/2008]
Example	view
Comments	

C.2.10 Keyword value

Metadata element name	Keyword value
Reference	Part B 3.1
Definition	Commonly used word(s) or formalised word(s) or phrase(s) used to describe the subject
ISO 19115 number and name	53. keyword
ISO/TS 19139 path	identificationInfo[1]*/descriptiveKeywords*/keyword
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1..*]
Data type (and ISO 19115 no.)	CharacterString
Domain	Free text
Example	- <i>Land use (Usage des sols) - Originating controlled vocabulary: GEMET - INSPIRE themes, version 1.0</i> - <i>(6020) Agriculture - Originating controlled vocabulary: Thèmes du géoportail wallon, version 1.0</i> - <i>agriculture - Originating controlled vocabulary: GEMET themes exploitation agricole - Originating controlled vocabulary: GEMET politique agricole commune - Originating controlled vocabulary: GEMET</i> - <i>LPIS</i>

	<ul style="list-style-type: none"> - <i>Land Parcel Identification System</i> - <i>Système d'identification du parcellaire agricole</i> - <i>PAC</i>
Comments	Each instance of ISO 19115 keyword may originate from a controlled vocabulary described through the thesaurusName property of the instance of descriptiveKeywords to which the keyword pertains. The keywords may contain elements not belonging to controlled vocabularies too. Keywords can be given in different languages.

C.2.11 Originating controlled vocabulary

Metadata element name	Originating controlled vocabulary
Reference	Part B 3.2
Definition	Name of the formally registered thesaurus or a similar authoritative source of keywords
ISO 19115 number and name	55. thesaurusName
ISO/TS 19139 path	identificationInfo[1]*/descriptiveKeywords*/thesaurusName
INSPIRE obligation / condition	Conditional: Mandatory if the keyword value originates from a controlled vocabulary
INSPIRE multiplicity	[0..1] relative to a single Keyword, but there may be many keywords originating from different controlled vocabularies
Data type (and ISO 19115 no.)	CI_Citation
Domain	<p>The following properties are expected:</p> <ul style="list-style-type: none"> - Title (characterString and free text) - Reference date (CI_Date) <ul style="list-style-type: none"> o dateType: creation, publication or revision o date: an effective date
Example	<p>Identification for a keyword originating from GEMET- INSPIRE themes:</p> <ul style="list-style-type: none"> - title: GEMET - INSPIRE themes, version 1.0 - date: <ul style="list-style-type: none"> o dateType: publication o date: 2008-06-01 <p>Identification for a keyword originating from GEMET - Concepts:</p> <ul style="list-style-type: none"> - title: GEMET - Concepts, version 2.4 - date: <ul style="list-style-type: none"> o dateType: publication o date: 2010-01-13 <p>Identification for a keyword originating from AGROVOC:</p> <ul style="list-style-type: none"> - title: AGROVOC - date: <ul style="list-style-type: none"> o dateType: publication o date: 2008-04-14

Comments	GEMET concepts: https://www.eionet.europa.eu/gemet/en/themes/ GEMET INSPIRE themes: https://www.eionet.europa.eu/gemet/en/inspire-themes/ AGROVOC: http://aims.fao.org/est-registry/vocabularies/agrovoc
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C.2.12 Geographic bounding box

Metadata element name	Geographic bounding box
Reference	Part B 4.1
Definition	Western-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east). Eastern-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east) Northern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north) Southern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north).
ISO 19115 number and name	344. westBoundLongitude 345. eastBoundLongitude 346. southBoundLatitude 347. northBoundLatitude
ISO/TS 19139 path	identificationInfo[1]/*/extent/*/geographicElement/*/westBoundLongitude identificationInfo[1]/*/extent/*/geographicElement/*/eastBoundLongitude identificationInfo[1]/*/extent/*/geographicElement/*/southBoundLatitude identificationInfo[1]/*/extent/*/geographicElement/*/northBoundLatitude
INSPIRE obligation / condition	- Mandatory for datasets and spatial dataset series - Conditional for spatial services: mandatory for services with an explicit geographic extent
INSPIRE multiplicity	[1..*] for spatial data sets and spatial dataset series [0..*] for spatial data services
Data type (and ISO 19115 no.)	Decimal
Domain	-180.00 ≤ westBoundLongitude ≤ 180.00 -180.00 ≤ eastBoundLongitude ≤ 180.00 -90.00 ≤ southBoundingLatitude ≤ 90.00 -90.00 ≤ northBoundingLatitude ≤ 90.00

Example	<pre><EX_GeographicBoundingBox> <westBoundLongitude>2.654318</westBoundLongitude> <eastBoundLongitude>6.651396</eastBoundLongitude> <southBoundLatitude>49.426123</southBoundLatitude> <northBoundLatitude>51.110623</northBoundLatitude> </EX_GeographicBoundingBox></pre>
Comment	

C.2.13 Temporal extent

Metadata element name	Temporal extent
Reference	Part B 5.1
Definition	Time period covered by the content of the dataset
ISO 19115 number and name	351. extent
ISO/TS 19139 path	identificationInfo[1]/*/extent/*/temporalElement/*/extent
INSPIRE obligation / condition	Conditional: At least one temporal reference is required
INSPIRE multiplicity	[0..*] for temporal extent but at least one temporal reference is required
Data type (and ISO 19115 no.)	TM_Primitive
Domain	As described in ISO 19108
Example	From 2008-01-01T11:45:30 to 2008-12-31T09:10:00
Comments	The overall time period covered by the content of the resource may be composed of one or many instances.

C.2.14 Date of publication

Metadata element name	Date of publication
Reference	Part B 5.2
Definition	Reference date for the cited resource - publication
ISO 19115 number and name	362. date
ISO/TS 19139 path	identificationInfo[1]/*/citation/*/date[./*/dateType*/text()='publication']/*/date
INSPIRE obligation / condition	Conditional: at least one date of publication / date of creation / date of revision is required
INSPIRE multiplicity	[0..*] but at least one date of publication / date of creation / date of revision or one temporal extent is required
Data type (and ISO 19115 no.)	393. CI_Date

Domain	Described in ISO 19108 and ISO 8601
Example	2009-03-15 2009-03-15T11:15:00
Comments	

C.2.15 Date of last revision

Metadata element name	Date of last revision
Reference	Part B 5.3
Definition	Reference date for the cited resource - revision
ISO 19115 number and name	362. date
ISO/TS 19139 path	identificationInfo[1]/*/citation/*/date[./*/dateType*/text()='publication']/*/date
INSPIRE obligation / condition	Conditional: at least one date of publication / date of creation / date of revision is required
INSPIRE multiplicity	[0..1] but at least one date of publication / date of creation / date of revision or one temporal extent is required
Data type (and ISO 19115 no.)	393. CI_Date
Domain	Described in ISO 19108 and ISO 8601
Example	2009-04-15 2009-04-15T11:15:00
Comments	There may be more than one revision date provided in an ISO 19115 metadata, but INSPIRE will consider as date of last revision the more recent one. <i>Mandatory for the LPIS and GSAA dataset. Updated LPIS and GSAA datasets shall be published at least at the end of the campaign year.</i>

C.2.16 Date of creation

Metadata element name	Date of creation
Reference	Part B 5.4
Definition	Reference date for the cited resource - creation
ISO 19115 number and name	362. date
ISO/TS 19139 path	identificationInfo[1]/*/citation/*/date[./*/dateType*/text()='publication']/*/date

INSPIRE obligation / condition	Conditional: at least one date of publication / date of creation / date of revision is required
INSPIRE multiplicity	[0..1] but at least one date of publication / date of creation / date of revision or one temporal extent is required
Data type (and ISO 19115 no.)	393. CI_Date
Domain	Described in ISO 19108 and ISO 8601
Example	2009-02-15 2009-02-15T11:15:00
Comments	

C.2.17 Lineage

Metadata element name	Lineage
Reference	Part B 6.1
Definition	General explanation of the data producer's knowledge about the lineage of a dataset
ISO 19115 number and name	83. statement
ISO/TS 19139 path	dataQualityInfo/*/lineage/*/statement
INSPIRE obligation / condition	- Mandatory for spatial dataset and spatial dataset series. - Not applicable to services.
INSPIRE multiplicity	[1] for datasets and data set series [0] for spatial data services
Data type (and ISO 19115 no.)	CharacterString
Domain	Free text
Example	<p><i>Example 1: (non-structured description). LPIS dataset has been created by the LPIS custodian alone, through a photointerpretation and digitisation from orthoimagery, compliant with the required cartographic scale. The reference parcels and their attributes are updated each year, on the basis of inputs from farmers' declarations, systematic field visits and interpretation of satellite imagery, provided as part of the annual on-the-spot control. One third of the country (region) is systematically checked against up-to-date orthophoto. Updating of LPIS may be also triggered by the changes in eligibility conditions. This dataset reflects the situation in 2017.</i></p> <p><i>Example 2: (structured description based on IXIT and the reporting of the LPIS updated evidence in LPIS QA) The initial/primary graphical data (polygon boundaries) for the perimeter that identifies a "unit of land representing agricultural area" and allows "unique and unambiguous</i></p>

	<i>localisation” are delivered by internal IACS procedures. The delineation of these units is made by the LPIS-custodian, (q7) the physical borders used to “measure the agricultural land” that “as a principle, is stable in time” are derived from a land cover mapping project set-up by the LPIS-custodian.</i>
Comments	<i>This is the element, where the outcome of IXIT reporting can be incorporated as shown in the second example.</i>

C.2.18 Spatial resolution

Metadata element name	Spatial resolution
Reference	Part B 6.2
Definition	<ul style="list-style-type: none"> - Equivalent scale: level of detail expressed as the scale denominator of a comparable hardcopy map or chart - Distance: ground sample distance
ISO 19115 number and name	<ul style="list-style-type: none"> - 60. equivalentScale - 61. distance
ISO/TS 19139 path	<ul style="list-style-type: none"> - identificationInfo[1]*/spatialResolution*/equivalentScale*/denominator (equivalent scale) - identificationInfo[1]*/spatialResolution*/distance (distance)
INSPIRE obligation / condition	<ul style="list-style-type: none"> - Conditional: Mandatory if an equivalent scale or a resolution distance can be specified. - Conditional: Mandatory when there is a restriction on the spatial resolution for service.
INSPIRE multiplicity	[0..*]
Data type (and ISO 19115 no.)	<ul style="list-style-type: none"> - Integer (equivalent scale) - Distance (distance)
Domain	<ul style="list-style-type: none"> - positive integer (equivalent scale) - number expressing the distance value and a unit of measure of the distance value (distance)
Example	5000 (e.g. 1:5000 scale map)
Comments	For services, it is not possible to express the restriction of a service concerning the spatial resolution in the current version of ISO 19119. While the problem is addressed by the standardization community, spatial resolution restrictions for services shall be expressed in the Abstract

C.2.19 Specification

Metadata element name	Specification
Reference	Part B 7.1
Definition	Citation of the product specification or user requirement against which data is being evaluated
ISO 19115 number and name	130. specification

ISO/TS 19139 path	dataQualityInfo*/report*/result*/specification
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1] understood in the context of a conformity statement when reported in the metadata – there may be more than one conformity statement
Data type (and ISO 19115 no.)	359. CI_Citation
Domain	The following properties are expected: <ul style="list-style-type: none"> - Title (characterString and free text) - Reference date (CI_Date): <ul style="list-style-type: none"> o dateType: creation, publication or revision date: an effective date
Example	<p><u>Example 1</u></p> <p>title: INSPIRE Data Specification on Land Use – Technical Guidelines</p> <p>date:</p> <ul style="list-style-type: none"> - dateType: publication - date: 2013-12-10 <p><u>Example 2</u></p> <p>title: Guidance document on the land parcel identification system (LPIS) under Art. 5, 9 and 10 of Commission Delegated Regulation (EU) No 640/2014</p> <ul style="list-style-type: none"> - dateType: publication - date: 2018-07-07
Comments	

C.2.20 Degree

Metadata element name	Degree
Reference	Part B 7.2
Definition	Indication of the conformance result
ISO 19115 number and name	132. pass
ISO/TS 19139 path	dataQualityInfo*/report*/result*/pass
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1] understood in the context of a conformity statement when reported in the metadata – there may be more than one conformity statement
Data type (and ISO 19115 no.)	Boolean

Domain	<ul style="list-style-type: none"> - true if conformant - false if not conformant - null (with nilReason = "unknown") if not evaluated
Example	true
Comments	<i>In addition to an INSPIRE theme, the conformance of the LPIS against the requirements given in the LPIS guidance document, or the conformance of the quality in relation to Art. 6 of (EU) No 640/2014 can be declared.</i>

C.2.21 Conditions applying to access and use

Metadata element name	Conditions applying to access and use
Reference	Part B 8.1
Definition	Restrictions on the access of a resource or metadata
ISO 19115 number and name	70. accessConstraints
ISO/TS 19139 path	identificationInfo[1]*/resourceConstraints*/accessConstraints
INSPIRE obligation / condition	Conditional. Mandatory if useConstraints is not documented.
INSPIRE multiplicity	[0..*] for accessConstraints per instance of MD_LegalConstraints
Data type (and ISO 19115 no.)	MD_RestrictionCode
Domain	Codelist (strictly limited to the value defined in B.5.24 of ISO 19115)
Example	otherRestrictions (limitation not listed).
Comments	

Metadata element name	Conditions applying to access and use (other constraints)
Reference	Part B 8.1
Definition	Other restrictions and legal prerequisites for accessing the resource or metadata
ISO 19115 number and name	72. otherConstraints
ISO/TS 19139 path	identificationInfo[1]*/resourceConstraints*/otherConstraints
INSPIRE obligation / condition	Conditional: referring to conditions applying to access. Mandatory if accessConstraints is set at the value "otherRestrictions"
INSPIRE multiplicity	[0..*] for otherConstraints per instance of MD_LegalConstraints
Data type (and ISO 19115 no.)	CharacterString
Domain	Free text or if the values "no conditions apply" or "conditions unknown" is used then an Anchor to the code list

	<p>http://inspire.ec.europa.eu/metadata-codelist/ConditionsApplyingToAccessAndUse</p> <p>in the Inspire Registry should be used. See also Annex D.2 in this document for the code list.</p>
Example	<p>Example if no conditions apply:</p> <p>http://inspire.ec.europa.eu/metadata-codelist/ConditionsApplyingToAccessAndUse/NoConditionsApply</p> <p>JRC cannot guarantee that the data are correct; neither does JRC accept any liability whatsoever for any error, missing data or omission in the data, or for any loss or damage arising from its use. The JRC will not be responsible for any direct or indirect use which might be made of the data. The JRC does not provide any assistance or support in using the data</p>
Comments	

Metadata element name	Conditions applying to use
Reference	Part B 8.1
Definition	Restrictions on the use of a resource or metadata
ISO 19115 number and name	71. useConstraints
ISO/TS 19139 path	identificationInfo[1]*/resourceConstraints*/useConstraints
INSPIRE obligation / condition	Conditional. Mandatory if accessConstraints is not documented.
INSPIRE multiplicity	[0..*] for useConstraints per instance of MD_LegalConstraints
Data type (and ISO 19115 no.)	MD_RestrictionCode
Domain	Codelist (strictly limited to the value defined in B.5.24 of ISO 19115)
Example	otherRestrictions (limitation not listed).
Comments	

Metadata element name	Conditions applying to use (other constraints)
Reference	Part B 8.1
Definition	Other restrictions and legal prerequisites for accessing and using the resource or metadata
ISO 19115 number and name	72. otherConstraints
ISO/TS 19139 path	identificationInfo[1]*/resourceConstraints*/otherConstraints

INSPIRE obligation / condition	Conditional: referring to conditions applying to use. Mandatory if useConstraints is set at the value "otherRestrictions"
INSPIRE multiplicity	[0..*] for otherConstraints per instance of MD_LegalConstraints
Data type (and ISO 19115 no.)	CharacterString
Domain	Free text or if the values "no conditions apply" or "conditions unknown" is used then an Anchor to the codelist in the Inspire Registry should be used.
Example	<p>Example if no conditions apply:</p> <p>http://inspire.ec.europa.eu/metadata-codelist/ConditionsApplyingToAccessAndUse/noConditionsApply</p> <p>Example if there is information about restrictions:</p> <p>Reproduction for non-commercial purposes is authorised, provided the source is acknowledged.</p>
Comments	

C.2.22 Limitations on public access

Metadata element name	Limitations on public access (access constraints)
Reference	Part B 8.2
Definition	access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource
ISO 19115 number and name	70. accessConstraints
ISO/TS 19139 path	identificationInfo[1]*/resourceConstraints*/accessConstraints
INSPIRE obligation / condition	Conditional: referring to limitations on public access. Mandatory if classification is not documented
INSPIRE multiplicity	[0..*] for accessConstraints per instance of MD_LegalConstraints
Data type (and ISO 19115 no.)	MD_RestrictionCode
Domain	Codelist (strictly limited at the value defined in B.5.24 of ISO 19115)
Example	otherRestrictions
Comments	

Metadata element name	Limitations on public access (other constraints)
Reference	Part B 8.2

Definition	Other restrictions and legal prerequisites for accessing and using the resource or metadata
ISO 19115 number and name	72. otherConstraints
ISO/TS 19139 path	identificationInfo[1]*/resourceConstraints*/otherConstraints
INSPIRE obligation / condition	Conditional: referring to limitations on public access. Mandatory if classification is not documented
INSPIRE multiplicity	[0..*] for otherConstraints per instance of MD_LegalConstraints
Data type (and ISO 19115 no.)	Gmx:anchor
Domain	A code list value from the code list at http://inspire.ec.europa.eu/metadata-codelist/LimitationsOnPublicAccess/ . See also Annex D.1 of this document for this code list.
Example	<gmx:Anchor link:href=" http://inspire.ec.europa.eu/ metadata-codelist /LimitationsOnPublicAccess//NoLimitations"> no limitations</gmx:Anchor>
Comments	

C.2.23 Responsible party

Metadata element name	Responsible party
Reference	Part B 9.1
Definition	Identification of, and means of communication with, person(s) and organization(s) associated with the resource(s)
ISO 19115 number and name	29. pointOfContact
ISO/TS 19139 path	identificationInfo[1]*/pointOfContact
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1] Relative to a responsible organisation, but there may be many responsible organisations for a single resource
Data type (and ISO 19115 no.)	374. CI_ResponsibleParty
Domain	The following properties are expected: <ul style="list-style-type: none"> - organisationName (characterString and free text) - contactInfo (CI_Contact): <ul style="list-style-type: none"> o address: <ul style="list-style-type: none"> ▪ electronicMailAddress [1..*] (characterString)
Example	<ul style="list-style-type: none"> - <i>organisationName: Paying Agency</i> - <i>contactInfo:</i> <ul style="list-style-type: none"> o <i>address:</i>

	<ul style="list-style-type: none"> ▪ <i>electronicMailAddress:</i> contact@paying.agency.gov
Comment	The contact point should be rather an organization with a functional mailbox than a physical person with a personal working e-mail address.

C.2.24 Responsible party role

Metadata element name	Responsible party role
Reference	Part B 9.2
Definition	Function performed by the responsible party
ISO 19115 number and name	379. role
ISO/TS 19139 path	identificationInfo[1]/*/pointOfContact/*/role
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1] relative to a responsible organisation, but there may be many responsible organisations for a single resource
Data type (and ISO 19115 no.)	CI_RoleCode
Domain	Codelist (see B.5.5 of ISO 19115)
Example	custodian
Comments	There is a direct mapping between the responsible party roles defined in Part D 6 of [Regulation 1205/2008] and the values of the CI_RoleCode code list of ISO 19115

C.2.25 Metadata point of contact

Metadata element name	Metadata point of contact
Reference	Part B 10.1
Definition	Party responsible for the metadata information
ISO 19115 number and name	8. contact
ISO/TS 19139 path	contact
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1..*]
Data type (and ISO 19115 no.)	374. CI_ResponsibleParty
Domain	The following properties are expected: <ul style="list-style-type: none"> - organisationName (characterString and free text) - contactInfo (CI_Contact):

	<ul style="list-style-type: none"> ○ address: <ul style="list-style-type: none"> ▪ <code>electronicMailAddress [1..*]</code> (characterString)
Example	<ul style="list-style-type: none"> - <i>organisationName</i>: Paying Agency - <i>contactInfo</i>: <ul style="list-style-type: none"> ○ address: <ul style="list-style-type: none"> ▪ <i>electronicMailAddress</i>: <code>contact@paying.agency.gov</code>

C.2.26 Metadata date

Metadata element name	Metadata date
Reference	Part B 10.2
Definition	Date that the metadata was created
ISO 19115 number and name	9. dateStamp
ISO/TS 19139 path	dateStamp
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1]
Data type (and ISO 19115 no.)	Date
Domain	ISO 8601
Example	2012-02-20

C.2.27 Metadata language

Definition	Language used for documenting metadata
ISO 19115 number and name	3. language
ISO/TS 19139 path	language
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1]
Data type (and ISO 19115 no.)	LanguageCode (ISO/TS 19139)
Domain	<p>Codelist (See ISO/TS 19139) based on alpha-3 codes of ISO 639-2. Use only three-letter codes from in ISO 639-2/B (bibliographic codes),</p> <p>The value domain for this element is limited to the official languages of the EU member states.</p> <p>The list of valid codes for the 24 official EU languages is:</p> <p>Bulgarian – bul Irish – gle Croatian – hrv Italian – ita Czech – cze</p>

	<p>Latvian – lav Danish – dan Lithuanian – lit Dutch – dut Maltese – mlt</p> <p>English – eng Polish – pol Estonian – est Portuguese – por Finnish – fin</p> <p>Romanian – rum French – fre Slovak – slo German – ger Slovenian – slv</p> <p>Greek – gre Spanish – spa Hungarian – hun Swedish – swe</p> <p>These values are part of the list defined at http://www.loc.gov/standards/iso639-2/</p>
Example	Eng
Comments	

C.3.1 Coordinate Reference System

Metadata element name	Coordinate Reference System
Reference	COMMISSION REGULATION (EU) No 1089/2010, article 13, clause 1
Definition	Description of the coordinatereference system(s) used in the data set.
ISO 19115 number and name	13. referenceSystem
ISO/TS 19139 path	referenceSystemInfo
INSPIRE obligation / condition	Mandatory for dataset and dataset series; not applicable to Network services;
INSPIRE multiplicity	[1..*] for dataset and dataset series;
Data type (and ISO 19115 no.)	186. MD_ReferenceSystem
Domain	<p>To identify the reference system, the referenceSystemIdentifier (RS_Identifier) shall be provided.</p> <p>RS_Identifier itself is a complex type (lines 206-207 and 208.1-208.2 from ISO 19115).</p> <p>At least the following element that is mandatory for ISO should be used (the multiplicity according to ISO 19115 is shown in parentheses):</p> <ul style="list-style-type: none"> - 207. code [1] / domain value: free text <p>If the code is given as an URI as shown above, the element codespace is not needed. The identifiers can be accessed via gm:Anchor (see XML example).</p>
Example	code: http://www.opengis.net/def/crs/EPSSG/0/4258

Comments	ISO 19115 lists several elements which build MD_ReferenceSystem. For the purpose of theme-specific metadata according to the INSPIRE Data specifications the element listed above is sufficient.
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C.3.2 Temporal Reference System

Metadata element name	Temporal Reference System
Reference	COMMISSION REGULATION (EU) No 1089/2010, article 13, clause 2
Definition	Description of the temporal reference system(s) used in the data set.
ISO 19115 number and name	13. referenceSystemInfo
ISO/TS 19139 path	referenceSystemInfo
INSPIRE obligation / condition	Conditional for dataset and dataset series: Only required if a non-default temporal reference system (i.e. Gregorian Calendar or the Coordinated Universal Time) is used; not applicable to services.
INSPIRE multiplicity	[0..*] for dataset and dataset series
Data type (and ISO 19115 no.)	186. MD_ReferenceSystem
Domain	No specific type is defined in ISO 19115 for temporal reference systems. Thus, the generic MD_ReferenceSystem element and its referenceSystemIdentifier (RS_Identifier) property shall be provided. RS_Identifier itself is a complex type (lines 206-207 and 208.1-208.2 from ISO 19115). At least the following element that is mandatory for ISO should be used (the multiplicity according to ISO 19115 is shown in parentheses): - 207. code [1] / domain value: free text
Example	JulianCalendar
Comment	This metadata element is listed for sake of completeness. As in IACS/LPIS all temporal references are given in the Gregorian calendar, this element is not mandatory.

C.3.3 Encoding

Metadata element name	Encoding
Reference	COMMISSION REGULATION (EU) No 1089/2010, article 13, clause 3
Definition	Description of the computer language construct(s) specifying the representation of data objects in a record, file, message, storage device or transmission channel.

ISO 19115 number and name	271.distributionFormat
ISO/TS 19139 path	distributionInfo/MD_Distribution/distributionFormat
INSPIRE obligation / condition	Mandatory for dataset and dataset series; not applicable to services
INSPIRE multiplicity	[1..*] for dataset and dataset series
Data type (and ISO 19115 no.)	284. MD_Format
Domain	This is a complex type (lines 285-290 from ISO 19115). At least the following elements that are mandatory for ISO should be used (the multiplicity according to ISO 19115 is shown in parentheses): - 285. name [1] / domain value: free text - 286. version [1] / domain value: free text Content for name could also be taken from INSIPRE Registry using the code list available here: http://inspire.ec.europa.eu/media-types/ and can be accessed via gmx:Anchor (see XML example).
Example	name: GML version: 3.2.1
Comments	ISO 19115 lists several elements which build MD_Format. For the purpose of theme-specific metadata according to the INSPIRE Data specifications the elements listed above are sufficient. Instead of using element specification here the documentation of the supported data scheme inside the distributed dataset (as mentioned in INSPIRE Data specification) can be given either in conformity statement (see 2.8) or the maybe existing metadata element applicationSchemaInfo (see ISO 19115, B.2.1, No. 21).

C.3.4 Character Encoding

Metadata element name	Character Encoding
Reference	COMMISSION REGULATION (EU) No 1089/2010, article 13, clause 5
Definition	Full name of the character coding standard used for the dataset
ISO 19115 number and name	40. characterSet
ISO/TS 19139 path	identificationInfo[1]*/characterSet
INSPIRE obligation / condition	Conditional for dataset and dataset series: mandatory if NOT using standard UTF-8 encoding; not applicable to services

INSPIRE multiplicity	[0..*] for dataset and dataset series
Data type (and ISO 19115 no.)	MD_CharacterSetCode
Domain	CodeList (see B.5.10 of ISO 19115)
Example	usAscii
Comments	

C.3.5 Spatial representation type

Metadata element name	Spatial representation type
Reference	COMMISSION REGULATION (EU) No 1089/2010, article 13, clause 6 (element added by amendment 1253/2013)
Definition	The method used to spatially represent geographic information
ISO 19115 number and name	37. SpatialRepresentationType
ISO/TS 19139 path	identificationInfo[1]*/spatialRepresentationType
INSPIRE obligation / condition	Mandatory for dataset and dataset series; not applicable to services
INSPIRE multiplicity	[1..*] for dataset and dataset series
Data type (and ISO 19115 no.)	MD_SpatialRepresentation TypeCode
Domain	Codelist (see B.5.26 of ISO 19115), following INSPIRE Data specifications only vector , grid and tin should be used.
Example	vector
Comments	This element is used to broadly categorise a spatial data resource being described.

C.3.6 Topological Consistency

Metadata element name	Topological Consistency – Number of invalid slivers
Reference	COMMISSION REGULATION (EU) No 1089/2010, article 13, clause 4
Definition	Correctness of the explicitly encoded topological characteristics of the data set as described by the scope.
ISO 19115 number and name	80. report
ISO/TS 19139 path	dataQualityInfo/DQ_DataQuality/report/

INSPIRE obligation / condition	Conditional for dataset and dataset series: mandatory if the data set includes types from the Generic Network Model and does not assure centreline topology (connectivity of centrelines) for the network; not applicable to services
INSPIRE multiplicity	[0..*] for dataset and dataset series
Data type (and ISO 19115 no.)	115. DQ_TopologicalConsistency
Domain	<p>DQ_TopologicalConsistency is a forming of the abstract complex type DQ_Element. See B.2.4.3 in ISO 19115:2003 for further information.</p> <p>The following ISO 19115 elements are the corresponding ones to express quantitative results of the data quality evaluation as given in INSPIRE Data specifications sections 8.3.2 which in fact focus on ISO 19157:</p> <ul style="list-style-type: none"> - 100. nameOfMeasure [0..*]: name of the test applied to the data / domain value: free text - 103. evaluationMethodType [0..1]: type of method used to evaluate quality of the dataset/ domain value: DQ_EvaluationMethod TypeCode - 104. evaluationMethodDescription [0..1]: description of the evaluation method / domain value: free text - 106. dateTime [0..*]: date or range of dates on which a data quality measure was applied / domain value: DateTime (ISO 19103) - 107. result [1..2]: value (or set of values) obtained from applying a data quality measure or the outcome of evaluating the obtained value (or set of values) against a specified acceptable conformance quality level / domain value: DQ_Result (abstract) - 133. DQ_QuantitativeResult, consisting of <ul style="list-style-type: none"> - 137. value [1..*]: quantitative value or values, content determined by the evaluation procedure used / domain value: Record (ISO 19103) <p>Due to making use of DQ_QuantitativeResult subset there is a mandatory element in ISO 19115 to be considerer too:</p> <ul style="list-style-type: none"> - 135. valueUnit [1]
Example	8
Comments	<i>The specification of LPIS fulfil the requirements of full planar graph; i.e. no overlaps and no gaps between the boundaries and no sliver polygons are allowed. If this condition is explicitly encoded in the GIS implementation, this element can be used for reporting topological consistency.</i>

C.3.7 Quantitative attribute accuracy

(Additional metadata element for LPIS)

Metadata element name	Quantitative attribute accuracy
Definition	Closeness of the value of a quantitative attribute to a value accepted or known to be true.
Derived data quality element to be reported as metadata	LPIS Quality Assurance Framework - Maximum eligible area QE1a – percentage
Definition of the derived data quality element	Percentage of the eligible hectares as observed, with respect to all eligible hectares recorded
Reference	Commission Delegated Regulation (EU) No 640/2014
ISO 19115 number and name	80. report
ISO/TS 19139 path	dataQualityInfo/DQ_DataQuality/report/
INSPIRE obligation / condition	No INSPIRE obligation
Multiplicity	[0..1] for dataset and dataset series
Data type (and ISO 19157 no.)	30. DQ_QuantitativeAttributeAccuracy Id=quantitativeResult
Domain	<p>DQ_QuantitativeAttributeAccuracy is a forming of the abstract complex type DQ_Element. See B.2.4.3 in ISO 19115:2003 for further information.</p> <p>The following ISO 19115 elements are the corresponding ones to express quantitative results of the data quality evaluation as given in INSPIRE Data specifications sections 8.3.2 which in fact focus on ISO 19157:</p> <ul style="list-style-type: none"> — 100. nameOfMeasure [0.*]: name of the test applied to the data / domain value: free text — 103. evaluationMethodType [0..1]: type of method used to evaluate quality of the dataset/ domain value: DQ_EvaluationMethod TypeCode — 104. evaluationMethodDescription [0..1]: description of the evaluation method / domain value: free text — 106. dateTime [0.*]: date or range of dates on which a data quality measure was applied / domain value: DateTime (ISO 19103) — 107. result [1..2]: value (or set of values) obtained from applying a data quality measure or the outcome of evaluating the obtained value (or set of values) against a specified acceptable conformance quality level / domain value: DQ_Result (abstract) were specified with 133. DQ_QuantitativeResult — 133. DQ_QuantitativeResult, consisting of — 137. value [1.*]: quantitative value or values, content determined by the evaluation procedure used / domain value: Record (ISO 19103)

	<p>Due to making use of DQ_QuantitativeResult subset there is a mandatory element in ISO 19115 to be considered too:</p> <p>— 135. valueUnit [1]</p>
Example	The rate of missing agricultural area is 0.24.
Comments	<p><i>This is a metadata element, which reports QE1a as data quality element of LPIS QA.</i></p> <p><i>QE1a is a derived data quality element, which is defined by aggregating the results of the inspection of the reference parcels contained in the sample used for the quality assessment procedure.</i></p> <p><i>As the users need to know the derivation/aggregation method, a standalone quality report should be prepared and referenced at this data quality element.</i></p> <p><i>The rest of the quality elements of conformance class 1 (QE1b, QE2a, QE2c, QE3) should be reported using a similar structure.</i></p>

Metadata element name	Quantitative Attribute accuracy – Conformance result
Definition	Closeness of the value of a quantitative attribute to a value accepted or known to be true.
Derived quality element to be reported as metadata	<p>LPIS Quality Assurance Framework - Maximum eligible area</p> <p>QE1a – conformance</p>
Reference	Commission Delegated Regulation (EU) No 640/2014
ISO 19115 number and name	80. report
ISO/TS 19139 path	dataQualityInfo/DQ_DataQuality/report/
INSPIRE obligation / condition	No INSPIRE obligation
Multiplicity	[0..1] for dataset and dataset series
Data type (and ISO 19157 no.)	<p>30. DQ_QuantitativeAttributeAccuracy</p> <p>Id=conformanceResult</p>
Domain	<p>DQ_QuantitativeAttributeAccuracy is a forming of the abstract complex type DQ_Element. See B.2.4.3 in ISO 19115:2003 for further information.</p> <p>The following ISO 19115 elements are the corresponding ones to express quantitative results of the data quality evaluation as given in INSPIRE Data specifications sections 8.3.2 which in fact focus on ISO 19157:</p> <p>- 100. nameOfMeasure [0..*]: name of the test applied to the data / domain value: free text</p>

	<ul style="list-style-type: none"> - 103. evaluationMethodType [0..1]: type of method used to evaluate quality of the dataset/ domain value: DQ_EvaluationMethod TypeCode - 104. evaluationMethodDescription [0..1]: description of the evaluation method / domain value: free text - 106. dateTime [0..*]: date or range of dates on which a data quality measure was applied / domain value: DateTime (ISO 19103) - 107. result [1..2]: value (or set of values) obtained from applying a data quality measure or the outcome of evaluating the obtained value (or set of values) against a specified acceptable conformance quality level / domain value: DQ_Result (abstract) - 133. DQ_QuantitativeResult, consisting of - 137. value [1..*]: quantitative value or values, content determined by the evaluation procedure used / domain value: Record (ISO 19103) <p>Due to making use of DQ_QuantitativeResult subset there is a mandatory element in ISO 19115 to be considerer too:</p> <ul style="list-style-type: none"> - 135. valueUnit [1]
Example	pass:true
Comments	<p><i>This is a metadata element, which reports conformance of QE1a data quality element of LPIS QA.</i></p> <p><i>QE1a is a derived data quality element, which is defined by aggregating the results of the inspection of the reference parcels contained in the sample used for the quality assessment procedure.</i></p> <p><i>As the users need to know the derivation/aggregation method, a standalone quality report should be prepared and referenced at this data quality element.</i></p> <p><i>The rest of the quality elements of conformance class 1 (QE1b, QE2a, QE2c, QE3) should be reported using a similar structure.</i></p>

C3.8 Standalone Quality Report

The description of this metadata element is defined in ISO 19157:2013 standard

Metadata element name	Standalone Quality report
Definition	Free text document providing fully detailed information about data quality evaluations, results, and measures used.
Reference	N.a.
ISO 19157 number and name	69 Standalone Quality Report Information
ISO/TS 19139 path	dataQualityInfo/DQ_DataQuality/standaloneQualityReportInformation/

INSPIRE obligation / condition	No INSPIRE obligation																		
Multiplicity	[0..1] for dataset and dataset series																		
Data type (and ISO 19157 no.)	69. DQ_StandaloneQualityInformation																		
Domain	<p>DQ_StandaloneQualityReport is a forming of the abstract complex type DQ_Element. See C.2.1.6 in ISO 19157:2013 for further information.</p> <p>The following ISO 19157 elements are used for referencing the standalone quality report:</p> <ul style="list-style-type: none"> — 70. reportReference [1]: reference to the associated standalone quality report / domain value: CI_Citation — 71. abstract [0..1]: abstract for the associated standalone quality report / domain value: free text 																		
Example	<p>(Abstract) <i>The standalone quality report attached to this quality evaluation is providing more details on the sampling of items under inspection, the derivation and aggregation methods.</i></p> <p>(Content) <i>This report contains the results of the quality assessment of the LPIS for year 2018. The overall quality of the LPIS is characterized by the following quality elements and results:</i></p> <table border="1" data-bbox="565 951 1395 1493"> <thead> <tr> <th>Measure</th> <th>Quantitative Attribute Accuracy</th> <th>Conformance</th> </tr> </thead> <tbody> <tr> <td>QE1a – LPIS maximum eligible area</td> <td>99.45</td> <td>Pass</td> </tr> <tr> <td>QE1b – LPIS maximum eligible area overestimates and underestimates</td> <td>7.56 0.56</td> <td>Pass</td> </tr> <tr> <td>QE2a - Proportion of items with incorrectly recorded area or contaminated with ineligible features</td> <td>0.31</td> <td>Pass</td> </tr> <tr> <td>QE2c – proportion of RPs with classification errors</td> <td>0.24</td> <td>Pass</td> </tr> <tr> <td>QE3 – Critical defects</td> <td>0.03</td> <td>Pass</td> </tr> </tbody> </table> <p><i>These quality elements have been derived from direct inspection of a sample of reference parcels (RPs) included in the LPIS. The total lot of 1,550,645 RPs were sampled within the random zones defined by the European Commission. Following ISO 2859-2 the sample of 1250 RPs was inspected for the correctness of the maximum eligible area value, based on direct external evaluation method. The external source of ground truth was orthoimagery, generated from true color areal imagery acquired in 2018, with ground resolution of 25 cm.</i></p> <p><i>The RP level measurements of the maximum eligible area as well as the results of the land cover observations were aggregated in the data quality</i></p>	Measure	Quantitative Attribute Accuracy	Conformance	QE1a – LPIS maximum eligible area	99.45	Pass	QE1b – LPIS maximum eligible area overestimates and underestimates	7.56 0.56	Pass	QE2a - Proportion of items with incorrectly recorded area or contaminated with ineligible features	0.31	Pass	QE2c – proportion of RPs with classification errors	0.24	Pass	QE3 – Critical defects	0.03	Pass
Measure	Quantitative Attribute Accuracy	Conformance																	
QE1a – LPIS maximum eligible area	99.45	Pass																	
QE1b – LPIS maximum eligible area overestimates and underestimates	7.56 0.56	Pass																	
QE2a - Proportion of items with incorrectly recorded area or contaminated with ineligible features	0.31	Pass																	
QE2c – proportion of RPs with classification errors	0.24	Pass																	
QE3 – Critical defects	0.03	Pass																	

	<i>measures reported in this document. The values of the limiting quality for the conformance results were defined according to ISO 2859-2 as 12.50 for QE1a, QE1b, QE2a, QE2c and 2.00 for QE3.</i>
Comments	It is recommended to store the standalone quality report online and give a link to its location.

Annex D

Governance of the metadata values of LPIS and GSAA datasets and series

INSPIRE metadata element/sub-element	Multiplicity	Harmonised values apply (according to this TG)	Comments
IDENTIFICATION INFORMATION			
C.2.1. Resource title	1		
C.2.2. Resource abstract	1		
C.2.3. Resource type	1		Possible values: - Spatial data set series (series) - Spatial dataset (dataset)
C.2.4. Resource locator	0..*		
C.2.5. Unique resource identifier	1..*		Consult the INSPIRE (NSDI) control point on ensuring the uniqueness at European level
C.2.6. Coupled resource			URI of the spatial data service on which the dataset is accessible. Possible values: - URI of LPIS datasets - URI of GSAA datasets
C.2.7. Resource language	0..*		
C.2.8. Topic category	1..*	x	Agreed mandatory values for LPIS - Farming - Land cover Agreed mandatory values for GSAA - Farming - Land use
C.2.9. Spatial data service type	1	x	Code list shall be taken from Part D3 of Regulation 1205/2008
KEYWORD INFORMATION			
C.2.10. Keyword value	1..*	x	Mandatory keyword for LPIS and GSAA - Common Agricultural Policy Mandatory keyword for LPIS - LPIS Mandatory keyword for GSAA - GSAA

C.2.11. Originating controlled vocabulary	1..*	x	Mandatory Originating controlled vocabulary: GEMET Recommended Originating controlled vocabulary: AGROVOC
SPATIAL AND TEMPORAL REFERENCE			
C.2.12. Geographic bounding box	1..*		
C.2.13. Temporal extent	0..1		Mandatory metadata element for dataset series
C.2.14. Date of publication	0..1		
C.2.15. Date of last revision	0..1		Mandatory element for datasets
C.2.16. Date of creation	0..1		Applies to datasets
QUALITY AND VALIDITY			
C.2.17. Lineage	1		The answers to the questions presented in https://marswiki.jrc.ec.europa.eu/wikicap/index.php/TG_IXIT_Data_structure can be included in the lineage description.
C.2.18. Spatial resolution	0..*		Mandatory for datasets and dataset series. Not applicable to spatial data services.
CONFORMITY			
C.2.19. Specification			Mandatory specification: INSPIRE (one of the themes, at least) Recommended specification: Regulation (EU) 640/2014 according to LPIS QA
C.2.20. Degree			Reported under the Pass metadata sub-element with Boolean values (true, nil)
CONSTRAINT RELATED TO ACCESS AND USE			
C.2.21. Conditions applying to access and use	1..*		Values decided according to national legislation / rules (eventual payment comprised)
C.2.22. Limitations on public access	0..*		If needed, according to national legislation / rules
RESPONSIBLE ORGANISATION			
C.2.23. Responsible party	1..*		
C.2.24. Responsible party role	1..*		Values from Annex D.6 of the INSPIRE metadata regulation. For each party a role should be defined.
C.2.25. Metadata point of contact	1..*		Should be an organisation, not a physical person
METADATA ON METADATA			
C.2.26. Metadata date	1		
C.2.27. Metadata language	1		Multilingual values can be used in the xml schema under the localised character string
EVALUATION AND USE (SPECIFIED IN INSPIRE)			
C.3.1. Coordinate Reference System	1..*		For LPIS/GSAA the national CRS is the default.
C.3.2. Temporal Reference System	0..*		The default TRS for LPIS/GSAA is the Gregorian calendar. Therefore, no value for this metadata element should be provided.

C.3.3. Encoding	1..*		Encoding in which the LPIS/GSAA dataset provided.
C.3.4. Character encoding	0..*		If the default UTF-8 encoding is used, no value for this metadata element must be provided.
C.3.5. Spatial representation type	1..*		The default value for LPIS/GSAA is “vector”.
C.3.6. Topological consistency	0..*		Contrary to INSPIRE, if this element is used, it does not relate to the Generic Network Model, but to the full planar graph of the RPs within the Agricultural area. This element is not applicable for GSAA, as not all the parcels are declared.
EVALUATION AND USE (SPECIFIED IN LPIS QA)			
C.3.7 Quantitative attribute accuracy			
– quantitative result	0..1		Value of the quality elements in percentage
– conformance result	0..1		Value of conformance result (pass or fail)
C. 3.8 Standalone quality report	0..1		Mandatory in case when the data quality elements are published as metadata

Annex E

Metadata scope: Some aspects of selecting the dataset or dataset series

1. Considerations from the side of the data

ISO 19115 specifies that a resource (DS_Resource) and aggregations of resources (DS_Aggregate) must have one or more related metadata sets (MD_Metadata). Dataset series (DS_Series) are one of the possible resource aggregations.

The standard defines **dataset** as an “**identifiable collection of data**”. It also states that the dataset can be a smaller grouping of data which, through a specific constraints (e.g. spatial extent or feature type), can be located physically within a larger dataset. **Dataset series** are defined as “**collection of datasets sharing common characteristics**”. Datasets within the series are related by having a common heritage, e.g. they may have been derived from the same sensor, or adhere to a common production specification.

The above definitions are rather flexible; the standard does not specify neither the criteria of being “identifiable”, nor the common characteristics that qualify datasets to be included in a series. Therefore, data custodians may select that solution for the production of metadata that fits the best their business processes, including the maintenance and life cycles of data, as well as the accessibility of the datasets (also those within the series) by the spatial data services. The standard also foresees a “hybrid” solution, when the common characteristics within the series are included in the metadata file at dataset series level, while the “exceptions” (the values that differ from one dataset to another, for example, because of partial updates) are included at the dataset level metadata. The general recommended approach is to **maintain metadata at the highest possible level**.

This guidance document was written in the sense that there are two identifiable spatial datasets in IACS that is subject of sharing: the LPIS and the GSAA. In case of LPIS, this view corresponds to the approach of Art. 5 of Commission Delegated Regulation No 640/2014, which describes reference parcels, agricultural area and EFA as part of this system. Such presentation implies that these concepts can be implemented as feature types of a database, which is, by default, an identifiable collection of data. Consequently, LPIS can be regarded as a dataset. In case of GSAA, the identification of the dataset is straightforward as there is only one feature type to be shared.

A dataset can be also restricted to a “layer”¹⁶. The notion of layer is a widely used in the LPIS community as substitute of the “feature type” of the ISO standards. In this connotation, one layer corresponds to one feature type; i.e. there are separate layers for RP, EFA and agricultural area. If so, the LPIS becomes a collection of datasets; i.e. a dataset series. The common heritage of the layer-datasets might be the same data input (orthoimagery), the same accuracy of digitisation, etc.

When a country is big, managing all the data in the same dataset might be difficult both from the point of view of data updates and from the spatial data services that are used for sharing the data. For spatial data services the response times can be a critical issue. Subdividing the database according to management districts (territorial division) or tiles may ease the situation. In such case, every subdivision (district or tile) becomes a member in a dataset series.

Another justification for selecting series for producing metadata is that some datasets are repeatedly produced according to the same specifications. For example, different editions of the LPIS can have the same type of input data and the same technical specifications. If so, the metadata values will not change from one edition to another. Applying the principle of maintaining metadata at the highest possible level, the various editions can be included in a dataset series. In fact, in such presentation the datasets form a kind of time series¹⁷. The same principle may be applied to the yearly GSAA datasets.

The usage of dataset series seems to be reasonable if the datasets within the series are stable, i.e. are less exposed to such updates that affect the metadata values. In this case a single metadata set can be created for the whole series, without the need of creating the metadata for the member-datasets. However, in an event of

¹⁶ This usage of the layer term does not correspond to the current approach of the geographic information standards. According to OGC, layer belongs to the domain of portrayal, which specifies a unit on which a spatial data service can operate. A layer can contain more than one feature type.

¹⁷ The first draft of Part 1 of the TG referred to dataset series in this sense. As this is only one of the possibilities for datasets series, the discussion and the related recommendations have been removed from the document.

a partial change that only affects the metadata values of one datasets included in the series (ISO 19115 calls it exception), it is possible to create additional metadata at the dataset level. The management of this solution is more complex, as **parent - child relationship between the metadata on the series and on the exception should be maintained.**

Another issue for dataset series might be the **selection of a meaningful temporal reference**, which is pertinent at the “layer” and the “time series” approach. The “date of creation” and “date of last update” most probably would have different values within the series. Therefore, this metadata element is less fit for series, unless the method mentioned in the previous paragraph is used. The “data of publication” could be used, if it is related to publishing the (whole) series. However, the question is how much this metadata element is useful, when under a very recent date of publication the user may find historical datasets? INSPIRE allows the use of the temporal extent, which could refer to the period of time covered by the datasets within the series. However, before applying this element it should be noted, that ISO 19115 does not use this metadata element for temporal references.

2. Consideration from the side of services

From user point of view the final aim of metadata is to provide access to data and to the associated services that allow to view, transform, manipulate, or download the data. The architecture of INSPIRE (that is a service-oriented architecture) also requires that the data are also visible to the services. From the side of the services, the link between the services and the data is established through the coupled resources metadata element, which points to the identifier of the datasets that the service operates on. The question is if a service can operate on dataset series? In some cases it can. For example if the series are pre-packaged in one downloadable (zip) file. However, in big volumes of data (that is infrequently the case for geographic information), such solution is not feasible. Therefore, there should also be access to the individual datasets within the series. Consequently, the **data identification section of the service metadata should contain the identifiers of every dataset that is included in the series.**

The users also may search for services and from the services they may wish to access the data. If datasets are included in series and the metadata is at series level, there should be a link to the metadata file too. Therefore, **the data identification section of the service metadata should contain**, in addition to the identifiers of the datasets, **the identifier of the series metadata too.**

3. Summary

The choice of the metadata scope for data resources depends on many aspects of organizational and technical character. Therefore, it is not possible to give a unique recommendation whether the dataset or the dataset series solution is more beneficial. In the diagram below we summaries the decisions to be made. It should be noted that the questions to be decided are not precisely defined; they contain such qualifiers as “manageable size”, or “too many layers”. These qualifiers can be replaced by quantifiers based on practical experience. Therefore, it is very important that the both the IACS and the INSPIRE community provide feedback and share their experiences that also depend on the technical solutions they apply.

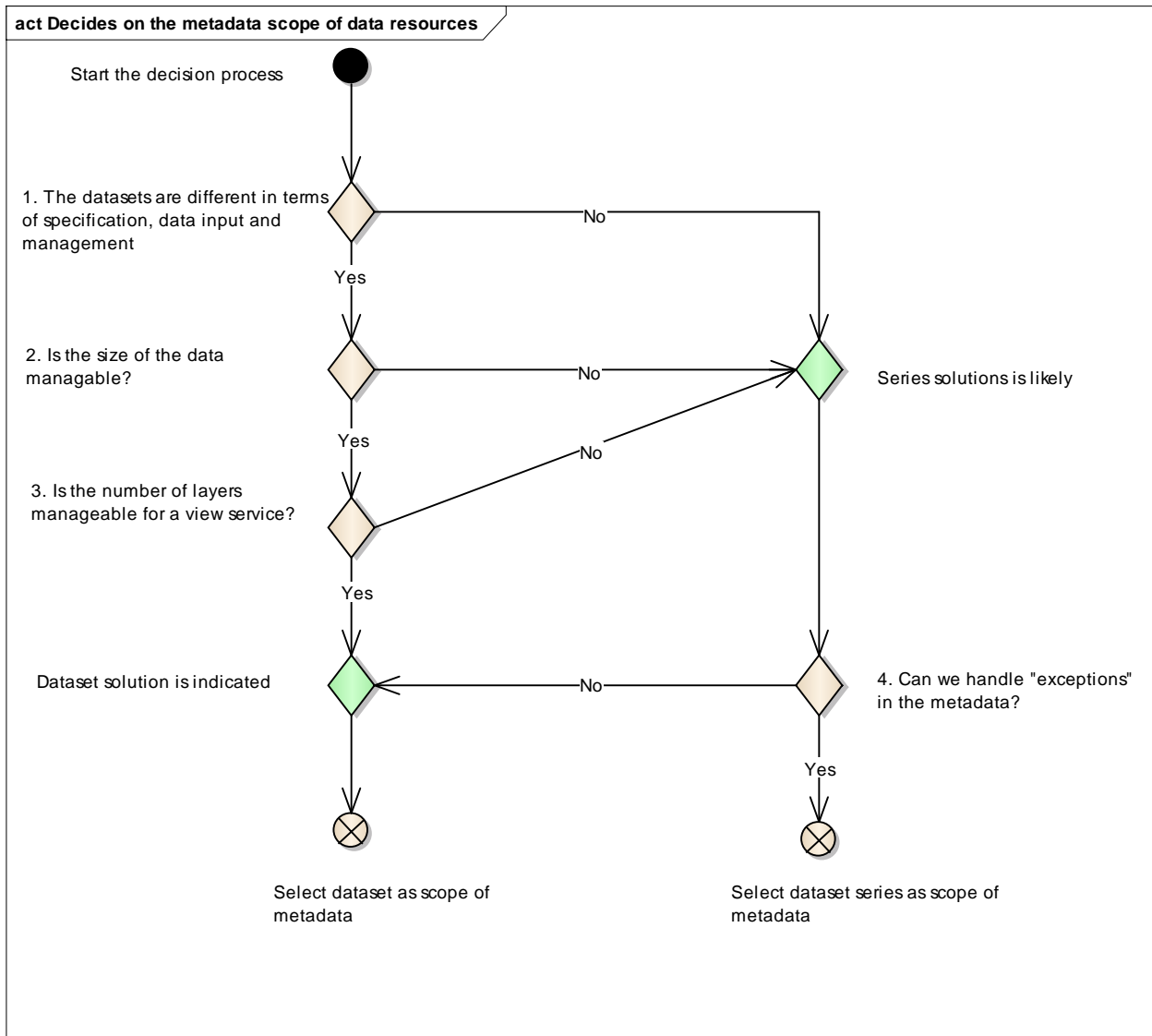


Figure 6, Decision workflow of selecting datasets or dataset series as metadata scope

Table 6. Decision steps of selecting datasets or dataset series as metadata scope

Process	Notes
Start the decision process	
1. The datasets are different in terms of specification, data input and management	<p>Main step 1</p> <p>It should be decided if the datasets to be published have a common heritage, such as specification, input data, legal basis, or other.</p>
2. Is the size of the data manageable?	<p>Main step 2</p> <p>The data custodian should decide if the data to be published is manageable in terms of volumes. From an organisational-business point of view an indicator of big volume are the management of data updates, notably</p> <ul style="list-style-type: none"> — Can the updates done in one go? — Is there a need to contract out to work to more organisations/companies that carry out the work by different methods? — Is there is a need for territorial subdivision? — From point of view of spatial data services the following aspects may matter: <ul style="list-style-type: none"> — Response time in data quarries — Size restrictions at download service (depending on bandwidths, etc.).
3. Is the number of layers manageable for a view service?	<p>Main step 3</p> <p>View services may have limitations on the number of layers that they can handle. This aspect might be pertinent when the practice of "one feature type is one layer" practice is followed.</p>
Dataset solution is indicated	If the answer to the three main steps above is yes, the dataset solution is indicated.
Series solutions is likely	If the answer to the three main steps above is no, the series solution is likely. However, before selecting this way, one more aspects, described in alternative step 4 should be considered.
4. Can we handle "exceptions" in the metadata?	<p>Alternative step 4</p> <p>Some datasets in the series may have different properties by the time (for example, the date of the last update). If so, that metadata property should be handled as "exception". In this case a metadata management mechanism is needed, which is built on "parent-child" (generalisation-specialisation) relationship.</p>
Select dataset as scope of metadata	If the main flow of event is followed (mains steps 1-3 trigger a yes answer), or the answer to alternative step 4 is no, select dataset as scope of metadata.
Select dataset series as scope of metadata	If the alternative flow is followed (answer to mains steps 1-3 is no) and the answer of alternative step 4 is yes, dataset series solution is beneficial.

List of abbreviations

AGROVOC	Controlled vocabulary covering all areas of interest of UN FAO
CAP	Common Agricultural Policy
CI	Citation (metadata prefix)
CSW	Catalogue Service Specification of OGC
DQ	Data quality (metadata prefix)
EC	European Commission
EFA	Ecological Focus Area
EN	European Norm
EU	European Union
EX	Extent (metadata prefix)
DG AGRI	Directorate General Agriculture
GEMET	General Multilingual Environmental Thesaurus
GML	Geography Markup Language
GSA	Geospatial Aid application
IACS	Integrated Administration and Control System
INSPIRE	Infrastructure of Spatial Information in Europe
IOC	Initial Operating Capacity (in INSPIRE)
ISO	International Standards Organisation
IXIT	Implementation Extra Information
JRC	Joint Research Centre
LC	Land cover
LCLU	Land cover/land use
LI	Lineage (metadata prefix)
LPIS	Land Parcel Identification System
LU	Land use
LULUCF	Land Use, Land Use Change and Forestry

MD	Metadata (metadata prefix)
MEA	Maximum eligible area
MS	Member States
MTS	Model Test Suite
NSDI	National Spatial Data Infrastructure
OGC	Open Geospatial Consortium
PA	Paying Agency
QA	Quality assurance
QAF	Quality assessment framework
QE	Quality element
RS	Reference system (metadata prefix)
SDI	Spatial data infrastructure
TG	Technical guideline
TS	Technical specification
UN FAO	Food and Agriculture Organization (FAO) of the United Nations
URI	Unique resource identifier
URL	Unique resource locator
UTF-8	8-bit Unicode Transformation Format
XML	Extensible markup language
WFS	Web feature service
WMS	Web map service

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