



INSPIRE

Infrastructure for Spatial Information in Europe

D2.8.I.6 INSPIRE Data Specification on Cadastral Parcels Draft Guidelines

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Foreword

How to read the document?

This document describes the INSPIRE draft data specification on *Cadastral parcels* as developed by the Thematic Working Group using both natural and conceptual schema language.

This document includes two executive summaries that provide a quick overview of the INSPIRE data specification process in general, and the content of the data specification on *Cadastral parcels* in particular. We highly recommend that managers, decision makers, and all those new to the INSPIRE process and/or information modelling should read these executive summaries in the first place.

The UML diagrams given in 5.1.1 offer a rapid way to see the main elements of the specifications and their relationships. The definition of the spatial objects, attributes, and relationships are included in the Feature Catalogue in 5.1.2. People having thematic expertise but not familiar with UML can fully understand the content of the data model focusing on the Feature Catalogue. Users might also find the Feature Catalogue especially useful to check if it contains the data necessary for the applications that they run. The technical details are expected to be of prime interest to those organisations that are/will be responsible for implementing INSPIRE within the field of *Cadastral parcels*.

The technical provisions and the underlying concepts are often illustrated by examples. Smaller examples are within the text of the specification, while longer explanatory examples are attached in the annexes.

In order to distinguish the INSPIRE spatial data themes from the spatial object types, the INSPIRE spatial data themes are written in *italics* and with capital letter, like *Cadastral parcels*.

Spatial Data Interest Communities and Legally Mandated Organisations are invited to comment on the proposed structure and content of the forthcoming Implementing Rule on Interoperability of Spatial Data Sets and Services. In order to do so we recommend that they read this draft data specification and the questions of the consultation document in parallel.

The document will be publicly available as a 'non-paper'. It does not represent an official position of the European Commission, and as such can not be invoked in the context of legal procedures.

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Interoperability of Spatial Data Sets and Services

General Executive Summary

The challenges regarding the lack of availability, quality, organisation, accessibility, and sharing of spatial information are common to a large number of policies and activities and are experienced across the various levels of public authority in Europe. In order to solve these problems it is necessary to take measures of coordination between the users and providers of spatial information. The Directive 2007/2/EC of the European Parliament and of the Council adopted on 14 March 2007 aims at establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) for environmental policies, or policies and activities that have an impact on the environment.

INSPIRE will be based on the infrastructures for spatial information that are created and maintained by the Member States. To support the establishment of a European infrastructure, Implementing Rules addressing the following components of the infrastructure are being specified: metadata, interoperability of spatial data themes (as described in Annexes I, II, III of the Directive) and spatial data services, network services and technologies, data and service sharing, and monitoring and reporting procedures.

INSPIRE does not require collection of new data. However, after the period specified in the Directive¹ Member States have to make their data available according to the Implementing Rules.

Interoperability in INSPIRE means the possibility to combine spatial data and services from different sources across the European Community in a consistent way without involving specific efforts of humans or machines. It is important to note that "interoperability" is understood as providing access to spatial data sets through network services, typically via Internet. Interoperability may be achieved by either changing (harmonising) and storing existing data sets or transforming them via services for publication in the INSPIRE infrastructure. It is expected that users will spend less time and efforts on understanding and integrating data when they build their applications based on data delivered within INSPIRE.

In order to benefit from the endeavours of international standardisation bodies and organisations established under international law their standards and technical means have been referenced, whenever possible.

To facilitate the implementation of INSPIRE, it is important that all stakeholders have the opportunity to participate its specification and development. For this reason, the Commission has put in place a consensus building process involving data users, and providers together with representatives of industry, research and government. These stakeholders, organised through Spatial Data Interest Communities (SDIC) and Legally Mandated Organisations (LMO)², have provided reference materials, participated in the user requirement and technical³ surveys, proposed experts for the Data Specification Drafting Team⁴ and Thematic Working Groups⁵, expressed their views on the drafts of the technical documents of the data specification development framework⁶ and are invited to comment the draft Implementing Rule on Interoperability of Spatial Data Sets and Services.

The development framework elaborated by the Data Specification Drafting Team aims at keeping the data specifications of the different themes coherent. It summarises the methodology to be used for the data specifications and provides a coherent set of requirements and recommendations to achieve interoperability. The pillars of the framework are four technical documents:

¹ For Annex I data: within two years of the adoption of the corresponding Implementing Rules for newly collected and extensively restructured data and within 5 years for other data in electronic format still in use

² Number of SDICs and LMOs on 21/11/2008 was 276 and 162 respectively

³ Surveys on unique identifiers and usage of the elements of the spatial and temporal schema,

⁴ The Data Specification Drafting Team has been composed of experts from Austria, Belgium, Czech Republic, France, Germany, Greece, Italy, Netherlands, Norway, Poland, Switzerland, UK, and the European Environmental Agency

⁵ The Thematic Working Groups of Annex I themes have been composed of experts from Belgium, Czech Republic, Denmark, France, Finland, Germany, Hungary, Italy, Netherland, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, UK, the European Commission, and the European Environmental Agency

⁶Four documents describing common principles for data specifications across all spatial data themes. See further details in the text.

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- The Definition of Annex Themes and Scope⁷ describes in greater detail the spatial data themes defined in the Directive, and thus provides a sound starting point for the thematic aspects of the data specification development.
- The Generic Conceptual Model⁸ defines the elements necessary for interoperability and data harmonisation including cross-theme issues. It specifies requirements and recommendations with regard to data specification elements of common use, like the spatial and temporal schema, unique identifier management, object referencing, a generic network model, some common code lists, etc. Those requirements of the Generic Conceptual Model that are directly implementable will be included in the Implementing Rule on Interoperability of Spatial Data Sets and Services.
- The Methodology for the Development of Data Specifications⁹ defines a repeatable methodology. It describes how to arrive from user requirements to a data specification through a number of steps including use-case development, initial specification development and analysis of analogies and gaps for further specification refinement.
- The “Guidelines for the Encoding of Spatial Data”¹⁰ defines how geographic information can be encoded to enable transfer processes between the systems of the data providers in the Member States. Even though it does not specify a mandatory encoding rule it sets GML (ISO 19136) as the default encoding for INSPIRE.

Based on the data specification development framework, the Thematic Working Groups have created the INSPIRE data specification for each Annex I theme. The data specifications follow the structure of “ISO 19131 Geographic information - Data product specifications” standard. They include the technical documentation of the application schema, the spatial object types with their properties, and other specifics of the spatial data themes using natural language as well as a formal conceptual schema language¹¹.

A consolidated model repository, feature concept dictionary, and glossary are being maintained to support the consistent specification development and potential further reuse of specification elements. The consolidated model consists of the harmonised models of the relevant standards from the ISO 19100 series, the INSPIRE Generic Conceptual Model, and the application schemas¹² developed for each spatial data theme. The multilingual INSPIRE Feature Concept Dictionary contains the definition and description of the INSPIRE themes together with the definition of the spatial object types present in the specification. The INSPIRE Glossary defines all the terms (beyond the spatial object types) necessary for understanding the INSPIRE documentation including the terminology of other components (metadata, network services, data sharing, and monitoring).

By listing a number of requirements and making the necessary recommendations, the data specifications enable full system interoperability across the Member States, within the scope of the application areas targeted by the Directive. They are published as technical guidelines and provide the basis for the content of the Implementing Rule on Interoperability of Spatial Data Sets and Services for data themes included in Annex I of the Directive. The Implementing Rule will be extracted from the data specifications keeping in mind short and medium term feasibility as well as cost-benefit considerations. The Implementing Rule will be legally binding for the Member States.

In addition to providing a basis for the interoperability of spatial data in INSPIRE, the data specification development framework and the thematic data specifications can be reused in other environments at local, regional, national and global level contributing to improvements in the coherence and interoperability of data in spatial data infrastructures.

⁷ http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/DataSpecifications/D2.3_Definition_of_Annex_Themes_and_scope_v3.0.pdf

⁸ http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/DataSpecifications/D2.5_v3.1.pdf

⁹ http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/DataSpecifications/D2.6_v3.0.pdf

¹⁰ http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/DataSpecifications/D2.7_v3.0.pdf

¹¹ UML – Unified Modelling Language

¹² Conceptual models related to specific areas (e.g. INSPIRE themes)

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Cadastral parcels

Executive Summary

Cadastral parcels are included in Annex I, which means that they are considered as reference data, i.e. data that constitute the spatial frame for linking to and/or pointing at other information that belong to specific thematic fields such as environment, soil, land use, and many others.

The INSPIRE data specification on cadastral parcel has been prepared following the participative principle of consensus building process. The stakeholders, based on their registration as a Spatial Data Interest Community (SDIC) or a Legally Mandated Organisation (LMO) had the opportunity to bring forward user requirements and reference materials, propose experts for the specification development and to participate in the review of the data specifications. The Thematic Working Group responsible for the specification development was composed of experts coming from Denmark, Finland, France, Hungary, Netherlands, Norway, Spain, Switzerland, United Kingdom and the European Commission. The specification process took place according to the methodology elaborated for INSPIRE respecting the requirements and the recommendation of the INSPIRE Generic Conceptual Model, which is one of the elements that ensures a coherent approach and cross-theme consistency with other themes in the Directive.

The cornerstone of the specification development was the definition from the Directive on cadastral parcels: “areas defined by cadastral registers or equivalent”. In accordance with the particular legal system, each Member State runs a related register under the responsibility of the government. Such registers are often called cadastre, sometimes land (or other type of) registry. Regardless of the name of the system the basic unit of area is the parcel. Cadastral parcels usually form a continuous partition of the national territory by the exception where some land owned by governments¹³ is not subject of registration. Consequently, the cadastral parcels in the sense of INSPIRE mean single areas on the Earth’s surface under homogenous real property rights and unique ownership.

INSPIRE does not aim at harmonising the concepts of ownership and rights related to the parcels, but focuses on the geometrical aspects, as presented in the national systems of the Member States.

Cadastral parcels in INSPIRE should serve the purpose of generic information locators, i.e. searching and linking other spatial information. Having included national cadastral identifiers as a property (attribute) of the INSPIRE parcels, the content of a national cadastre or land register can be linked. Using this two-step approach information on the owners, rights, restrictions etc. may be accessed according to the national legislation on data protection. The data model for INSPIRE cadastral parcels has been prepared in a way that supports compatibility with the upcoming international standard for the Land Administration Domain Model¹⁴. The LADM provides a wider context for the INSPIRE *Cadastral parcels* as the latter includes additional information on rights (bound to national legislation) and owners, which are outside the direct scope of INSPIRE.

The wide range of use-cases¹⁵ analysed by the Thematic Working Group should help to meet the expectations of various user communities in the fields of agriculture, disaster management, soil protection, environmental public rights management, public land management, urban planning, utilities, land use, and many others.

The core element of the INSPIRE cadastral parcel model is the cadastral parcel. It is described by some mandatory elements such as geometry (as a surface), identifier¹⁶, national cadastral reference¹⁷, the area and the label of the parcels that supports their identification on displayed maps. In case of availability, Member States are also requested to supply:

¹³ In some countries such territories are called public domain

¹⁴ ISO/DS 19152 – Geographical Information, Land Administration Domain Model.

¹⁵ The use-cases included EULIS, Land Parcel Identification System, Vineyard registers, Soil protection, Public environmental restrictions, Urban planning, Public land management, Flood risk management, and Infrastructure management.

¹⁶ Unique identifier required by the Directive, which is defined by the local data provider completed by a prefix of the country and/or organisation of source.

¹⁷ National identifiers which enables to make link with information in the national registers

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- life-cycle information, e.g. when the parcel has been inserted or changed in the dataset, and when the parcel has been superseded or retired
- the reference point, which is especially useful for visualisation purposes
- the topology in the sense of the connectivity of parcels.

When a Member State maintains specific metadata elements (positional accuracy and original map scale) at the parcel level, such information should be communicated as a property of the parcel.

The management of cadastral parcels in some countries reflects historical subdivision, i.e. intermediate units such as municipalities, sections, districts, parishes, urban and rural blocks etc.. Very often these units carry information related to all parcels belonging to the same unit, for example information about accuracy of measurements or the scale of original mapping. In order to refer these units with a common name the Thematic Working Group has introduced the notion of the cadastral index set. Member States should decide about the usage of index sets according to their organisational structures. If such units are not in use, they are not required to be produced for INSPIRE. Cadastral index sets are especially useful for data discovery; they often carry metadata and also support portrayal and data management.

If a Member State decides to use cadastral index sets they must be supplied with the same properties and under the same conditions as cadastral parcels. When several levels of index sets are in use, Member State must ensure that the higher level units are composed of elements from lower levels.

Member States should deliver cadastral boundary data only when data accuracy information is associated with it. This approach should be useful when national cadastral datasets are composed of boundaries and the INSPIRE cadastral parcel geometry is derived from them.

Interoperability is further supported by a common coordinate reference system¹⁸ and provisions for selecting a common projection system for cross-border applications. The latter must be agreed and documented by the interested parties of the Member States.

Comparable data on top of harmonised specification elements create additional value for achieving interoperability in INSPIRE. For this finality the data specification on cadastral parcels includes recommendations on minimal data quality: on the rate of missing elements, topological consistency, positional and thematic accuracy, and update frequency. It is highly desirable that Member States consider them when they further develop their cadastral systems.

Regardless whether these recommendations on data quality are met, the actual values of data quality elements should be published as metadata. These elements usually have to be published at the dataset level. Positional accuracy forms an exception to this obligation, as in this case, three other choices are possible: a statement related to the whole dataset or, as mentioned before, an attribute attached to the cadastral index sets or the cadastral boundaries. Metadata at dataset level also should contain lineage information, i.e. the condition of the creation and transformation of data.

For visualisation purposes, simple rules for default portrayal are given by specifying the colour and line-width of the borders of cadastral parcels and the index sets, as well as the font and size of the labels.

The main value of the INSPIRE *Cadastral parcels* model is it is a simple, yet flexible structure that allows data providers to publish their existing data in the most convenient way. It is also expected that those INSPIRE themes that are listed in Annex III and that are related to cadastral parcels (buildings, soil, land use, utility and governmental services, area management/restriction/regulation zones and reporting units) can re-use and/or further develop the concepts of the current cadastral parcel model.

Consultations with other initiatives within the field allows coherent developments in INSPIRE, the Permanent Committee on Cadastre, Working Group III of FIG (International Federation of Surveyors) and ISO TC 211 responsible for standardisation of geographic information that opens towards a wider scoped multi-purpose spatial data infrastructure.

¹⁸ ETRS89 or (when applicable) the ITRS

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1 Scope

This document specifies a harmonised data specification for the spatial data theme *Cadastral parcels* as defined in Annex I of the INSPIRE Directive.

This data specification provides the basis for the drafting of Implementing Rules according to Article 7 (1) of the INSPIRE Directive [Directive 2007/2/EC]. The entire data specification will be published as implementation guidelines accompanying these Implementing Rules.

2 Overview

2.1 Name and acronyms

INSPIRE data specification for the theme *Cadastral parcels*.

2.2 Informal description

Definition:

Areas defined by cadastral registers or equivalent. [Directive 2007/2/EC]

Description:

The INSPIRE Directive focuses on the geographical part of cadastral data.

In the INSPIRE context, cadastral parcels will be mainly used as locators for geo-information in general, including environmental data.

As much as possible, in the INSPIRE context, cadastral parcels should be forming a partition of national territory. Cadastral parcel should be considered as a single area of Earth surface, under homogeneous real property rights and unique ownership (adapted from UN ECE 2004 and WG-CPI, 2006).

Remark: By unique ownership is meant that the ownership is held by one or several joint owners for the whole parcel.

In the definition given by the INSPIRE directive, "or equivalent" refers to all public agencies and institutions other than the main traditional/nominal cadastre or land registry, that register parts of the Earth's surface such as special domains, urban cadastres, public lands, which spatially complement the registrations by the main cadastre or land registry.

Cadastral parcels are considered in the INSPIRE scope if they are available as vector data.

Rights and owners are out of the INSPIRE scope.

Buildings, land use, addresses are considered in other INSPIRE themes.

The ISO 19152 Land Administration Domain Model (LADM) and the INSPIRE *Cadastral parcels* model are compatible. The LADM provides a wider context for the INSPIRE *Cadastral parcels*. It includes other spatial object types, such as rights and ownership, which are outside the direct scope of INSPIRE.

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2.3 Normative References

Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)

EN ISO 19107:2005, Geographic Information – Spatial Schema

EN ISO 19108:2005, Geographic Information – Temporal Schema

ISO 19108:2002/Cor 1:2006, Geographic Information – Temporal Schema, Technical Corrigendum 1

EN ISO 19113:2005, Geographic Information – Quality principles

ISO/TS 19138:2006, Geographic Information – Data quality measures

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

2.4 Information about the creation of the specification

Document title: INSPIRE Data Specification *Cadastral parcels*
Reference date: 2008-12-15
Responsible party: INSPIRE TWG Cadastral Parcels
Language: English

2.5 Terms and definitions

Terms and definitions necessary for understanding this document are defined in the INSPIRE Glossary <https://inspire-registry.jrc.ec.europa.eu>. In addition the following terms and definitions are used:

(1) Basic property unit

The basic unit of ownership that is recorded in the land books, land registers or equivalent. It is defined by ownership and homogeneous real property rights, and may be made up of none or several parcels.

NOTE In many (but not all) countries, the area of the basic property unit corresponds to the cadastral parcel itself.

(2) Cadastral gap

Area which is not supposed to be covered by cadastral parcels, due to national regulation.

NOTE should not be confused with areas not yet surveyed and registered

EXAMPLE

- in many countries, the sea
- in France and Belgium, the public domain (roads, rivers)

(3) Cadastral overlap

Area which may be covered by several cadastral parcels, due to national regulation.

EXAMPLE in United Kingdom, overlapping parcels may occur where rights are registered at the same space but at different heights e.g. a block of flats where an individual parcel is recorded for each flat.

(4) Topological gap

Area which is covered by cadastral parcels in the real world but not in the database.

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EXAMPLE topological gaps may occur when assembling cadastral parcels coming from several cadastral sheets or after format conversions.

(5) Topological overlap

Area which is covered by only one cadastral parcel in the real world but by several parcels in the database.

EXAMPLE topological overlaps may occur when assembling cadastral parcels coming from several cadastral sheets or after format conversions.

2.6 Symbols and abbreviations

GCM	Generic Conceptual Model
LADM	Land Administration Domain Model
MS	Member State
OCL	Object Constraint Language
PCC	Permanent Committee on Cadastre
SDI	Spatial Data Infrastructure
SLD	Style Layer Descriptor
TWG CP	Thematic Working Group Cadastral Parcel
UML	Unified Modelling Language
UN ECE	United Nations – Economic Commission for Europe
UUID	Universal Unique Identifier
WG - CPI	Working Group on Cadastral Parcels in INSPIRE – Group of experts from EuroGeographics and Permanent Committee on Cadastre which conducted a survey about cadastral parcels in INSPIRE in 2005 - 2006

2.7 Notation of requirements and recommendations

To make it easier to identify the mandatory requirements and the recommendations for spatial data sets in the text, they are highlighted and numbered.

Requirement 1 Requirement 1 Requirements are shown using this style.

Recommendation 1 Recommendations are shown using this style.

3 Specification scopes

This data specification has only one scope, the general scope.

4 Identification information

Table 1 – Information identifying the INSPIRE data specification *Cadastral parcels*

Title	INSPIRE data specification <i>Cadastral parcels</i>
Abstract	Contains mainly the cadastral parcels as closed surfaces/polygons with their identifiers, which will enable users to use parcels as locators for geographic information and to make links with rights and owners in national cadastral registers or equivalent, when necessary. Includes other spatial objects (optional cadastral index sets and cadastral boundaries) and attributes considered as helpful for an easy data management,

	such as temporal or quality information.
Topic categories	planningCadastre
Geographic description	This INSPIRE data specification covers spatial data sets which relate to an area where a Member State has and/or exercises jurisdictional rights.
Purpose	The purpose of this document is to specify a harmonised data specification for the spatial data theme <i>Cadastral parcels</i> as defined in Annex I of the INSPIRE Directive.
Spatial representation type	vector
Spatial resolution	The Local level. Typical scale ranges from 1:500 to 1:10 000.
Supplemental information	

5 Data content and structure

In the application schemas in this sections several stereotypes are used that have been defined as part of a UML profile for use in INSPIRE [INSPIRE DS-D2.5]. These are explained in Table 2 below.

Table 2 – Stereotypes (adapted from [INSPIRE DS-D2.5])

Stereotype	Model element	Description
applicationSchema	Package	An INSPIRE application schema according to ISO 19109 and the Generic Conceptual Model.
featureType	Class	A spatial object type.
type	Class	A conceptual, abstract type that is not a spatial object type.
dataType	Class	A structured data type without identity.
union	Class	A structured data type without identity where exactly one of the properties of the type is present in any instance.
enumeration	Class	A fixed list of valid identifiers of named literal values. Attributes of an enumerated type may only take values from this list.
codeList	Class	A flexible enumeration that uses string values for expressing a list of potential values.
placeholder	Class	A class that acts as a placeholder for a class, typically a spatial object type, that will be specified as part of an Annex II or Annex III theme. The class should at least have a definition, but can otherwise have a preliminary or no specification.

voidable	Attribute, association role	<p>If a characteristic of a spatial object is not present in the spatial data set, but may be present or applicable in the real world, the property shall receive this stereotype. If and only if a property receives this stereotype, the value of void may be used as a value of the property which shall imply that the characteristic is not present in the spatial data set, but may be present or applicable in the real world. It is possible to qualify a value of void in the data with a reason using the VoidValueReason type.</p> <p>The VoidValueReason type is a code list, which includes the following pre-defined values:</p> <ul style="list-style-type: none"> - <i>Unknown</i>: The correct value for the specific spatial object is not known to, and not computable by the data provider. However, a correct value may exist. For example when the “elevation of the water body above the sea level” of a certain lake has not been measured, then the reason for a void value of this property would be ‘Unknown’. This value is applied on an object-by-object basis in a spatial data set. - <i>Unpopulated</i>: Same as ‘Unknown’ with the difference that the property is unknown for <u>all</u> spatial objects of that spatial object type within the spatial data set. <p>NOTE It is expected that additional reasons will be identified in the future, in particular to support reasons / special values in coverage ranges.</p>
lifeCycleInfo	Attribute, association role	If in an application schema a property is considered to be part of the life-cycle information of a spatial object, the property shall receive this stereotype.
version	Association role	If in an application schema an association role ends at a spatial object type, this stereotype denotes that the value of the property is meant to be a specific version of the spatial object, not the spatial object in general.

Requirement 2 Spatial data sets related to the theme *Cadastral parcels* shall be provided using the spatial object types and data types specified in the application schema *Cadastral parcels* in this section.

Requirement 3 Each spatial object shall comply with all constraints specified for its spatial object type or data types used in values of its properties, respectively.

Recommendation 2 The reason for a void value should be provided where possible using a listed value from the VoidValueReason code list to indicate the reason for the missing value.

NOTE The application schema specifies requirements on the properties of each spatial object including its multiplicity, domain of valid values, constraints, etc. All properties have to be reported, if the relevant information is part of the data set. Most properties may be reported as “void”, if the data set does not include relevant information. See the Generic Conceptual Model [INSPIRE DS-D2.5] for more details.

5.1 Application schema *Cadastral parcels*

5.1.1 Description

5.1.1.1 Narrative description and UML Overview

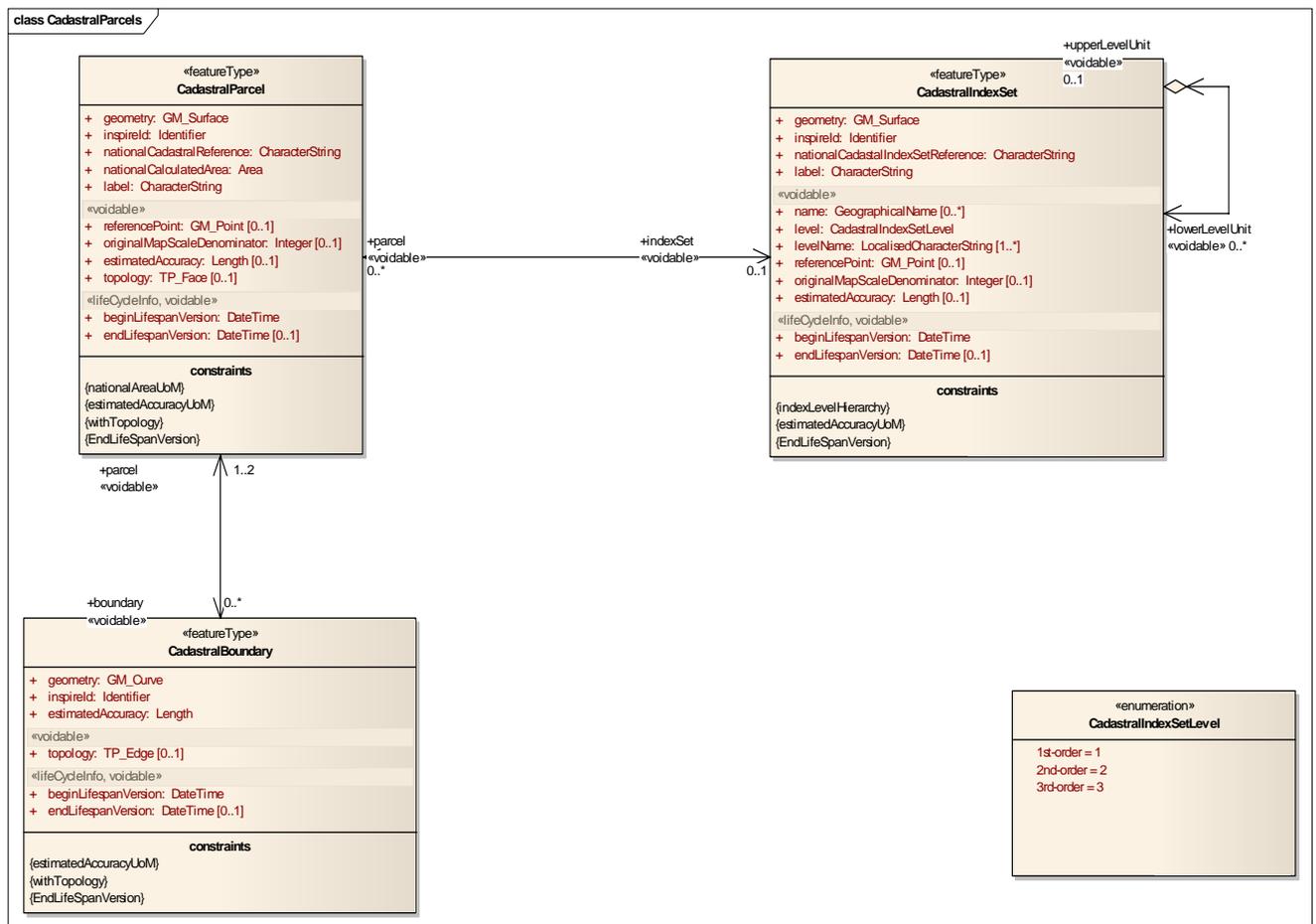


Figure 1 – UML class diagram: Overview of the *Cadastral parcels* application schema

The application schema *Cadastral parcels* contains the feature types *CadastralParcel*, *CadastralBoundary* and *CadastralIndexSet*.

General attributes for all spatial object types:

Each spatial object type has a geometry, an INSPIRE identifier and lifeCycleInfo attributes.

Feature type *CadastralParcel* (mandatory):

Cadastral parcels have the following additional attributes:

- a national cadastral reference
- a national calculated area
- portrayal attributes: reference point and label
- metadata attributes: original map scale denominator and estimated accuracy
- topology

INSPIRE	Reference: INSPIRE_DataSpecification_CP_v2.0.pdf		
TWG-CP	Data Specification on <i>Cadastral parcels</i>	2008-12-19	Page 7

Feature type *CadastralIndexSet* (optional):

Cadastral index sets have the following additional attributes:

- a national cadastral index set reference
- a name, if any
- a level in the national cadastral hierarchy and the name of this level
- portrayal attributes : reference point and label
- metadata attributes : original map scale denominator and estimated accuracy

Feature type *CadastralBoundary* (optional):

Cadastral boundaries have the following additional attributes:

- metadata attribute: estimated accuracy
- topology

If cadastral index sets are provided, cadastral parcels shall belong to one cadastral index set of lowest level. When several levels of index sets exist in a Member State, it must be ensured that the higher level units are composed of that of lower level.

Cadastral boundaries are included in order to carry information about estimated accuracy.

Topology may be supplied if both cadastral parcels and cadastral boundaries are present in a given dataset. In this case, value of the attribute topology shall be provided both for cadastral parcels and for cadastral boundaries.

5.1.1.2 Consistency between spatial data sets

Cadastral parcels will very likely be used in conjunction with data coming from other INSPIRE themes (e.g. transport, buildings, land use, addresses, orthoimage).

Cadastral parcels should be considered as reference data and geometric consistency with other themes may be achieved if these other themes use cadastral parcels as background data during the production or the validation of their own data.

Currently, no consistency rule between cadastral parcels and other spatial datasets has been identified.

5.1.1.3 Identifier management

Requirement 1 All spatial objects published for INSPIRE in theme *Cadastral parcels* shall carry a unique identifier: the attribute *inspireId*. This attribute must have the characteristics defined in the Generic Conceptual Model

The characteristics defined in the Generic Conceptual Model are the following:

- be unique in the INSPIRE context
- be persistent (life-cycle rules being up to each Member State)
- give a way to find the download service where the spatial object is available
- be compliant with the lexical rules:
 - o composed of a namespace beginning by the 2 letter country code
 - o the namespace and the local identifier shall include only the limited set of characters allowed by the Generic Conceptual Model.

INSPIRE	Reference: INSPIRE_DataSpecification_CP_v2.0.pdf		
TWG-CP	Data Specification on <i>Cadastral parcels</i>	2008-12-19	Page 8

5.1.1.4 Modelling of object references

Reference to other information in national registers

Requirement 2 All instances of feature type CadastralParcel shall carry as a thematic identifier the attribute nationalCadastralReference (identifier of the basic property unit). This attribute must enable users to make the link with rights, owners and other cadastral information in national cadastral registers or equivalent.

NOTE 1 The geometry of basic property unit is carried by parcels. As in most cases, the basic property unit is a single area and therefore it corresponds to the cadastral parcel as defined by INSPIRE. As in some countries there are basic property units including several parcels, the attribute nationalCadastralReference does not need to be unique for cadastral parcels (but for the implicit basic property unit it belongs to).

NOTE 2 For instance, In addition to rights and owners, the information to be found in national cadastral registers or equivalent may be the official area, the history or the valuation of the basic property unit.

Requirement 3 All instances of feature type CadastralIndexSets shall carry as thematic identifier the attribute nationalCadastralIndexSetReference.

NOTE This attribute does not need to be unique in case the cadastral index set in national cadastral register is a multi-surface object (whereas in INSPIRE, it is defined as a single area object).

Reference as geography providers

Cadastral parcels are spatial objects that may be commonly used to serve as providers of geography for spatial objects in other INSPIRE data themes.

Recommendation 3 If cadastral parcels are used as providers of geography for spatial objects in other INSPIRE data themes, these reference should be done using the unique external object identifier (the attribute inspireId).

5.1.1.5 Geometry representation

Requirement 4 Only linear interpolations shall be used to define geometry of all the spatial objects included in this application schema.

5.1.1.6 Temporality representation

The attribute beginLifespanVersion specifies the date and time at which this version of the spatial object was inserted or changed in the spatial data set. The attribute endLifespanVersion specifies the date and time at which this version of the spatial object was superseded or retired in the spatial data set.

NOTE 1 The attributes specify the beginning of the lifespan of the version in the spatial data set itself, which is different from the temporal characteristics of the real-world phenomenon described by the spatial object. This lifespan information, if available, supports mainly two requirements: First, knowledge about the spatial data set content at a specific time; second, knowledge about changes to a data set in a specific time frame. The lifespan information should be as detailed as in the data set (i.e., if the lifespan information in the data set includes seconds, the seconds should be represented in data published in INSPIRE) and include time zone information.

INSPIRE	Reference: INSPIRE_DataSpecification_CP_v2.0.pdf		
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NOTE 2 Changes to the attribute endLifespanVersion does not trigger a change in the attribute beginLifespanVersion.

Recommendation 4 If life-cycle information is not maintained as part of the spatial data set, all spatial objects belonging to this data set should provide a void value with a reason of "unknown".

NOTE 3 A spatial object may change in a way where it is still considered to be the same spatial object; in this case, there will be several versions of the same object.

EXAMPLE On 01/01/2008, there has been new delineation of a cadastral parcel (A) and a new value for attribute nationalCalculatedArea has been computed. Two cases may occur, depending on the life-cycle information management at national level:

- It is considered that it is a new cadastral parcel (B) with a new identifier
- It is considered that it is a new version of the same object (A) with unchanged identifier.

(For instance, in France, the first case occurs when there is a new survey of cadastral data on a whole area. The second case occurs when there is a new survey for an individual cadastral parcel).

In first case:

- the spatial object "parcel A" will get for attribute endLifespanVersion the value 01/01/2008.
- a new spatial object "parcel B" will be created; it will get a new identifier and this new spatial object "parcel B" will also get for attribute beginLifespanVersion the value 01/01/2008.

In second case,

- the spatial object "parcel A" will get for attribute endLifespanVersion the value 01/01/2008.
- a new version of the spatial object "parcel A" will be created and will get for attribute beginLifespanVersion the value 01/01/2008.
- this new version the spatial object "parcel A" may be identified by a new value for objectIdentifier.version but it is not mandatory (the attribute beginLifespanVersion being enough to identify the different versions of a same object).

5.1.2 Feature catalogue

Table 3 – Feature catalogue metadata

Feature catalogue name	INSPIRE feature catalogue <i>Cadastral parcels</i>
Scope	Cadastral Parcels
Field of application	Cadastral Parcels
Version number	2.0
Version date	2008-11-30
Definition source	INSPIRE Data specification <i>Cadastral parcels</i>

Table 4 – Types defined in the feature catalogue

Type Name	Package Name	Stereotypes	Section
CadastralBoundary	CadastralParcels	"featureType"	5.1.2.1.1
CadastralIndexSet	CadastralParcels	"featureType"	5.1.2.1.2
CadastralIndexSetLevel	CadastralParcels	"enumeration"	5.1.2.3.1
CadastralParcel	CadastralParcels	"featureType"	5.1.2.1.3

5.1.2.1 Spatial object types

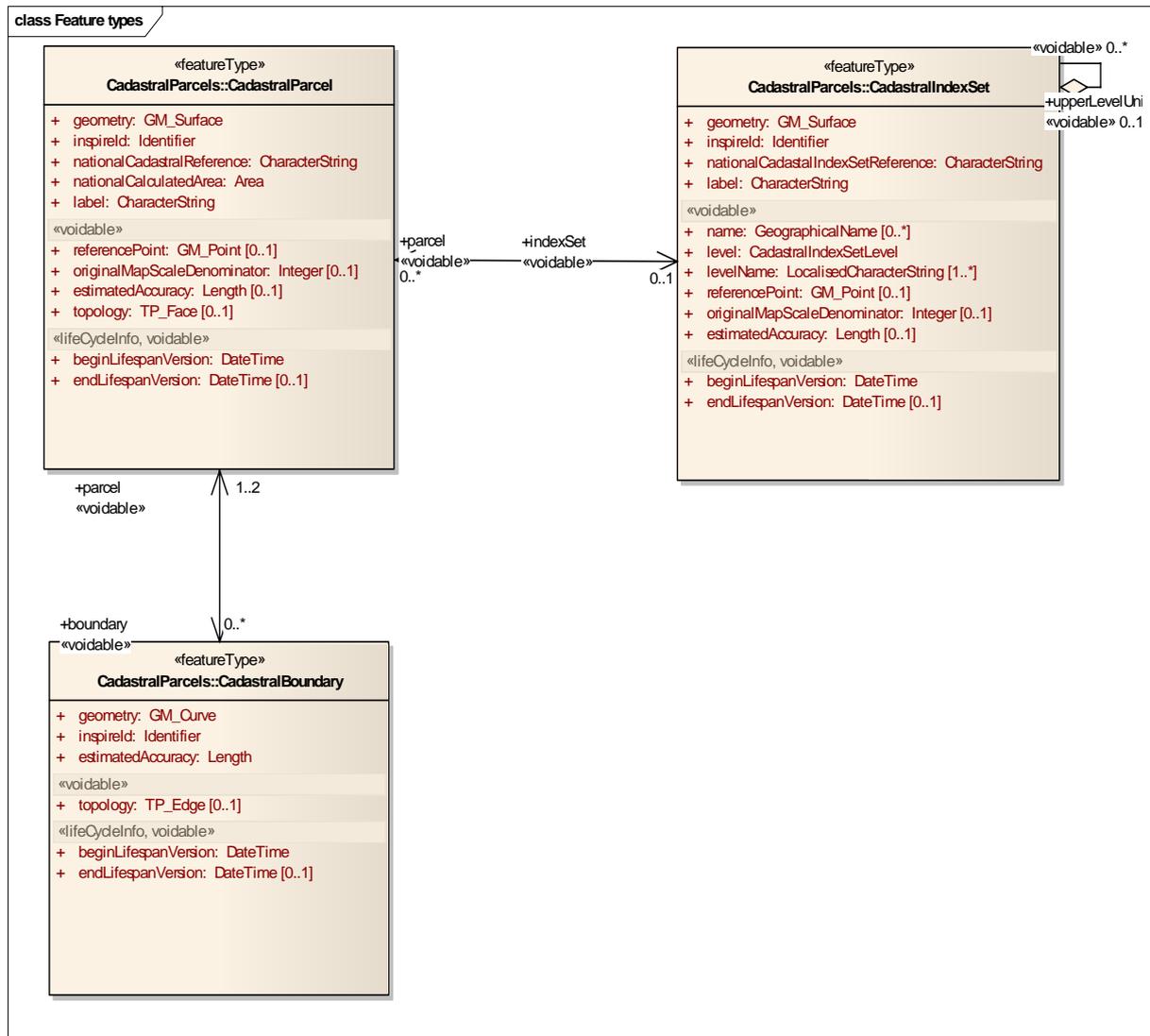


Figure 2 – UML class diagram: Feature types

5.1.2.1.1 CadastralBoundary

Class: "featureType" CadastralParcels.CadastralBoundary	
Definition:	Cadastral boundary is a part of the outline of a cadastral parcel. One cadastral boundary can be shared by two neighbouring cadastral parcels.
Subtype of:	
Status:	Proposed
Stereotypes:	"featureType"
Attribute: geometry	
Definition:	Geometry of the cadastral boundary.
Value type:	GM_Curve
Multiplicity:	1
Stereotypes:	

Attribute: inspireId

Definition: External identifier of the cadastral boundary, as required by the INSPIRE Directive and as defined by the Generic Conceptual Model. Must be unique in the INSPIRE context.

Value type: Identifier

Multiplicity: 1

Stereotypes:

Attribute: estimatedAccuracy

Definition: Estimated absolute positional accuracy of the cadastral boundary in the INSPIRE official Coordinate Reference System. Absolute positional accuracy is defined as the mean value of the positional uncertainties for a set of positions where the positional uncertainties are defined as the distance between a measured position and what is considered as the corresponding true position. For more details, see clause 10.4.

Value type: Length

Multiplicity: 1

Stereotypes:

Attribute: topology

Definition: Topology of the cadastral boundary.

Value type: TP_Edge

Multiplicity: 0..1

Stereotypes: "voidable"

Attribute: beginLifespanVersion

Definition: Date and time at which this version of the cadastral boundary was inserted or changed in the spatial data set.

Value type: DateTime

Multiplicity: 1

Stereotypes: "lifeCycleInfo,voidable"

Attribute: endLifespanVersion

Definition: Date and time at which this version of the cadastral boundary was superseded or retired in the spatial data set.

Value type: DateTime

Multiplicity: 0..1

Stereotypes: "lifeCycleInfo,voidable"

Association role: boundary

Definition: Boundaries of cadastral parcels.

Value type: CadastralBoundary

Multiplicity: 0..*

Stereotypes: "voidable"

Association role: parcel

Definition: Cadastral parcels having cadastral boundaries.

Value type: CadastralParcel

Multiplicity: 1..2

Stereotypes: "voidable"

Constraint: estimatedAccuracyUoM

Natural language: Value of estimatedAccuracy has to be given in meters.
 OCL: `inv: self.estimatedAccuracy.uom.uomSymbol='meter'`

Constraint: withTopology

Natural language: Attribute topology of cadastral boundary (TP_Edge) is mandatory if topology of cadastral parcel (TP_Face) is delivered.
 OCL: `inv: self.parcel -> notEmpty() and self.topology -> notEmpty() implies CadastralParcel.topology -> notEmpty()`

Constraint: EndLifeSpanVersion

Natural language: If set, the date endLifespanVersion must be later than beginLifespanVersion.
 OCL: `inv: self.endLifespanVersion .isAfter(self.beginLifespanVersion)`

5.1.2.1.2 *CadastralIndexSet*

Class: "featureType" CadastralParcels.CadastralIndexSet

Definition: Intermediary areas used in order to divide national territory into cadastral parcels.
 EXAMPLE: municipality, section, parish, district, block.
 NOTE : Cadastral index sets have generally been defined when cadastral maps were created for the first time.
 Subtype of:
 Status: Proposed
 Stereotypes: "featureType"

Attribute: geometry

Definition: Geometry of the cadastral index set. Must be a single area.
 Value type: GM_Surface
 Multiplicity: 1
 Stereotypes:

Attribute: inspireId

Definition: External identifier of the cadastral index set, as required by the INSPIRE Directive and as defined by the Generic Conceptual Model. Must be unique in the INSPIRE context.
 Value type: Identifier
 Multiplicity: 1
 Stereotypes:

Attribute: nationalCadastralIndexSetReference

Definition: Thematic identifier on national level. Generally full national code of the cadastral index set.
 EXAMPLE : 03260000AB15 (France), 30133 (Austria), APD00F (Netherlands)

Value type:	CharacterString
Multiplicity:	1
Stereotypes:	
Attribute: name	
Definition:	Name of the cadastral index set, if any.
	NOTE: Cadastral index sets which are also administrative units have generally a name.
	EXAMPLE: Barcelona, Bordeaux, Copenhagen, Zurich
	RECOMMENDATION: the language of the name should be filled in most cases, except if the data producer does not know in which language the names are.
Value type:	GeographicalName
Multiplicity:	0..*
Stereotypes:	"voidable"
Attribute: level	
Definition:	Level of the cadastral index set in the national cadastral hierarchy.
Value type:	CadastralIndexSetLevel
Multiplicity:	1
Stereotypes:	"voidable"
Attribute: levelName	
Definition:	Name of the level of the cadastral index set in the national cadastral hierarchy.
	NOTE: This attribute must be supplied both in national official language(s) and in English.
	EXAMPLE : For Spain, municipio (in Spanish) and municipality (in English)
Value type:	LocalisedCharacterString
Multiplicity:	1..*
Stereotypes:	"voidable"
Attribute: referencePoint	
Definition:	A point within the cadastral index set (e.g. centroid).
Value type:	GM_Point
Multiplicity:	0..1
Stereotypes:	"voidable"
Attribute: label	
Definition:	Text commonly used to display the cadastral index set identification. Usually last part of the national cadastral index set reference or that reference itself or the name. Can be used for label in portrayal.
Value type:	CharacterString
Multiplicity:	1
Stereotypes:	
Attribute: originalMapScaleDenominator	
Definition:	The denominator in the scale of the original paper map.

	<p>Applies when:</p> <ul style="list-style-type: none"> - cadastral data comes from old paper map. - cadastral index set corresponds to the extent of this old map. <p>EXAMPLE : 2000 means that original cadastral map was designed at scale 1: 2000.</p> <p>Value type: Integer</p> <p>Multiplicity: 0..1</p> <p>Stereotypes: "voidable"</p>
--	--

Attribute: estimatedAccuracy

Definition:	The estimated absolute positional accuracy of cadastral parcels within the cadastral index set, in the INSPIRE official Coordinate Reference System. Absolute positional accuracy is defined as the mean value of the positional uncertainties for a set of positions where the positional uncertainties are defined as the distance between a measured position and what is considered as the corresponding true position. For more details, see clause 10.4.
Value type:	Length
Multiplicity:	0..1
Stereotypes:	"voidable"

Attribute: beginLifespanVersion

Definition:	Date and time at which this version of the cadastral index set was inserted or changed in the spatial data set.
Value type:	DateTime
Multiplicity:	1
Stereotypes:	"lifeCycleInfo,voidable"

Attribute: endLifespanVersion

Definition:	Date and time at which this version of the cadastral index set was superseded or retired in the spatial data set.
Value type:	DateTime
Multiplicity:	0..1
Stereotypes:	"lifeCycleInfo,voidable"

Association role: parcel

Definition:	Cadastral parcels are part of a cadastral index set (in case it exists).
Value type:	CadastralParcel
Multiplicity:	0..*
Stereotypes:	"voidable"

Association role: indexSet

Definition:	A cadastral index set contains cadastral parcels.
Value type:	CadastralIndexSet
Multiplicity:	0..1
Stereotypes:	"voidable"

Association role: lowerLevelUnit

<p>Definition: Lower level cadastral index set.</p> <p>Value type: CadastralIndexSet</p> <p>Multiplicity: 0..*</p> <p>Stereotypes: "voidable"</p>
<p>Association role: upperLevelUnit</p> <p>Definition: Upper level cadastral index set.</p> <p>Value type: CadastralIndexSet</p> <p>Multiplicity: 0..1</p> <p>Stereotypes: "voidable"</p>
<p>Constraint: indexLevelHierarchy</p> <p>Natural language: Defines the hierarchy of cadastral index sets - a lower level cadastral index set is part of an upper level index set.</p> <p>OCL: <code>inv: self.cadastralIndexSetLevel < self.lowerLevelUnit.cadastralIndexSetLevel</code></p>
<p>Constraint: estimatedAccuracyUoM</p> <p>Natural language: Value of estimatedAccuracy has to be given in meters.</p> <p>OCL: <code>inv: self.estimatedAccuracy.uom.uomSymbol='meter'</code></p>
<p>Constraint: EndLifeSpanVersion</p> <p>Natural language: If set, the date endLifespanVersion must be later than beginLifespanVersion.</p> <p>OCL: <code>inv: self.endLifespanVersion .isAfter(self.beginLifespanVersion)</code></p>

5.1.2.1.3 CadastralParcel

Class: "featureType" CadastralParcels.CadastralParcel	
<p>Definition: Areas defined by cadastral registers or equivalent [INSPIRE Directive:2007].</p> <p>As much as possible, in the INSPIRE context, cadastral parcels should be forming a partition of national territory. Cadastral parcel should be considered as a single area of Earth surface, under homogeneous real property rights and unique ownership (adapted from UN ECE 2004 and WG-CPI, 2006).</p> <p>REMARK: By unique ownership is meant that the ownership is held by one or several joint owners for the whole parcel.</p> <p>Subtype of:</p> <p>Status: Proposed</p> <p>Stereotypes: "featureType"</p>	
<p>Attribute: geometry</p> <p>Definition: Geometry of the cadastral parcel. Must be a single area.</p> <p>Value type: GM_Surface</p> <p>Multiplicity: 1</p> <p>Stereotypes:</p>	

Attribute: inspireId

Definition: External identifier of the cadastral parcel, as required by the INSPIRE Directive and as defined by the Generic Conceptual Model. Must be unique in the INSPIRE context.

Value type: Identifier

Multiplicity: 1

Stereotypes:

Attribute: nationalCadastralReference

Definition: Thematic identifier. Generally full national code of the cadastral parcel. Must ensure the link to the national cadastral register or equivalent in order to find additional information.

NOTE : In fact, thematic identifier of the basic property unit the cadastral parcel belongs to. See 5.1.1.4.

Value type: CharacterString

Multiplicity: 1

Stereotypes:

Attribute: nationalCalculatedArea

Definition: Area of the cadastral parcel calculated from digital data in source Coordinate Reference System.

Value type: Area

Multiplicity: 1

Stereotypes:

Attribute: referencePoint

Definition: A point within the cadastral parcel (e.g. centroid).

Value type: GM_Point

Multiplicity: 0..1

Stereotypes: "voidable"

Attribute: originalMapScaleDenominator

Definition: The denominator of scale of the original paper map. Applies when the cadastral data comes from old paper map.

EXAMPLE : 2000 means that original cadastral map was designed at scale 1: 2000.

Value type: Integer

Multiplicity: 0..1

Stereotypes: "voidable"

Attribute: estimatedAccuracy

Definition: Estimated accuracy means the estimated absolute positional accuracy of the cadastral parcel in the INSPIRE official Coordinate Reference System. Absolute positional accuracy being defined as the mean value of the positional uncertainties for a set of positions where the positional uncertainties are defined as the distance between a measured position and what is considered as the corresponding true position. See 10.4.

Value type: Length

Multiplicity: 0..1

Stereotypes:	"voidable"
Attribute: label	
Definition:	Text commonly used to display the cadastral parcel identification. Usually the last part of the national cadastral reference. Can be used for label in portrayal.
Value type:	CharacterString
Multiplicity:	1
Stereotypes:	
Attribute: topology	
Definition:	Topology of the cadastral parcel.
Value type:	TP_Face
Multiplicity:	0..1
Stereotypes:	"voidable"
Attribute: beginLifespanVersion	
Definition:	Date and time at which this version of the cadastral parcel was inserted or changed in the spatial data set.
Value type:	DateTime
Multiplicity:	1
Stereotypes:	"lifeCycleInfo,voidable"
Attribute: endLifespanVersion	
Definition:	Date and time at which this version of the cadastral parcel was superseded or retired in the spatial data set.
Value type:	DateTime
Multiplicity:	0..1
Stereotypes:	"lifeCycleInfo,voidable"
Association role: CP_parcel	
Definition:	A cadastral parcels is included in (or belongs to) an administrative unit.
Value type:	CadastralParcel
Multiplicity:	0..*
Stereotypes:	"voidable"
Association role: AU_admUnit	
Definition:	An administrative contains a cadastral parcel.
Value type:	AdministrativeUnits::AdministrativeUnit
Multiplicity:	0..1
Stereotypes:	"voidable"
Association role: boundary	
Definition:	Boundaries of cadastral parcels.
Value type:	CadastralBoundary
Multiplicity:	0..*
Stereotypes:	"voidable"
Association role: parcel	
Definition:	Cadastral parcels having cadastral boundaries.
Value type:	CadastralParcel
Multiplicity:	1..2
Stereotypes:	"voidable"

Association role: parcel

Definition: Cadastral parcels are part of a cadastral index set (in case it exists).
Value type: CadastralParcel
Multiplicity: 0..*
Stereotypes: "voidable"

Association role: indexSet

Definition: A cadastral index set contains cadastral parcels.
Value type: CadastralIndexSet
Multiplicity: 0..1
Stereotypes: "voidable"

Constraint: nationalAreaUoM

Natural language: Value of nationalCalculatedArea has to be given in square meters.
OCL: inv: self.nationalCalculatedArea.uom.uomSymbol='square meter'

Constraint: estimatedAccuracyUoM

Natural language: Value of estimatedAccuracy has to be given in meters.
OCL: inv: self.estimatedAccuracy.uom.uomSymbol='meter'

Constraint: withTopology

Natural language: Attribute topology for cadastral parcel (TP_Face) is mandatory if topology for cadastral boundary (TP_Edge) is delivered.
OCL: inv: self.boundary -> notEmpty() and self.topology -> notEmpty() implies CadastralBoundary.topology -> notEmpty()

Constraint: EndLifeSpanVersion

Natural language: If set, the date endLifespanVersion must be later than beginLifespanVersion.
OCL: inv: self.endLifespanVersion .isAfter(self.beginLifespanVersion)

5.1.2.2 Data types

None.

5.1.2.3 Enumerations and code lists

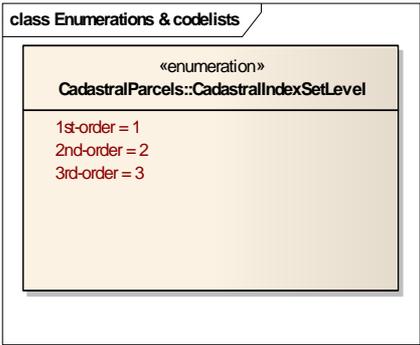


Figure 3 – UML class diagram: Enumerations and code lists

5.1.2.3.1 CadastralIndexSetLevel

Class: "enumeration" CadastralParcels.CadastralIndexSetLevel	
Definition:	Value domain for levels of hierarchy of the cadastral index sets (see annex B of data specification for examples of meaningful interpretation of the levels in the different member states). Not repeating the higher levels in the administrative units theme (province, state).
Status:	Proposed
Stereotypes:	"enumeration"
Value: 1st-order	
Definition:	Uppermost level (largest areas) in the hierarchy of cadastral index sets, equal or equivalent. For more details, see clause 10.1.2.
Code:	1
Value: 2nd-order	
Definition:	2nd level in the hierarchy of cadastral index sets.
Code:	2
Value: 3rd-order	
Definition:	3rd level in the hierarchy of cadastral index sets.
Code:	3

5.1.2.4 Imported Types (informative)

None.

6 Reference systems

6.1 Spatial reference system

Requirement 5 For the horizontal component, the European Terrestrial Reference System 1989 (ETRS89) shall be used. This coordinate reference system is linked to the Eurasian tectonic plate. For areas that are not on the stable part of the Eurasian tectonic plate, the International Terrestrial Reference System (ITRS) or other geodetic coordinate reference systems compliant with ITRS shall be used. The parameters of the GRS80 ellipsoid shall be used for the computation of latitude and longitude and for the computation of plane coordinates using a suitable mapping projection.

For the vertical component, the European Vertical Reference System (EVRS) shall be used. Other vertical reference systems may be used in areas that are outside the geographical scope of EVRS.

Recommendation 5 For the representation of data in plane coordinates in general applications, the following projections should be used:

- Lambert Azimuthal Equal Area (ETRS-LAEA) for spatial analysis and display;
- Transverse Mercator (ETRS-TMzn) for conformal pan-European mapping at scales larger than 1:500,000.

Requirement 6 Based on the INSPIRE horizontal coordinate reference system, each Member State shall define a projection or a set of projections suitable for working with cadastral parcels on national territory and cross-border areas. A projection is suitable if it offers few linear alteration (ideally less than 50 cm per 500 m) and so enable users to measure distances and surfaces in meaningful way. This projection or set of projections has to be defined in agreement with neighbour countries. This projection or set of projections must be well documented to allow the conversion from and to the common Coordinate Reference System. The documentation shall be provided according to ISO 19111, which states how a projected coordinate reference system must be described.

6.2 Temporal reference system

Requirement 7 Date values shall be provided using the Gregorian Calendar. Time values shall be provided either using the Coordinated Universal Time (UTC) or as local time including their time zone as an offset from [UTC](#).

7 Data quality

Table 5 – Data quality elements used in the theme *Cadastral parcels*

INSPIRE Data Specification <i>Cadastral parcels</i> Section	Data quality element	Usage
7.1	Completeness	dataset-level
7.2	Logical consistency	dataset-level
7.4 and 5.1	Positional accuracy	feature-level and/or dataset-level
7.5	Thematic accuracy	dataset-level

NOTE All quality elements described below apply to cadastral data, as published in INSPIRE. Some of these quality elements may be different for cadastral data, as they exist in national cadastral databases and for cadastral data, as they should be published in INSPIRE.

7.1 Completeness

7.1.1 Omission

7.1.1.1 Rate of missing items

Name	Rate of missing items
Alternative name	-
Data quality element	Completeness
Data quality subelement	Omission
Data quality basic measure	Error rate
Definition	Number of missing items in the data set in relation to the number of items that should have been present
Description	-
Parameter	-
Data quality value type	Real, percentage, ratio
Data quality value structure	-
Source reference	-
Example	-
Measure identifier	7

Clause 10.1 of this document explains which items should be present in an INSPIRE data set on spatial data theme *Cadastral parcels*.

Recommendation 1 Rate of missing items should be 0% for *Cadastral parcels* and cadastral index sets.

NOTE The purpose of this recommendation is just to ensure that all existing data under the INSPIRE scope are published. So, this recommendation is perfectly achievable, provided that data producers put in place relevant processes of control when exporting/publishing their cadastral data for INSPIRE.

7.2 Logical consistency

7.2.1 Topological consistency

7.2.1.1 Overlap

Name	Overlap
Alternative name	-
Data quality element	Logical consistency
Data quality subelement	Topological consistency
Data quality basic measure	Correctness indicator
Definition	Indication that there are no topological overlaps between cadastral parcels.
Description	-
Parameter	-
Data quality value type	True
Data quality value structure	-
Source reference	-
Example	-
Measure identifier	9

Recommendation 2 There should be no topological overlaps between cadastral parcels.

NOTE In other words, a dataset is compliant with this recommendation means that value of overlap is true.

7.2.1.2 Gap

Name	Gap
Alternative name	-
Data quality element	Logical consistency
Data quality subelement	Topological consistency
Data quality basic measure	Correctness indicator
Definition	Indication that there are no topological gaps in the dataset between cadastral parcels.
Description	-
Parameter	-
Data quality value type	True
Data quality value structure	-
Source reference	-
Example	-
Measure identifier	9

Recommendation 3 There should be no topological gaps between cadastral parcels.

NOTE In other words, a dataset is compliant with this recommendation means that value of gap is true.

7.2.1.3 Edge matching

Name	Edge-matching
Alternative name	Edge match to adjacent data sets
Data quality element	Logical consistency
Data quality subelement	Topological consistency
Data quality basic measure	Correctness indicator
Definition	Indication that all surfaces match each other on the boundary to adjacent data sets
Description	-
Parameter	-
Data quality value type	True
Data quality value structure	-
Source reference	-
Example	-
Measure identifier	9

Recommendation 4 There should be no missing edge match between cadastral parcels in adjacent data sets

NOTE In other words, a dataset is compliant with this recommendation means that value of edge-matching is true.

7.3 Positional accuracy

7.3.1 Absolute external positional accuracy

7.3.1.1 Mean value of positional uncertainties (1D, 2D)

Name	Mean value of positional uncertainties (1D, 2D)
Alternative name	-
Data quality element	Positional accuracy
Data quality subelement	Absolute or external accuracy
Data quality basic measure	Not applicable
Definition	Mean value of the positional uncertainties for a set of positions where the positional uncertainties are defined as the distance between a measured position and what is considered as the corresponding true position
Description	See ISO 19138
Parameter	-
Data quality value type	Measure
Data quality value structure	-
Source reference	-
Example	-
Measure identifier	28

NOTE The purpose of this quality element is to give a rough idea of the estimated positional accuracy. Therefore, the mean value of positional uncertainties may be given, based on the knowledge of the accuracy of the source information and of the production processes.

If appropriate, the value of positional accuracy may be rounded off (for instance, given with a resolution in metre).

Recommendation 5 Mean value of positional uncertainties should be 1 metre or better in urban areas and 2,5 metres or better in rural/agricultural areas. Cadastral data may be less accurate in unexploited areas.

NOTE 1 More generally, absolute positional accuracy should be function of the density of human activities. This recommendation may be adapted to the specific context of each Member State.

NOTE 2 Absolute positional accuracy shall be given for cadastral data as they are published in INSPIRE and, so, in the Coordinate Reference System mandated by INSPIRE (ETRS89 or ITRS). For more detail, see clause 10.4.

7.4 Thematic accuracy

7.4.1 ThematicClassificationCorrectness

7.4.1.1 Rate of incorrect classification for national cadastral reference

Name	Rate of incorrect classification for national cadastral reference
Alternative name	-
Data quality element	Thematic accuracy
Data quality subelement	ThematicClassificationCorrectness
Data quality basic measure	Not applicable
Definition	Number of incorrect or missing national cadastral references (on cadastral parcels) in the data set in relation to the number of items in the data set
Description	-
Parameter	-

Data quality value type	Real, percentage, ratio
Data quality value structure	-
Source reference	-
Example	-
Measure identifier	7

Recommendation 6 Rate of incorrect or missing items should be 0% for national cadastral references on cadastral parcels.

NOTE The purpose of this recommendation is just to ensure that no error about national cadastral references has occurred during the process of capturing and transforming data for INSPIRE: the attribute nationalCadastralReference is a key information as it ensures the link with rights, owners and other related information in cadastral registers; errors or omissions on this specific attribute might have big impacts.

This recommendation is achievable, provided that data producers put in place relevant processes of control when transforming and publishing their cadastral data for INSPIRE.

8 Dataset-level Metadata

Metadata can be reported for each individual feature (feature-level metadata) or once for a complete dataset (dataset-level metadata). Feature-level metadata is fully described in the application schema (section 5). If data quality elements are used on a feature level, the documentation shall refer to the appropriate definition in section 7. This section only specifies dataset-level metadata elements.

Mandatory or conditional metadata elements are specified in Table 7 – Mandatory and conditional theme-specific metadata for the theme *Cadastral parcels*

INSPIRE Data Specification Cadastral parcels Section	Metadata element	Multiplicity	Condition
8.1	Rate of missing items	1	
8.2	Overlap between surfaces	1	
8.3	Gap between surfaces	1	
8.5	Mean value of positional uncertainties (1D, 2D)	0..1	To be provided at dataset level if information on positional accuracy not provided at feature level (by attribute estimatedAccuracy on cadastral index set or on cadastral parcel or on cadastral boundary)
8.6	Rate of incorrect classification for national identifier	1	
8.7	Description of a data set	1	
8.10	Frequency with witch changes are made	1	

Table 8 – Optional theme-specific metadata for the theme *Cadastral parcels*

INSPIRE Data Specification Cadastral parcels Section	Metadata element	Multiplicity
8.4	Edge matching Error! Reference source not found.	0..1

8.8	Information about events	0..1
8.9	Information about the source	0..1
8.11	Scheduled revision date	0..1

8.1 CompletenessOmission

Metadata element name	Rate of missing items
Definition	See section 7.1
ISO 19115 number and name	110. DQ_CompletenessOmission
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_CompletenessOmission
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Real
Domain	
Implementing instructions	Number of missing items in the data set in relation to the number of items that should have been present
Example	
Comment	

8.2 Overlap

Metadata element name	Overlap between surfaces
Definition	See section 7.2.1.1
ISO 19115 number and name	115. DQ_TopologicalConsistency
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_TopologicalConsistency
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Boolean
Domain	
Implementing instructions	Indication that there are no topological overlaps between cadastral parcels.
Example	
Comment	

8.3 Gap

Metadata element name	Gap between surfaces
Definition	See section 7.2.1.2
ISO 19115 number and name	115. DQ_TopologicalConsistency
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_TopologicalConsistency
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Boolean
Domain	
Implementing instructions	Indication that there are no topological gaps in the dataset between cadastral parcels.
Example	
Comment	

8.4 Edge matching

Metadata element name	Edge matching on boundary
Definition	See section 7.2.1.3
ISO 19115 number and name	115. DQ_TopologicalConsistency
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_TopologicalConsistency
INSPIRE obligation / condition	Optional
INSPIRE multiplicity	0..1
Data type	Boolean
Domain	
Implementing instructions	Indication that all surfaces match each other on the boundary to adjacent data sets
Example	
Comment	

8.5 Mean value of positional uncertainties (1D, 2D)

Metadata element name	Mean value of positional uncertainties (1D, 2D)
Definition	See 7.3
ISO 19115 number and name	117. DQ_AbsoluteExternalPositionalAccuracy
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_AbsoluteExternalPositionalAccuracy
INSPIRE obligation / condition	Conditional To be provided at dataset level if information on positional accuracy not provided at feature level (by attribute estimatedAccuracy on cadastral index set or on cadastral parcel or on cadastral boundary)
INSPIRE multiplicity	0..1
Data type	Measure
Domain	
Implementing instructions	See ISO 19138
Example	
Comment	

8.6 Rate of incorrect classification for national cadastral references

Metadata element name	Rate of incorrect classification for national cadastral references
Definition	See 7.4
ISO 19115 number and name	125. DQ_ThematicClassificationCorrectness
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_ThematicClassificationCorrectness
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Real
Domain	
Implementing instructions	Number of incorrect or missing national cadastral references for cadastral parcels in the data set in relation to the number of items in the data set
Example	
Comment	

INSPIRE	Reference: INSPIRE_DataSpecification_CP_v2.0.pdf		
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Requirement 8

The metadata element Lineage required in the INSPIRE Metadata Regulation [REGULATION ../../EC] shall be provided in a structured way, using the mandatory sub-element Description of a dataset and, if appropriate, the optional sub-elements Process step and Information about the source.

8.7 Description of a data set

Metadata element name	Description of a data set
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	MD_Metadata.DQ_DataQuality.LI_Lineage.statement
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Free text
Domain	
Implementing instructions	General description what is included in the data set and what is not included
Example	Covers all cadastral parcels from the national cadastral registry. In this national registry public areas and roads are excluded. Temporal information at spatial object level is not available.
Comment	

Requirement 9 The main specificities of initial source of cadastral data shall be documented in the element "description of a data set".

NOTE Main specificities of initial source of cadastral data will include for instance:

- which parts of national territory are excluded (i.e. the cadastral gaps), if any
- if there are cadastral overlaps and in which case
- which spatial object types and which attributes are populated.

8.8 Information about events

Metadata element name	Information about events
Definition	Information about events in the life of a data set specified by the scope
ISO 19115 number and name	86. LI_ProcessStep
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality.LI_Lineage.LI_ProcessStep
INSPIRE obligation / condition	Optional
INSPIRE multiplicity	0..1
Data type	Free text
Domain	
Implementing instructions	Information about an event or transformation in the life of a data set including the process used to maintain the data set
Example	Transformed from national coordinates S34J to ETRS89
Comment	

8.9 Information about the source

Metadata element name	Information about the source
Definition	Information about the source data used in creating the data specified by the scope
ISO 19115 number and name	92. LI_Source
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality.LI_Lineage.LI_Source
INSPIRE obligation / condition	Optional
INSPIRE multiplicity	0..1
Data type	Free text

Domain	
Implementing instructions	Information about the source data used in creating the data specified by the scope
Example	a) Automatic vectorisation from analogue maps in scale 1:2000 b) Cadastral parcels are captured using the general boundaries provided by MasterMap from OrdnanceSurvey
Comment	

8.10 Frequency with which changes are made

Metadata element name	Frequency with which changes are made
Definition	Frequency with which changes and additions are made to the resource after the initial resource is completed
ISO 19115 number and name	143. MaintenanceAndUpdateFrequency
ISO/TS 19139 path	MD_Metadata.MD_MaintenanceInformation.maintenanceAndUpdateFrequency
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	CodeList
Domain	
Implementing instructions	
Example	002 daily
Comment	

Recommendation 7 Frequency with which changes are made for INSPIRE should be as close as possible to the frequency with which changes are made in national cadastral register or equivalent. Moreover, frequency with which changes are made for INSPIRE should be one year or better.

NOTE Typically, frequency with which changes are made will vary from daily basic for data providers publishing on-line continuous updating of cadastral data to yearly basis for data providers publishing annual updated editions of cadastral data.

8.11 Scheduled revision date

Metadata element name	Scheduled revision date
Definition	Scheduled revision date for resource
ISO 19115 number and name	144. DateOfNextUpdate
ISO/TS 19139 path	MD_Metadata.MD_MaintenanceInformation.dateOfNextUpdate
INSPIRE obligation / condition	Optional
INSPIRE multiplicity	0..1
Data type	Date
Domain	
Implementing instructions	
Example	
Comment	

. Optional metadata elements are specified in **Error! Reference source not found.**

Requirement 10 The metadata describing a spatial data set or a spatial data set series related to the theme Cadastral Parcels shall comprise the metadata elements required by Regulation 1205/2008/EC implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata) for spatial datasets and /patial dataset series (Table 6) as well as the theme-specific metadata elements

specified in Table 7 – Mandatory and conditional theme-specific metadata for the theme *Cadastral parcels*

INSPIRE Data Specification Cadastral parcels Section	Metadata element	Multiplicity	Condition
8.1	Rate of missing items	1	
8.2	Overlap between surfaces	1	
8.3	Gap between surfaces	1	
8.5	Mean value of positional uncertainties (1D, 2D)	0..1	To be provided at dataset level if information on positional accuracy not provided at feature level (by attribute estimatedAccuracy on cadastral index set or on cadastral parcel or on cadastral boundary)
8.6	Rate of incorrect classification for national identifier	1	
8.7	Description of a data set	1	
8.10	Frequency with witch changes are made	1	

Table 8 – Optional theme-specific metadata for the theme *Cadastral parcels*

INSPIRE Data Specification Cadastral parcels Section	Metadata element	Multiplicity
8.4	Edge matchingError! Reference source not found.	0..1
8.8	Information about events	0..1
8.9	Information about the source	0..1
8.11	Scheduled revision date	0..1

8.12 CompletenessOmission

Metadata element name	Rate of missing items
Definition	See section 7.1
ISO 19115 number and name	110. DQ_CompletenessOmission
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_CompletenessOmission
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Real
Domain	
Implementing instructions	Number of missing items in the data set in relation to the number of items that should have been present
Example	
Comment	

8.13 Overlap

Metadata element name	Overlap between surfaces
Definition	See section 7.2.1.1
ISO 19115 number and name	115. DQ_TopologicalConsistency
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_TopologicalConsistency
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Boolean
Domain	
Implementing instructions	Indication that there are no topological overlaps between cadastral parcels.
Example	
Comment	

8.14 Gap

Metadata element name	Gap between surfaces
Definition	See section 7.2.1.2
ISO 19115 number and name	115. DQ_TopologicalConsistency
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_TopologicalConsistency
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Boolean
Domain	
Implementing instructions	Indication that there are no topological gaps in the dataset between cadastral parcels.
Example	
Comment	

8.15 Edge matching

Metadata element name	Edge matching on boundary
Definition	See section 7.2.1.3
ISO 19115 number and name	115. DQ_TopologicalConsistency
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_TopologicalConsistency
INSPIRE obligation / condition	Optional
INSPIRE multiplicity	0..1
Data type	Boolean
Domain	
Implementing instructions	Indication that all surfaces match each other on the boundary to adjacent data sets
Example	
Comment	

8.16 Mean value of positional uncertainties (1D, 2D)

Metadata element name	Mean value of positional uncertainties (1D, 2D)
Definition	See 7.3
ISO 19115 number and name	117. DQ_AbsoluteExternalPositionalAccuracy
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_AbsoluteExternalPositionalAccuracy

INSPIRE obligation / condition	Conditional To be provided at dataset level if information on positional accuracy not provided at feature level (by attribute estimatedAccuracy on cadastral index set or on cadastral parcel or on cadastral boundary)
INSPIRE multiplicity	0..1
Data type	Measure
Domain	
Implementing instructions	See ISO 19138
Example	
Comment	

8.17 Rate of incorrect classification for national cadastral references

Metadata element name	Rate of incorrect classification for national cadastral references
Definition	See 7.4
ISO 19115 number and name	125. DQ_ThematicClassificationCorrectness
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_ThematicClassificationCorrectness
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Real
Domain	
Implementing instructions	Number of incorrect or missing national cadastral references for cadastral parcels in the data set in relation to the number of items in the data set
Example	
Comment	

Requirement 11 The metadata element Lineage required in the INSPIRE Metadata Regulation [REGULATION .../EC] shall be provided in a structured way, using the mandatory sub-element Description of a dataset and, if appropriate, the optional sub-elements Process step and Information about the source.

8.18 Description *of a data set*

Metadata element name	Description of a data set
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	MD_Metadata.DQ_DataQuality.LI_Lineage.statement
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Free text
Domain	
Implementing instructions	General description what is included in the data set and what is not included
Example	Covers all cadastral parcels from the national cadastral registry. In this national registry public areas and roads are excluded. Temporal information at spatial object level is not available.
Comment	

Requirement 12 The main specificities of initial source of cadastral data shall be documented in the element "description of a data set".

NOTE Main specificities of initial source of cadastral data will include for instance:

- which parts of national territory are excluded (i.e. the cadastral gaps), if any
- if there are cadastral overlaps and in which case
- which spatial object types and which attributes are populated.

8.19 Information about events

Metadata element name	Information about events
Definition	Information about events in the life of a data set specified by the scope
ISO 19115 number and name	86. LI_ProcessStep
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality.LI_Lineage.LI_ProcessStep
INSPIRE obligation / condition	Optional
INSPIRE multiplicity	0..1
Data type	Free text
Domain	
Implementing instructions	Information about an event or transformation in the life of a data set including the process used to maintain the data set
Example	Transformed from national coordinates S34J to ETRS89
Comment	

8.20 Information about the source

Metadata element name	Information about the source
Definition	Information about the source data used in creating the data specified by the scope
ISO 19115 number and name	92. LI_Source
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality.LI_Lineage.LI_Source
INSPIRE obligation / condition	Optional
INSPIRE multiplicity	0..1
Data type	Free text

Domain	
Implementing instructions	Information about the source data used in creating the data specified by the scope
Example	a) Automatic vectorisation from analogue maps in scale 1:2000 b) Cadastral parcels are captured using the general boundaries provided by MasterMap from OrdnanceSurvey
Comment	

8.21 Frequency with which changes are made

Metadata element name	Frequency with which changes are made
Definition	Frequency with which changes and additions are made to the resource after the initial resource is completed
ISO 19115 number and name	143. MaintenanceAndUpdateFrequency
ISO/TS 19139 path	MD_Metadata.MD_MaintenanceInformation.maintenanceAndUpdateFrequency
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	CodeList
Domain	
Implementing instructions	
Example	002 daily
Comment	

Recommendation 8 Frequency with which changes are made for INSPIRE should be as close as possible to the frequency with which changes are made in national cadastral register or equivalent. Moreover, frequency with which changes are made for INSPIRE should be one year or better.

NOTE Typically, frequency with which changes are made will vary from daily basic for data providers publishing on-line continuous updating of cadastral data to yearly basis for data providers publishing annual updated editions of cadastral data.

8.22 Scheduled revision date

Metadata element name	Scheduled revision date
Definition	Scheduled revision date for resource
ISO 19115 number and name	144. DateOfNextUpdate
ISO/TS 19139 path	MD_Metadata.MD_MaintenanceInformation.dateOfNextUpdate
INSPIRE obligation / condition	Optional
INSPIRE multiplicity	0..1
Data type	Date
Domain	
Implementing instructions	
Example	
Comment	

Requirement 13

Recommendation 9 The metadata describing a spatial data set or a spatial data set series related to the spatial data theme *Cadastral parcels* should comprise the theme-specific metadata elements specified in **Error! Reference source not found.**

Table 6 – Metadata for spatial datasets and spatial dataset series specified in the INSPIRE Metadata Regulation [REGULATION 1205/2008/EC]

Metadata Regulation Section	Metadata element	Multiplicity	Condition
1.1	Resource title	1	
1.2	Resource abstract	1	
1.3	Resource type	1	
1.4	Resource locator	0..*	Mandatory if a URL is available to obtain more information on the resource, and/or access related services.
1.5	Unique resource identifier	1..*	
1.7	Resource language	0..*	Mandatory if the resource includes textual information.
2.1	Topic category	1..*	
3	Keyword	1..*	
4.1	Geographic bounding box	1..*	
5	Temporal reference	1..*	
6.1	Lineage	1	
6.2	Spatial resolution	0..*	Mandatory for data sets and data set series if an equivalent scale or a resolution distance can be specified.
7	Conformity	1..*	
8.1	Conditions for access and use	1..*	
8.2	Limitations on public access	1..*	
9	Responsible organisation	1..*	
10.1	Metadata point of contact	1..*	
10.2	Metadata date	1	
10.3	Metadata language	1	

Table 7 – Mandatory and conditional theme-specific metadata for the theme *Cadastral parcels*

INSPIRE Data Specification Cadastral parcels Section	Metadata element	Multiplicity	Condition
8.1	Rate of missing items	1	
8.2	Overlap between surfaces	1	
8.3	Gap between surfaces	1	
8.5	Mean value of positional uncertainties (1D, 2D)	0..1	To be provided at dataset level if information on positional accuracy not provided at feature level (by attribute estimatedAccuracy on cadastral index set or on cadastral parcel or on cadastral boundary)
8.6	Rate of incorrect classification for national identifier	1	
8.7	Description of a data set	1	
8.10	Frequency with which changes are made	1	

Table 8 – Optional theme-specific metadata for the theme *Cadastral parcels*

INSPIRE Data Specification Cadastral parcels Section	Metadata element	Multiplicity
8.4	Edge matching Error! Reference source not found.	0..1
8.8	Information about events	0..1
8.9	Information about the source	0..1
8.11	Scheduled revision date	0..1

8.23 Completeness Omission

Metadata element name	Rate of missing items
Definition	See section 7.1
ISO 19115 number and name	110. DQ_CompletenessOmission
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_CompletenessOmission
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Real
Domain	
Implementing instructions	Number of missing items in the data set in relation to the number of items that should have been present
Example	
Comment	

8.24 Overlap

Metadata element name	Overlap between surfaces
Definition	See section 7.2.1.1
ISO 19115 number and name	115. DQ_TopologicalConsistency
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_TopologicalConsistency
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Boolean
Domain	
Implementing instructions	Indication that there are no topological overlaps between cadastral parcels.
Example	
Comment	

8.25 Gap

Metadata element name	Gap between surfaces
Definition	See section 7.2.1.2
ISO 19115 number and name	115. DQ_TopologicalConsistency
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_TopologicalConsistency
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Boolean
Domain	

Implementing instructions	Indication that there are no topological gaps in the dataset between cadastral parcels.
Example	
Comment	

8.26 Edge matching

Metadata element name	Edge matching on boundary
Definition	See section 7.2.1.3
ISO 19115 number and name	115. DQ_TopologicalConsistency
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_TopologicalConsistency
INSPIRE obligation / condition	Optional
INSPIRE multiplicity	0..1
Data type	Boolean
Domain	
Implementing instructions	Indication that all surfaces match each other on the boundary to adjacent data sets
Example	
Comment	

8.27 Mean value of positional uncertainties (1D, 2D)

Metadata element name	Mean value of positional uncertainties (1D, 2D)
Definition	See 7.3
ISO 19115 number and name	117. DQ_AbsoluteExternalPositionalAccuracy
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_AbsoluteExternalPositionalAccuracy
INSPIRE obligation / condition	Conditional To be provided at dataset level if information on positional accuracy not provided at feature level (by attribute estimatedAccuracy on cadastral index set or on cadastral parcel or on cadastral boundary)
INSPIRE multiplicity	0..1
Data type	Measure
Domain	
Implementing instructions	See ISO 19138
Example	
Comment	

8.28 Rate of incorrect classification for national cadastral references

Metadata element name	Rate of incorrect classification for national cadastral references
Definition	See 7.4
ISO 19115 number and name	125. DQ_ThematicClassificationCorrectness
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality. DQ_ThematicClassificationCorrectness
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Real
Domain	
Implementing instructions	Number of incorrect or missing national cadastral references for cadastral parcels in the data set in relation to the number of items in the data set
Example	

INSPIRE	Reference: INSPIRE_DataSpecification_CP_v2.0.pdf		
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Comment	
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Requirement 14 The metadata element Lineage required in the INSPIRE Metadata Regulation [REGULATION ../../EC] shall be provided in a structured way, using the mandatory sub-element Description of a dataset and, if appropriate, the optional sub-elements Process step and Information about the source.

8.29 Description of a data set

Metadata element name	Description of a data set
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	MD_Metadata.DQ_DataQuality.LI_Lineage.statement
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	Free text
Domain	
Implementing instructions	General description what is included in the data set and what is not included
Example	Covers all cadastral parcels from the national cadastral registry. In this national registry public areas and roads are excluded. Temporal information at spatial object level is not available.
Comment	

Requirement 15 The main specificities of initial source of cadastral data shall be documented in the element "description of a data set".

NOTE Main specificities of initial source of cadastral data will include for instance:

- which parts of national territory are excluded (i.e. the cadastral gaps), if any
- if there are cadastral overlaps and in which case
- which spatial object types and which attributes are populated.

8.30 Information about events

Metadata element name	Information about events
Definition	Information about events in the life of a data set specified by the scope
ISO 19115 number and name	86. LI_ProcessStep
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality.LI_Lineage.LI_ProcessStep
INSPIRE obligation / condition	Optional
INSPIRE multiplicity	0..1
Data type	Free text
Domain	
Implementing instructions	Information about an event or transformation in the life of a data set including the process used to maintain the data set
Example	Transformed from national coordinates S34J to ETRS89
Comment	

8.31 Information about the source

Metadata element name	Information about the source
Definition	Information about the source data used in creating the data specified by the scope
ISO 19115 number and name	92. LI_Source
ISO/TS 19139 path	MD_Metadata.DQ_DataQuality.LI_Lineage.LI_Source
INSPIRE obligation / condition	Optional
INSPIRE multiplicity	0..1
Data type	Free text

Domain	
Implementing instructions	Information about the source data used in creating the data specified by the scope
Example	a) Automatic vectorisation from analogue maps in scale 1:2000 b) Cadastral parcels are captured using the general boundaries provided by MasterMap from OrdnanceSurvey
Comment	

8.32 Frequency with which changes are made

Metadata element name	Frequency with which changes are made
Definition	Frequency with which changes and additions are made to the resource after the initial resource is completed
ISO 19115 number and name	143. MaintenanceAndUpdateFrequency
ISO/TS 19139 path	MD_Metadata.MD_MaintenanceInformation.maintenanceAndUpdateFrequency
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	1
Data type	CodeList
Domain	
Implementing instructions	
Example	002 daily
Comment	

Recommendation 10 Frequency with which changes are made for INSPIRE should be as close as possible to the frequency with which changes are made in national cadastral register or equivalent. Moreover, frequency with which changes are made for INSPIRE should be one year or better.

NOTE Typically, frequency with which changes are made will vary from daily basic for data providers publishing on-line continuous updating of cadastral data to yearly basis for data providers publishing annual updated editions of cadastral data.

8.33 Scheduled revision date

Metadata element name	Scheduled revision date
Definition	Scheduled revision date for resource
ISO 19115 number and name	144. DateOfNextUpdate
ISO/TS 19139 path	MD_Metadata.MD_MaintenanceInformation.dateOfNextUpdate
INSPIRE obligation / condition	Optional
INSPIRE multiplicity	0..1
Data type	Date
Domain	
Implementing instructions	
Example	
Comment	

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9 Delivery

9.1 Delivery medium

Data conformant to this INSPIRE data specification will be made available through services conformant to the Implementing Rules for Download Services. In these Implementing Rules, two types of Download services are defined:

- 1) a Download service providing access to pre-defined dataset or pre-defined part of a dataset
- 2) a Download service providing direct access to data and streaming data based upon user defined criteria called a filter

9.2 Encodings

9.2.1 Encoding for application schema *Cadastral parcels*

Requirement 16 Data conformant to the application schema *Cadastral parcels* shall be encoded using the encoding specified in section 9.2.1.1.

9.2.1.1 Default Encoding: GML Application Schema | Cadastral Parcels

Format name: GML Application Schema
Version of the format: GML, version 3.2.1
Reference to the specification of the format: ISO 19136:2007
Character set: UTF-8

The GML Application Schema is distributed in a zip-file separately from the data specification document.

9.2.1.2 Alternative Encoding

Not specified.

10 Data Capture

10.1 Spatial object types

10.1.1 CadastralParcel

Requirement 17 All cadastral parcels which are under the INSPIRE scope shall be published

Cadastral parcels are considered as under the INSPIRE scope if:

- they fit with the definition given by the Directive “areas defined in cadastral registers or equivalent”
- they fit as much as possible with the description given in this document “single area on Earth surface under homogeneous real property rights and unique ownership, forming a partition of national territory”
- they are available as vector data.

EXAMPLE 1: France

In France, there are two kinds of “areas defined in cadastral registers or equivalent”:

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- parcels (single areas on Earth surface under unique or homogeneous property right)
 - sub-parcels (division of parcels based on official land use for taxation purposes)
- Only the first one "parcels" have to be published for INSPIRE.

EXAMPLE 2: Finland

In Finland, basic units "in cadastral registers or equivalent" are called basic property units. Areas of basic property units are called parcels (single areas on Earth surface under unique or homogenous property rights). Notice: one basic property unit can be composed from 0 to many parcels. Only the parcels will be published for INSPIRE.

EXAMPLE 3: United Kingdom

In United Kingdom, cadastral parcels represent the extent (in 2D) of titles, they may overlap in case two titles own the same space, but at different heights.

These parcels are compliant with the definition given by the Directive "areas defined in cadastral registers or equivalent" but not with the description given in this document "single areas on Earth surface under unique or homogeneous property right" because some parcels are not really at Earth surface.

If the United Kingdom Land Registry can find a convenient mean to extract only parcels as "single areas **on Earth surface** under unique or homogeneous property right", only these parcels will have to be published for INSPIRE. If not, all parcels registered in United Kingdom will have to be published for INSPIRE (definition given by Directive having precedence on description given in this document).

EXAMPLE 4: Hungary

In national regulation:

- (1) Cadastral parcels are
 - (a) single areas on Earth surface, which are not cut off by administrative or built-up area boundary, under unique or homogenous ownership or trusteeship rights.
 - (b) shaped building lots independently of ownership or trusteeship rights.
- (2) Cadastral parcels must be subdivided into subparcels based on land use categories
- (3) Objects must be registered together with cadastral parcels, if the ownership rights are the same like the cadastral parcel
 - (a) buildings and structures within the cadastral parcel
 - (b) in case of condominium the common parts and chambers of the building, which are under joint ownership rights

In Hungary only the cadastral parcels will be published for INSPIRE.

NOTE Cadastral parcels should form, as much as possible, a partition of national territory. However, it won't be possible in every country, due to national regulations. These gaps and overlaps due to national regulations have been called respectively "cadastral gaps" and "cadastral overlaps" and information about them has to be given in metadata (lineage information).

10.1.2 CadastralIndexSet

Requirement 18 All cadastral index sets which are under the INSPIRE scope shall be published.

Cadastral index sets are considered under the INSPIRE scope:

- a) if they are available as vector data
- b) if they include cadastral parcels also published for INSPIRE
- c) if Member State considers them as helpful for users
- d) if the extent of cadastral index sets is equivalent or smaller than the extent of cadastral data generally required by users.

EXAMPLE 1 (about condition b): France

In some parts of its territory, France has cadastral parcels as raster data (so cadastral parcels outside the INSPIRE scope) but has cadastral index sets as vector data. In this case, it won't be relevant to supply cadastral index sets for INSPIRE.

NOTE 1 (about condition c)

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Cadastral index sets should be considered as helpful for users at least in the following cases:

- when they carry metadata attributes (estimated accuracy and/or original map scale denominator)
- when the current practice for portrayal of cadastral parcels is to display only the last part of national cadastral reference (in this case, cadastral index sets will be required to display the first part of this attribute).
- when cadastral index sets are generally used to make easier data management in the users data base (e.g. for queries).

NOTE 2 (about condition d)

Most users will very likely require cadastral parcels only to work at local level, e.g. on a municipality or a set of municipalities. So, generally, cadastral index sets should not have an extent significantly bigger than municipalities (the lowest level in administrative hierarchy).

Requirement 19 If in a Member State, municipalities are used as cadastral index sets, municipalities shall be considered as the upper level of cadastral index sets.

NOTE 3 In case a Member State uses other administrative levels than municipalities as cadastral index sets, these upper levels of administrative units should not be duplicated in theme *Cadastral parcels*.

EXAMPLE 2

In the Netherlands there is nationwide coverage of the cadastral parcels, which are organised in a hierarchical structure: the top levels of this hierarchical structure coincide with the administrative boundaries of municipality, province, nation. In the INSPIRE context, the cadastral index set levels will be:

- Cadastral section (lowest level = 3)
- Cadastral municipality (level = 2)
- Civil municipality (upper level= 1 and also lowest level of administrative unit).

Cadastral municipalities are the old (original) municipalities, which are in many cases now grouped to larger units in the current actual (civil) municipalities. The old cadastral municipalities are still there - as their code is part of the parcel identifier. And they do form a part of a proper hierarchy.

NOTE 4 In case a Member State does not use municipalities as cadastral index set, it is up to this Member State to decide which cadastral index sets shall be published in INSPIRE, taking into account that the extent of cadastral index sets shall be equivalent or smaller than the extent of cadastral data generally required by users.

EXAMPLE 4

In Denmark, there is only one level of cadastral index set, called cadastral district (corresponding to old towns with local cadastral maps).

NOTE 5 This spatial object type is considered as optional; it may happen that some countries (e.g. United Kingdom) do not have this spatial object type or do not consider it as helpful (e.g. Finland).

10.1.3 CadastralBoundary

Requirement 20 Cadastral boundaries have to be published for INSPIRE only if available as vector data and if carrying the information about estimated accuracy.

NOTE In case a Member State provides for INSPIRE the spatial object type CadastralBoundary, all instances of this spatial object type have to be published (even if some instances do not carry any information about estimated accuracy), i.e. all cadastral boundaries of all parcels have to be published.

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EXAMPLE Cadastral boundaries will have to be provided by countries such as Norway or Finland which consider convenient to supply the information about accuracy at the boundary level.

Requirement 21 In the application schema, a spatial object CadastralParcel may be associated to zero or one spatial object CadastralIndexSet. Cardinality zero will be used by Member States not providing cadastral index sets. Cardinality one has to be used by Member States providing cadastral index sets. The association will be done with the cadastral index set of lowest level.

10.2 nationalCadastralReference

The structure of cadastral reference is different for every country and it is outside the scope/ambition of INSPIRE to make this uniform.

Every country have different cadastral references with different structure which generally are not meaningless: sometimes a hierarchical cadastral division is stored in the cadastral reference, sometimes some lineage can be observed etc...

EXAMPLES

- Austria: 30133-123/45, behind the / is the result of dividing an (earlier) parcel
- Belgium: 92001A0999/02R999, cadastral division key (5d), section (1l), root (4d), bis ('/' + 2d), alphanumeric (1l or '/'), numeric (3d)
- Denmark: 590151,157h, cadastral district (max 7d), parcel id (max 4d+3L)
- Finland: 09140300020017, municipality number (3d), cadastral division number (3d), group number (4d) and sequence number (4d)
- Norway: 1729 – 12/4/0/2. municipality number (4d), land number (max 4d), title number (max 4d), lease number (max 4d, only for leased area), unit number (max 4d, only for sectioned area, that is limited part of building) . “– “ is used as separator between municipality and land number. A “/” is used as separator otherwise.
- Spain: two options:
 1. urban: 9872023 VH5797S 0001 WX, estate/parcel (7d), sheet (7c), flat/unit (4d), control (2l)
 2. rural: 13 077 A 018 00039 0000 FP, province (2d), municipality (3d), sector (1l), poligon (3d), parcel (5d), construction (4d), control (2l)
- The Netherlands: APD00 F 2345, municipality (3l+2d), section (2l), parcel (5d)
- Hungary: 0214-023 settlement statistic code (4 digits)-parcel_id (max. 6 digits)
0214-023/25: in the case of subdivided parcel: original_parcel_id + „/” + subdivided_parcel_id (max. 3d). For parcels inside rural areas parcel_id started with „0” (zero)

Recommendation 11 If the national cadastral reference is a structured identifier, it is recommended to make this structure visible by use of separators, provided that the national cadastral reference still enables to make link with rights, owners and other information related to cadastral parcels in the national cadastral register or equivalent. If not possible, the structure may be made visible in the inspireId.

EXAMPLE 1

In France, the structure is the following: municipality (5 digits), arrondissement/absorbed municipality (3 digits), section (2 letters), sheet (2 digits), parcel number (4 digits).

So, 63139.000.AB.12.0145 (or 63139_000_AB_12_0145) would be better than 63139000AB120145.

EXAMPLE 2

In Spain, the national cadastral reference does not show the structure of the identifier (e.g. 13077A01800039) and it would be very difficult to change it and to still keep the link with rights and owners. However, it might be relevant to use a structured character string based on national cadastral reference (e.g. 13_007_A_018_00039) as local identifier for the attribute inspireId (see following paragraph).

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10.3 INSPIRE Identifier (*inspireId*)

As explained in clause 5.1.1.4, all spatial objects published for INSPIRE shall carry a unique identifier: the “*inspireId*”. This attribute must have the characteristics defined in the Generic Conceptual Model:

- be unique in the INSPIRE context
- be persistent (life-cycle rules being up to each MS)
- give a way to find the download service where the spatial object is available
- be compliant with the lexical rules:
 - o composed of a namespace and a local identifier
 - o the namespace must begin by the 2 letter country code
 - o the namespace and the local identifier can include only the limited set of characters allowed by the Generic Conceptual Model.

The following part of this clause gives some advices and examples to data providers about how they may supply such unique identifiers.

10.3.1 Namespace

The first point is to define a convenient **namespace**. To ensure both uniqueness within the INSPIRE context and possible link with download services, it may be useful to add to the mandatory country code, the data provider name or acronym.

For instance, namespace might be: NL.KADASTER or ES.Catastro.Barcelona (if download services available at province level in Spain).

More examples and details may be found in the Generic Conceptual Model.

10.3.2 Local identifier

The second point is to decide on the **local identifier** to be used. Of course, to ensure the required characteristics, this local identifier must be itself unique (in the local/national set of cadastral data), persistent and must include only the limited set of characters allowed by the Generic Conceptual Model.

Case 1: data provider has both external identifiers and thematic identifiers (the national cadastral reference)

For instance, Denmark has thematic structured identifiers and meaningless external identifiers (UUID). If both identifiers comply with the characteristics of the local identifier required by INSPIRE, it will be up to Danish cadastre to decide which should be used as the local identifier for INSPIRE.

Case 2: data provider has only thematic identifiers (the national cadastral reference) and this thematic identifier comply with the characteristics of the local identifier required by INSPIRE. It seems to be the case in many countries.

In this case, the thematic identifier may be used as local identifier.

Case 3: data provider has no external identifier, it has only thematic identifier (the national cadastral reference) but which does not comply with the characteristics of the local identifier required by INSPIRE.

- o The thematic identifier may be not unique

It is the case, for instance, in Finland, where the thematic identifier is carried by the basic property units (which may be composed from 0 to many cadastral parcels). In this case, the national Cadastre must attribute unique identifiers to parcels, e.g. by adding a suffix to each parcel composing the same basic property unit, by using internal identifier, if any, by attributing automatic identifiers (UUID, coordinates of centroid points, ...). The method to form the local identifier is up to each data provider.

- o The thematic identifier uses other characters than the ones allowed by the Generic Conceptual Model.

It is the case, for instance, in Austria where the thematic identifier may include the “/” separator to indicate parcel splitting whereas this separator is not allowed by the Generic Conceptual Model.

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In this case, to form the local identifier, the national Cadastre must provide a method to make this thematic identifier compliant with the rules in the Generic Conceptual Model (e.g. by replacing the “/” by another allowed separator, such as “_”).

10.4 Estimated accuracy

For INSPIRE, cadastral data shall be published in the Coordinate Reference System mandated by the Implementing Rule on Reference Systems, i.e. in ETRS89 for areas on the Eurasian tectonic plate and in ITRS elsewhere.

Of course, INSPIRE users will be interested by having information about the accuracy of cadastral data, as they receive them, in the Coordinate Reference System mandated by INSPIRE. It is why the clauses about application schema and about quality and metadata require cadastral data providers to give estimated accuracy related to the coordinates in ETRS89 (or ITRS).

However, in most Member States, the estimated accuracy is generally known in the source Coordinate Reference System, the national or local one.

The estimated accuracy for INSPIRE will be the combination of estimated accuracy in original Coordinate Reference System and of the accuracy of the coordinate transformation between original Reference System to INSPIRE Reference System.

Coordinate transformation between two horizontal geodetic datum is generally done, using one of the three following methods:

- transformation with 3 parameters
- transformation with 7 parameters
- transformation with a grid.

Experience in some countries has shown that transformation with 3 or even 7 parameters might bring deviations up to 10 metres. So, the impact of such transformations may not be neglected on cadastral data whose original accuracy generally varies from some decimetres to some metres.

The ideal solution would be for each Member State to define good quality coordinate transformations (using grids and bringing no deviation bigger than some centimetres). However, if not possible before the deadlines of INSPIRE, the impact of coordinate transformation has to be taken into account when giving information about positional accuracy, both in the application schema and in metadata.

11 Portrayal

This clause defines the rules for layers and styles to be used for portrayal of the spatial object types defined for this theme.

Requirement 22 If an INSPIRE view service supports the portrayal of data related to the spatial data theme *Cadastral parcels*, it shall provide at least the layer *CadastralParcel*. If feature type *CadastralIndexSet* is available, the view service shall also support the layer *CadastralIndexSet*.

Requirement 23 If an INSPIRE view service supports the portrayal of data related to the spatial data theme *Cadastral parcels*, it shall support the default style specified in this section. Moreover, if attribute *referencePoint* is available, the view service shall also support the additional well-defined style.

Requirement 24 If no user-defined style is specified in a portrayal request to an INSPIRE view service, the default style specified in this section shall be used.

NOTE 1 The two default styles described in 11.1 are considered as convenient for displaying current cadastral parcels and related information as background data.

NOTE 2 These two default styles can always be overridden by a user-defined symbology, e.g. in order to use an existing national or thematic style or to avoid conflicts when visualising several themes together.

NOTE 3 Other default styles will probably be required in future for more elaborate but very likely use of cadastral data, e.g.:

- style for cadastral parcels displayed on a coloured screen or with an orthophoto as background (need in this case of lighter/brighter colours such as white for parcel outline).
- style for making distinction between current and historical parcels (if both available and required by users)

11.1 Layers

The XML fragments in this section use the following namespace prefixes:

- sld="http://www.opengis.net/sld" (WMS/SLD 1.1)
- se="http://www.opengis.net/se" (SE 1.1)
- ogc="http://www.opengis.net/ogc" (FE 1.1)

11.1.1 CadastralParcel

Layer Name	CadastralParcels.CadastralParcel	
Layer Title	CadastralParcel	
Content	CadastralParcel	
Keywords	Cadastre, Parcel	
Default Style	Name	Cadastral parcels - Label on geometry
	Title	Cadastral parcels - Label on geometry
	Abstract	Parcel outline carried by the mandatory attribute geometry + text with attribute label carried by the mandatory attribute geometry Parcel outlines: black line 1 pixel Labels: in Arial 10 black
	Symbology	The SLD specifying the symbology is distributed in a file separately from the data specification document.
Additional Well-defined Style	Name	Cadastral parcels - Label on reference point
	Title	Cadastral parcels - Label on reference point
	Abstract	Parcel outline carried by the mandatory attribute geometry + text with attribute label carried by the optional attribute referencePoint Parcel outlines: black line 1 pixel Labels: in Arial 10 black
	Symbology	The SLD specifying the symbology is distributed in a file separately from the data specification document
Minimum & maximum scales	from 1:1 to 1:20 000	

11.1.2 CadastralIndexSet

Layer Name	CadastralParcels.CadastralIndexSet	
Layer Title	CadastralIndexSet	
Content	CadastralIndexSet	
Keywords	Cadastre, IndexSet	
Default Style	Name	Cadastral index set - Label on geometry
	Title	Cadastral index set - Label on geometry
	Abstract	Cadastral index set outline carried by the mandatory attribute geometry+ text with attribute label carried by the mandatory attribute geometry Cadastral Index Set outline : black line 2 pixels Labels: in Arial 20 black
	Symbology	The SLD specifying the symbology is distributed in a file separately from the data specification document.
Additional Well-defined Style	Name	Cadastral index set - Label on reference point
	Title	Cadastral index set - Label on reference point
	Abstract	Cadastral index set outline carried by the mandatory attribute geometry+ text with attribute label carried by the optional attribute referencePoint Cadastral Index Set outline: black line 2 pixels Labels: Arial 20 black
	Symbology	The SLD specifying the symbology is distributed in a file separately from the data specification document
Minimum & maximum scales	from 1:1 to 1:20 000	

11.2 Layers organization

No layer organisation specified.

11.3 Bibliography

INSPIRE DS-D2.5, Generic Conceptual Model, v3.0.

INSPIRE DS-D2.6, Methodology for the development of data specifications, v3.0.

INSPIRE DS-D2.7, Guidelines for the encoding of spatial data, v2.0.

UNECE, 2004, Guidelines on Real Property Units and Identifiers, United Nations, New York and Geneva, 2004

WG-CPI, 2006, Role of the cadastral parcel in INSPIRE and national SDIs with impacts on cadastre and land registry operations. Joint Working Group of EuroGeographics and the PCC (WG-CPI), Inventory document.

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Annex A (normative)

Abstract Test Suite

A.1 Test cases for mandatory conformance requirements for a dataset with this INSPIRE data specification *Cadastral parcels*

Conformance and abstract test suite in conformance with the ISO 19105 and the INSPIRE conceptual modelling framework.

The IR (Annex B7) specifies a mandatory conformity element that can take one of the following values:

1. Conformant (conformant)
The resource is fully conformant with the cited specification.
2. Not Conformant (notConformant)
The resource does not conform to the cited specification.
3. Not evaluated (notEvaluated)
Conformance has not been evaluated.

This conformance clause tests for conformance to the INSPIRE data specification *Cadastral parcels*, **not** to the Implementing Rule/Regulation on Cadastral Parcels that will be derived from it.

A.1.1 General

1. Test Purpose: Verify that a dataset is conformant with the INSPIRE data specification *Cadastral Parcels*.
2. Test Method: Inspect the data specification and check it against the requirements included in the data specifications on *Cadastral parcels*.
3. Reference: INSPIRE data specification for *Cadastral parcels*.
4. Test Type: Basic Test

Annex B (informative)

Correspondance between INSPIRE and national levels for CadastralIndexSet

Denmark

INSPIRE level	National level	
	English term	National term
Level 1	Cadastral district	Ejerlav

Finland

No CadastralIndexSet in Finland

France:

INSPIRE level	National level	
	English term	National term
Level 1	Municipality	Commune
Level 2	Section	Section
Level 3	Cadastral sheet	Feuille cadastrale

Hungary

INSPIRE level	National level	
	English term	National term
Level 1	Settlement	Település
Level 2	Built-up area Rural area Garden area	Fekvés

The Netherlands

INSPIRE level	National level	
	English term	National term
Level 1	Civil municipality	Burgerlijke gemeente
Level 2	Cadastral municipality	Kadastrale gemeente
Level 3	Cadastral section	Kadastrale sectie

Norway

INSPIRE level	National level	
	English term	National term
Level 1	Municipality	Kommune

Spain

INSPIRE level	National level	
	English term	National term
Level 1	Municipality	Municipio

United Kingdom

No cadastral index set in United Kingdom

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Annex C (informative)
ISO 19152 LADM and INSPIRE *Cadastral parcels*

To be included in this annex: a LADM-based version of INSPIRE *Cadastral parcels*, showing that the two approaches do fit well and that there are no inconsistencies

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Annex D (informative)

Rationale for cadastral parcel data specification

D.1 Abbreviations

CRS	Coordinate Reference System
DPS	Data Product Specification
DT DS	Drafting Team Data Specification
DTM	Digital terrain Model
EULIS	European Land Information System
GCM	Generic Conceptual Model
GIS	Geographic Information System
GML	Geographic Markup Language
JRC	Joint Research Centre
LADM	Land Administration Domain Model
LMO	Legally Mandated Organisation
SDIC	Spatial Data Interest Community
TWG	Thematic Working Group
TWG CP	Thematic Working Group
WG CPI	Working Group on Cadastral Parcel in INSPIRE
WPLA	Working Party on Land Administration

D.2 Methodology

TWG CP has followed the methodology defined in the document D2.6 elaborated by the Drafting Team Data Specification.

D.2.1 User requirements

The first step has been to find relevant use cases for cadastral parcels in INSPIRE. Use cases have been considered as relevant for INSPIRE if they are linked with environment and if they are (at least potentially) European or cross-border use cases.

Two main sources have been used to identify relevant use cases:

- the user requirement survey launched by JRC in February 2008
- use cases proposed by TWG CP members.

The check-list provided in the document "Methodology for the development of data specifications" from DT DS has been adapted for the cadastral parcels context (e.g. the lines concerning multiple representation have been deleted because not relevant for cadastral parcels).

Then, TWG CP has tried to have this check-list filled for each use case, contacting the user(s) and/or using existing documentation, if any.

Use cases have been based on the one used during the survey conducted by WG-CPI in 2005:

- real estate market
- agriculture (subsidies on land use)
- environmental monitoring
- spatial planning (urban/rural/regional planning + restrictions on land use)
- infrastructure management
- public administration
- public safety
- socio-economic analysis

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Land market is not considered as a use case for INSPIRE but two examples have nevertheless been considered, one about EULIS as it is an harmonisation initiative about cadastre and one coming from Nature GIS project because including also protected sites and other INSPIRE themes.

All the (real) use cases submitted during the user requirements survey launched by JRC in February 2008 have been considered.

NOTE: The examples (collected during this survey) involving only publishing of existing data have not been considered as real use cases

TWG CP has collected more than 20 check-lists during this user requirement phase, covering a wide range of applications.

The main weaknesses in this user requirements phase are the following:

- o the information collected in the check-list has given various and sometimes disappointing results (e.g. answers not detailed enough or not focusing on cadastral parcels)
- o the geographic extent of national use cases is mainly limited to 7 countries (Belgium, France, Hungary, Netherlands, Spain, Sweden, Germany)
- o the use cases (except Land Parcel Identification System) giving good reasons to harmonise data in Europe because at European level have given only very generic requirements
- o the detailed (and really useful) requirements mainly come from national examples (even if potentially cross-border in future)

D.2.2 As-is analysis

TWG CP has investigated the Reference Material provided by SDIC/LMO:

- the survey conducted by WG-CPI in 2005 about the cadastral parcel in INSPIRE
- some national cadastral specifications (some countries already having experts involved in the TWG CP + Italy).

TWG CP has begun to investigate more in detail the existing data in countries represented in TWG CP, with focus on the five key elements identified by the survey conducted by WG-CPI: identifier, boundaries, surface, georeferencement, origin-history.

TWG CP has tried to enlarge the geographic extent of the as-is analysis by inviting other countries to provide more detailed information about their existing cadastral data.

To summarise, TWG CP has generic information about cadastral parcels in most of European countries, due to the survey conducted by WG-CPI and more detailed information for the following countries: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Netherlands, Latvia, Norway, Spain, Switzerland and United Kingdom.

Moreover, as TWG CP has considered, since the beginning of its work, that the existence of cadastral parcels only as raster data was a key issue, a questionnaire about existence and characteristics of cadastral raster data has been sent to countries:

- which answered to the questionnaire sent by WG-CPI saying they had only raster data on parts of their territory
- which did not answer the questionnaire sent by WG-CPI.

D.2.3 Gap analysis

The gap analysis has been done during the whole process through oral discussions during telecons and meetings and through written discussion papers about main components of cadastral parcels.

The results are summarised in the following chapter (recapitulative check-list).

D.2.4 Harmonisation approach

TWG CP has been helped by some Reference Material, mainly:

- the work done by WG-CPI in 2005 about the cadastral parcel in INSPIRE
- the Land Administration Domain Model, a proposal for a new ISO standard

Documents issued by UNECE and the EULIS glossary have also been used in order to clarify some cadastral concepts.

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TWG CP has had to cope with the many national specificities which exist in cadastral data in European countries.

The results are summarised in the following chapter (recapitulative check-list).

Moreover, the internal review (by the European Commission, by the European Environmental Agency and by the INSPIRE Thematic Working Groups and Drafting Teams) has enabled some stakeholders to express requirements or feasibility issues.

D.3 Recapitulative check-list

Data harmonisation component	Requirements	As-is analysis	Harmonisation approach	Gap analysis
(B) Terminology in general	<p>Current use of cadastral concepts as defined by national data providers.</p> <p>The INSPIRE context requires harmonised terminology.</p>	Definition of cadastral parcels given by the Directive but very vague “areas defined in cadastral registers or equivalent”	Some Reference Material providing already some cadastral terms with more or less agreed definition (WPLA, UN/ECE).	
(B) Terminology definition/description of cadastral parcels	<p>TWG CP understanding is that users require parcels as “single areas on the Earth surface under unique ownership and homogeneous property rights”.</p> <p>Parcels as single areas are better:</p> <ul style="list-style-type: none"> - for queries (e.g. parcels included in an area of interest) - to attach user-defined attributes - for portrayal 	<p>Definition given by the Directive is too vague because some MS have several levels of “areas defined in cadastral registers or equivalent”:</p> <ul style="list-style-type: none"> - sub-parcels - parcels - multi-parcels 	<p>TWG CP decided:</p> <ul style="list-style-type: none"> - to keep the definition coming from the INSPIRE directive - to add “single areas on the Earth surface under unique ownership and homogeneous property rights” as description of cadastral parcels 	<p>Some MS have parcels which may be multi-surfaces. They will have to cut them in several parcels and to identify them (with the inspire identifier)</p> <p>Some MS may not be able to match their existing data to the description provided by TWG CP (e.g. United Kingdom). In this case, definition from the Directive will have precedence.</p>
(D) Application schemas Cadastral parcels	Of course, the spatial object type required by all use cases.	Cadastral parcels widely available in most countries in Europe.	Cadastral parcels as mandatory spatial object type.	

nationalCalculatedArea	<p>Official area required by some use cases.</p> <p>Area required by JRC as mandatory attribute.</p>	<p>Areas are generally available in cadastral registers or equivalent. They may be official (legal, fiscal) or not.</p>	<p>TWG CP decided to focus on the topographic view of cadastral parcels and to require a reference (in original CRS) calculated area, which may be provided by every MS.</p>	<p>Official area (if available) may be found in national cadastral register.</p>
referencePoint	<p>Centroïd point required by some use cases with its coordinates.</p> <p>Moreover, TWG CP consider that reference point may be useful for portrayal (e.g. case of concave parcels) or to speed some spatial queries.</p>	<p>Reference point available in many countries but not all.</p>	<p>TWG CP has included reference point as optional attribute with definition "point within cadastral parcel".</p> <p>TWG CP has not included as semantic attributes the coordinates of this reference point, coordinated may be derived from geometry by users.</p>	<p>Some countries (Germany) have some reference points located outside the parcel (when parcel too small to carry the parcel label).</p>

<p>CadastralIndexSet</p>	<p>Cadastral index sets are required by some use cases They are generally required as defined in the national model, i.e. not as cadastral index sets but as municipalities, sections, ... In the quoted use cases, they are required with the following attributes: name and code</p> <p>TWG CP understanding is that cadastral index sets are required:</p> <ul style="list-style-type: none"> - for querying/searching data - for carrying metadata information - for displaying data 	<p>Cadastral index sets are often available in existing data, they are ordered generally in a pyramidal classification but in a very heterogeneous way:</p> <ul style="list-style-type: none"> - there may be different number of levels - they have different names and meanings (e.g. municipalities, parishes, settlements, sections, blocks). - pyramidal classification may be different in rural and urban areas 	<p>The LADM standard offers a model allowing the harmonisation of cadastral index sets.</p> <p>Examples of correspondence between national and INSPIRE levels are provided in annex B of this Data Specification. Attribute level name has also been added to explain this correspondence.</p> <p>Cadastral index sets have same attributes as cadastral parcels plus:</p> <ul style="list-style-type: none"> - level (as in LADM) - name (in case cadastral index set is also an administrative unit) 	<p>No cadastral index sets in some countries (e.g. United Kingdom)</p>
<p>ParcelBoundary</p>	<p>Generally not required by use cases.</p>	<p>For some countries (e.g. Finland, Norway), the most convenient way to provide information about positional accuracy (required by users) is at the parcel boundary level.</p>	<p>TWG CP has added optional spatial object type Parcel Boundary ; to be provided by MS only if carrying accuracy information</p>	

<p>(E) Spatial and temporal aspects (Vector geometry)</p>	<p>Users require cadastral parcels as closed surfaces and generally as 2D data. Some use cases interested at least in future by 2,5D cadastral parcels.</p> <p>Possible requirements in future for 3D parcels.</p>	<p>Most countries have parcels as closed polygons and as 2D data.</p> <p>Some countries also use circular arcs. However, from experts experience, circular arcs are generally sources of problems.</p> <p>Currently, few countries have 3D parcels (Norway, ...) but it may be growing in future.</p> <p>Norway has some 2,5D parcels used as a way to represent 3D parcels.</p>	<p>TWG CP has required geometry as GM_Surface with only linear interpolation.</p> <p>TWG CP has restricted cadastral parcels as 2D (or 2,5D) parcels:</p> <ul style="list-style-type: none"> - the INSPIRE directive defines parcels as "areas" - no current environmental use case requiring them. <p>INSPIRE model extensible by LADM.</p>	<p>Countries with circular arcs will have to convert them into lines.</p> <p>3D parcels may be useful now for non-environmental use cases or in future for environmental use cases.</p>
<p>(E) spatial and temporal aspects (Topology)</p>	<p>Users generally require topologically correct cadastral data (i.e. without topological gaps and overlaps).</p>	<p>Some countries still have topological gaps and overlaps (e.g. when assembling parcels from 2 cadastral sheets).</p>	<p>TWG CP has included an optional attribute Topology (TP_Face or TP_Edge) for MS providing both cadastral parcels and cadastral boundaries.</p> <p>More over, TWG CP has required data providers to report on topological consistency (topological gaps and overlaps) and has recommended: "no topological gaps and overlaps".</p>	<p>In some countries, topological gaps and overlaps between cadastral parcels will remain in INSPIRE.</p>

<p>(E) Spatial and temporal aspects (Coverages)</p>	<p>Use of raster data is generally considered as a “minimum solution”, e.g. because only raster data is available or because the application is only for viewing.</p> <p>Use of raster data is generally considered as not practical (big data volume, not possible to change symbology, bad results when zooming, bad quality when printing, not possible to make requests or modifications / simulations)</p>	<p>Most countries have cadastral parcels as vector data.</p> <p>Some countries have raster data on part of their territory but have vectorisation projects which will be achieved before 2016 (Croatia, Czech Republic, Poland).</p> <p>Some countries have raster data on part of their territory but have vectorisation projects whose date of achievement is unknown (Bulgaria, France, Slovakia).</p>	<p>At the beginning, TWG CP envisaged 2 possible options for cadastral parcels: raster and vector.</p> <p>Taking into account that: -the Commission considers vectorisation as new data capture (so no feasibility issue) -only few countries will/may still have only raster cadastral data on part of their territory in 2016 TWG CP has decided to keep only the vector option.</p>	<p>Even after 2016, some parts of Europe will/might not be covered by cadastral parcels because only raster data will be available.</p> <p>These parts should be limited to a small number of countries.</p>
<p>(E) Spatial and temporal aspects (Temporal profile)</p>	<p>Some use cases require historic cadastral data.</p> <p>Temporal information at spatial object level required by many use cases but it is not very clear which dates are most relevant.</p>	<p>Historic data not available in all MS.</p> <p>WG-CPI considered date of last update as the most relevant temporal information.</p>	<p>TWG CP has given priority to harmonisation of temporal information between TWG and has adopted the stereotype provided by GCM.</p>	<p>Temporal attributes not available in each MS.</p> <p>More detailed information about history/traceability of parcels to be found in national cadastral registers.</p>
<p>(F) Multi-lingual text and cultural adaptability (content)</p>	<p>In multi-lingual countries, some use cases require all languages spoken in the country, including regional ones.</p>	<p>As cadastral data include very few geographical names, these names are generally available only in one language.</p>	<p>Name (for cadastral index set) will be multi-lingual (reference to GN).</p> <p>Level name (for cadastral index sets) is required both in national language(s) and in English to be understandable both by national users and by cross-border or pan-European ones.</p>	

<p>(G) Coordinate referencing and units model</p>	<p>Currently, users work with national CRS.</p> <p>Users need to measure distances and surfaces, so they require working with projections offering few linear alteration.</p> <p>The INSPIRE context requires harmonised CRS.</p>	<p>Currently, cadastral data mainly available in national CRS.</p> <p>But many MS have already prepared accurate coordinate transformations between national CRS and ETRS89.</p>	<p>TWG CP has required official CRS defined by TWG RS.</p> <p>Moreover, TWG CP has recommended MS to define relevant projection (or set of projection) to work with cadastral parcels.</p>	<p>Adoption of ETRS89 (or ITRS) may degrade the accuracy of cadastral data (see component (O)).</p>
<p>(H) Object referencing model</p>	<p>Users widely use cadastral parcels to reference (in a wide meaning) other data or administrative dossiers.</p> <p>They generally do it using the parcel identifier and/or the address. Some also use the coordinates of centroid point.</p>	<p>Parcel identifier available in all European countries (except may be Iceland).</p>	<p>TWG CP has included in its application schema for cadastral parcels both an external identifier and a thematic one.</p> <p>TWG CP has not included as semantic attributes the coordinates of this reference point, coordinates may be derived from geometry by users.</p>	<p>TWG CP has identified the following risk: if cadastral parcels are used as reference data (in the GCM meaning) for other themes, it may lead to inconsistencies due to different update cycles.</p>
<p>(I) Data transformation / guidelines</p>	<p>The INSPIRE context requires harmonised specifications.</p>	<p>Cadastral data is subject to lots of national specificities.</p> <p>Some specificities are due to national regulations and it won't be possible to have them changed.</p>	<p>TWG CP has tried to propose a UML schema enabling each country (from TWG CP current knowledge) to match its existing cadastral data to common INSPIRE schema.</p> <p>Moreover, in data capture comment, TWG CP has given some examples about possible matching rules.</p>	<p>Information lacking about at least half MS.</p> <p>Probably, some unknown national specificities and difficulties to match with INSPIRE specifications.</p>

<p>(J) Portrayal</p>	<p>Main current use of cadastral parcels:</p> <ul style="list-style-type: none"> - as background data with a discrete style (grey or black) - with orthophoto as background or on a coloured screen with a brighter style. <p>The INSPIRE context requires a harmonised default style for view services.</p>	<p>Generally, the full identifier is not displayed but only its last part (e.g. parcel number)</p> <p>No detailed information about style. It seems that many countries use to represent cadastral parcels in black but some others use red or other colours.</p>	<p>TWG CP has decided:</p> <ul style="list-style-type: none"> - to add in the application schema the attribute label for cadastral parcels and cadastral index sets - to define 2 default styles, one with the label being carried by mandatory attribute Geometry (surface), the other with the label carried by optional attribute reference point. <p>Moreover, TWG CP has recommended (without defining them) other styles (with background, if historic data)</p>	<p>Simple style not yet tested.</p> <p>May probably be improved after testing phase.</p>
<p>(K) Identifier Management</p>	<p>Users need thematic identifier to make links with rights, owners and other information related to cadastral parcels.</p> <p>They also need a unique identifier to use cadastral parcels as reference data.</p> <p>INSPIRE Directive requires unique external identifier; characteristics defined in the GCM.</p>	<p>Most MS have only thematic identifier for cadastral parcels.</p>	<p>TWG CP has included in its application schema 2 identifiers with 2 different roles:</p> <ul style="list-style-type: none"> -INSPIRE Id: identifying the cadastral parcel (be unique) - national cadastral reference: making link with rights and owners in national cadastral registers. 	<p>As most countries may have difficulties to match with the INSPIRE identifier, some examples are given in the data capture component.</p>

(M) Metadata	<p>Main user requirements are about:</p> <ul style="list-style-type: none"> - lineage - quality (see component (O)) - temporal info (see components (E) and (N)) 	<p>In some countries, lineage information is heterogeneous in whole country and is available at cadastral index set level or even at parcel boundary level.</p>	<p>TWG CP has decided:</p> <ul style="list-style-type: none"> - not to include an attribute about lineage at spatial object level (because of multi-lingual issues and because information not really interesting) - ask MS to report in detail about characteristics of their initial cadastral data (e.g. about cadastral gaps or overlaps). 	
(N) Maintenance	<p>Users generally want to work with the most updated available cadastral data. However, actuality less than one year is considered enough for most use cases.</p>	<p>Update frequency varies according to countries, from daily update to yearly updates or less. Generally, there is some delay between the change in cadastral register and the update of cadastral map.</p>	<p>TWG CP has required MS to report about the update frequency of their cadastral data and has recommended an update frequency better than one year.</p>	<p>Even with yearly updates, there may be data with an actuality worse than one year.</p>

<p>(O) Data quality</p>	<p>Main user requirements are about:</p> <ul style="list-style-type: none"> - positional accuracy (1m more frequently quoted) - semantic accuracy (for national cadastral reference) - topological consistency (see component (E)) - completeness 	<p>MS may have information about absolute accuracy:</p> <ul style="list-style-type: none"> - at data set level - at cadastral index set level - at cadastral parcel level - at parcel boundary level - not at all. <p>Moreover, many MS have attribute original map scale available at cadastral index set level. This attribute may give an idea about relative accuracy.</p> <p>Generally, no issue neither about completeness nor about semantic accuracy.</p>	<p>TWG CP requires MS to report positional accuracy:</p> <ul style="list-style-type: none"> - at data set level - or at cadastral index set level - or at cadastral parcel level - or at parcel boundary level <p>TWG CP has included the attributes estimated accuracy (for all feature types) and original Map Scale Denominator (for cadastral index set and for cadastral parcels) in order to enable MS to report about this information at the most relevant level for them.</p> <p>TWG CP has recommended 1 m in urban areas and 2,5 m in rural area (based on Agriculture use case) for positional accuracy</p> <p>TWG CP also ask MS to report about completeness (0% omission recommended) and about semantic accuracy (0% non-conformity about national cadastral reference for CP)</p>	<p>Some efforts to be done by MS:</p> <ul style="list-style-type: none"> - for those which do not have any metadata, to produce and supply them - estimated accuracy generally known in national CRS but will have to be provided in ETRS89 (or ITRS)
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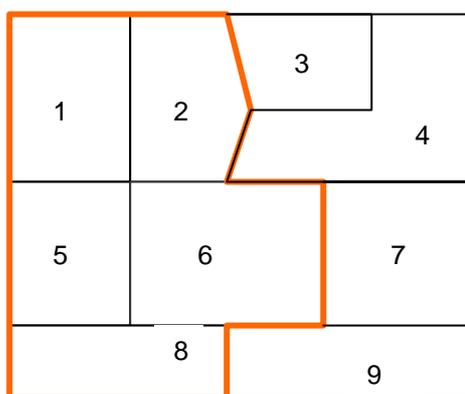
(P) Data transfer	<p>Current use of industry standards (shape, MIF/MID, dxf, dgn) or national standards.</p> <p>Cadastral data already available on-line in some countries.</p> <p>D2.7 requires GML but allows alternative/additional formats, if specific requirements.</p>	<p>Current use of industry standards (shape, MIF/MID, dxf, dgn) or national standards.</p> <p>Cadastral data already available on-line in some countries.</p>	<p>TWG CP has decided to require only GML:</p> <ul style="list-style-type: none"> - review by SDIC/LMO will show if there are issues on this topic - the general guess is that INSPIRE will give great incitation to GIS providers for including GML 	
(Q) Consistency between data (between themes)	<p>Cadastral data often used with administrative units, orthoimage, addresses, roads, buildings,</p> <p>In future, combination with DTM.</p> <p>No clear consistency rule widely required by users.</p>	<p>Few information on this topic.</p>	<p>In the application schema, association between cadastral parcels and administrative units (and between addresses and cadastral parcels from TWG AD).</p> <p>Possible recommendation for annex II and III for data compatible with cadastral parcels (orthophoto, DTM) or for associations (buildings)</p>	
(Q) Consistency between data (across boundaries)	<p>Current use of cadastral data at national level.</p> <p>Only one example quoted of a cross-boundary infrastructure project requiring consistency across boundaries.</p>	<p>Geometric consistency across international boundaries seems difficult to achieve (legal issues).</p> <p>Even, within a country, it does not seem so obvious to have good continuity of cadastral data.</p>	<p>TWG CP just recommends MS to report about edge-matching with neighbour data sets.</p>	
(S) Data capturing	<p>Users generally want all cadastral parcels on the area of interest for their application (e.g. rural for Agriculture, settlements for urban planning)</p>	<p>Due to national regulations, MS do not survey and register same parts of their territory, e.g. generally no cadastral parcels on sea (except Norway) and in some countries, no cadastral parcels on public domain.</p>	<p>TWG CP requires MS to publish for INSPIRE all registered parcels.</p> <p>Moreover, TWG CP requires MS to report about their cadastral gaps.</p>	<p>Cadastral parcels will also miss in countries building their cadastre (e.g. Greece).</p>

(T)Conformance	For input data, users quote sometimes conformance to national specifications and once to ISO standards.	Few information on this topic.	TWG CP has applied the common solution for all TWG: Conformance is required in annex A (abstract test suite)	
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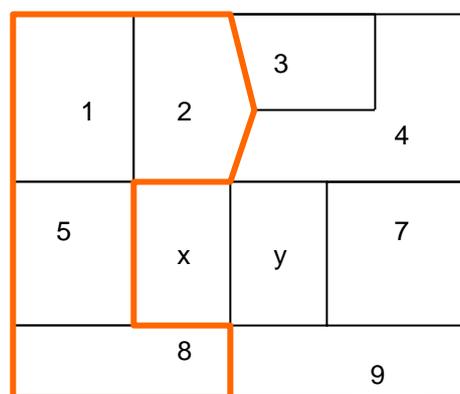
D.4 Possible evolutions

D.4.1 Links with themes in Annex II and III

- Many users work both with cadastral parcels and orthophoto. When cadastral parcels are displayed on an orthophoto background, it is better if the result look consistent. This may be more or less solved by orthophotos of similar resolution and accuracy as cadastral parcels.
- Some users have expressed the requirement (in future) to combine cadastral parcels with 3D data (DTM, buildings).
- other TWG should not recommend to use parcels as reference data (in the Generic Conceptual Model meaning) because it may put strong requirements on temporal aspects for cadastral parcels.



 at date t1
Land use area defined as set of parcels 1, 2, 5, 6, 8



At date t2
Parcel 6 has been split
The user can not completely build Land use area because parcel 6 missing

If a TWG recommends to use cadastral parcels as reference data (in D2.5 meaning), it would oblige to keep in INSPIRE historical data. It would be a big requirement, specially for countries (such as France) which only use dataset versioning, publishing cadastral data at regular dates.

- Many cadastral data sets include information about official land use; this source of existing data may be worth to be investigated by future TWG Land use.
- This Data Product Specification does not include 3D cadastral data (because cadastral parcels are defined as “areas” by the Directive) but some 3D cadastral data are related to building or to utilities network.

Ideally, Data Specification for cadastral parcels should be reviewed and, if required, updated, once data specification for themes in annexes II and III have been developed.

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D.4.2 New standards

The new ISO 19152 standard LADM is currently being developed. This initiative is proposed and lead by FIG (Fédération Internationale des Géomètres) and has support from UN Habitat; it aims at providing a model that can be used as both an exchange data model (between countries) and a data model start for countries which want to (re-)build their land information system.

This new standard deals with land administration in general and includes cadastral parcels. Its scope is quite wider than the scope of cadastral parcels in INSPIRE as LADM also includes rights-responsibilities - restrictions, parties, surveying points, documents, etc.

As shown in Annex C, the INSPIRE model is compatible with LADM and might in the future be extended by the supplementary feature types as included in LADM.

Several European countries are represented in the ISO 19152 Working Group, which ensures that European cadastral systems are taken into account in this standard.

Once adopted, this ISO 19152 standard will provide quite interesting Reference Material if Data Specification for *Cadastral parcels* has to be updated or extended. It may for instance propose harmonisation solutions for rights and owners or for 3D cadastral objects (such as building or network reserves).