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INFORMATION MANAGEMENT



# Core Spatial Data Theme Administrative Units Recommendation for Content

Working Group A - Deliverable of Task 1.b

Version 1.1 - 2022-05-05

## Version History

Version number	Date	Modified by	Comments
1.0	2018.02.01	WG A	Consolidated draft, for review by geographic and statistic community
1.1	2022-05-05	WG A	Comments from geographic and statistic community taken into account  Definitive deliverable

Warning: in the following parts of this document, the paragraphs written in grey e.g. “This document has annexes containing more detailed explanations “ are common to all core spatial data themes; they aim to provide context and objectives of core data. The paragraphs written in black are specific to core spatial data theme Administrative Units.

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## 1 Executive Summary

In September 2015 the countries of the United Nations adopted the 2030 Agenda for Sustainable Development; a set of goals to end poverty, protect the planet, and ensure prosperity for all as part of a new sustainable development agenda. Each goal has specific targets to be achieved over the next 15 years. The 17 Sustainable Development Goals (SDGs) of the 2030 Agenda are supported by 169 targets and 230 indicators.

Geospatial data supports the measuring, achieving and monitoring of many of the goals and targets set by the 2030 Agenda. The 2030 Agenda demands new data acquisition and integration approaches to improve the availability, quality, timeliness and disaggregation of data. Goal 17 explicitly emphasizes the need for developing capacities and partnerships. In this context the success of the 2030 Agenda depends on senior administrators owning and leading the geospatial efforts in their respective countries.

In Europe, building on the INSPIRE Directive redirecting the focus on a cohesive spatial data infrastructure without gaps in content and discrepancies in quality, stakeholders are working on geospatial standardization and increasing richness of data through Core Data Recommendations for Content that correspond to the first phase of WGA work program. Core data is primarily meant for fulfilling the common user requirements related to SDGs in Member States and European institutions.

The theme Administrative Units is widely required by most if not all the SDGs, as it defines the areas of responsibility of governments, at different levels, from national to local. In addition, administrative units are also necessary for many other applications, such as mapping or use as statistical units.

This theme is composed of two sub-themes Land Administrative Units and Maritime Units.

The land administrative units are generally organised in a hierarchical way; they should be provided with key attributes, such as geometry, identifier, name, national code, national order, residence of authority. In addition, it is strongly recommended to manage their temporal attributes. The data should be provided at different levels of detail: large scale, medium scale or small scale.

There are five types of maritime units (internal waters, territorial sea, contiguous zone, exclusive economic zone, continental shelf). These maritime units should be provided with at least a geometry, an identifier and their type.

In both cases, it is advised to get a unique and agreed representation of these administrative or maritime units, in order to ensure correct topology. However, the edge-matching of international boundaries is recognised as being still a challenge, especially for large scale data.

In longer term, the geographic data on Administrative Units might generate more benefits if linked with an information system managing the responsibilities and the responsible parties of each administrative level.

## 2 Foreword

### 2.1 Document purpose and structure

#### 2.1.1 Purpose

This document provides the main characteristics of core data for theme **Administrative Units** with focus on the recommendation for content. This document aims to help decision makers (from governments, data producers, national coordination bodies, etc.) to define their policy regarding the improvement of existing data and production of new geospatial data. It addresses digital data.

This document has Annexes containing more detailed explanations targeting the technical people who will be in charge of implementing or adapting core data recommendations (e.g. for production purpose, as source of other standards, etc.).

#### 2.1.2 Structure

The executive summary synthesizes the main conclusions of the Working Group A (WG A) process and results to develop the recommendation for content. It is meant mainly for high level decision makers.

The foreword reminds the general context of core data, the first step achieved by WG A (i.e. selecting core data themes), and it explains the general principles set by WG A to develop the recommendations for content of core data specifications for all selected themes.

The ‘recommendation for content’ document itself includes four chapters:

- Overview: it provides the general scope of the theme and describes the main use cases addressed;
- Data content: it provides the main characteristics of the recommended content, such as the list of core features and attributes (for vector data), as well as data capture and quality rules;
- Other recommendations: e.g. Coordinate Reference System, Metadata, Delivery;
- Considerations for future: this chapter addresses some key trends or significant user requirements that cannot be considered as core today but that might be considered in future.

The ‘recommendation for content’ document is meant for medium level decision makers. It is written in natural and not too technical language.

The technical explanations included in annexes describe the relationship between the recommendation for content and the corresponding INSPIRE specification, and contain any other appropriate information useful for this theme.

## 2.2 Core data context

### 2.2.1 Rationale for core data

The following background of harmonised pan-European data was identified.<sup>1</sup>

*Authoritative geospatial data are used to support both the implementation of public policies and the development of downstream services. Moreover, geospatial data are required to be homogenous to enable the implementation of public policies in a coherent and coordinated way among countries and at regional or global level. Likewise, significant opportunities exist if services developed by industry can be exploited without requiring country specific adaptation.*

The INSPIRE Directive has set up the legal and technical framework for harmonisation of the existing data related to the themes in annexes I, II and III. INSPIRE specifications provide common data models that ensure a first step towards interoperability, however ensuring homogeneous content is outside their scope, as they contain no indication about levels of detail, very few recommendations about quality, and as most features and attributes are “voidable”, i.e. to be supplied if available or derivable at reasonable cost.

This background led the UN-GGIM: Europe Regional Committee to setup in 2014 the Working Group A on Core Data to deal with core data content and quality, production issues, funding and data availability.

Recommendations for content of core data will complement INSPIRE data specifications by defining the priorities on the core content that is encouraged to be made available in Europe in order to fulfil the main user requirements that are common to many countries, with focus on the SDG related ones.

Core data availability may be ensured either through upgrading of existing data when feasible or through production of new data when necessary.

### 2.2.2 Core data scope

In its first phase, WG A selected core data themes according to the following criteria: core data is the geospatial data that is the most useful, either directly or indirectly, to analyse, to achieve and to monitor the Sustainable Development Goals.

Among the 34 INSPIRE data themes, 14 have been considered as core including theme **Administrative Units**.

More information about the selection process and results may be found in document [‘Core Data Scope - Working Group A - First Deliverable of Task 1.a - Version 1.2’](http://un-ggim-europe.org/content/wg-a-core-data) on <http://un-ggim-europe.org/content/wg-a-core-data>

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<sup>1</sup> Extract from the Report by the Preparatory Committee on the establishment of the UN-GGIM: Europe Regional Committee, European Commission Ref. Ares(2014)1491140 - 09/05/2014.

## 2.3 Document objectives and principles

### 2.3.1 Encouraging content availability

This deliverable provides recommendations for national governments and data producers, aiming to help them to define their priorities for enriching existing data or producing new data. This deliverable is meant mainly for data producers, however it defines the recommended result and target but not the production process.

### 2.3.2 Complementing INSPIRE

Core data specifications are built upon INSPIRE data specifications. On one hand, they often simplify INSPIRE by selecting core feature types and attributes and by restricting or clarifying the scope; On the other hand, they enrich INSPIRE by recommending specific levels of detail, quality rules and sometimes data model extensions. Besides, the INSPIRE common terminology is thoroughly used for naming core features and attributes.

Regarding the levels of detail, the ELF (European Location Framework) project terminology has been used. The ELF levels of detail are the following: Global, Regional, Master level 2, Master level 1, Master level 0. These terms are defined in the glossary.

Regarding delivery, core data may be supplied according to several ways. It is expected that, very often, the core data recommendations will be used to enrich and upgrade existing products. In this case, core data will be available through these improved products. Core data may also be delivered through INSPIRE conditions (specifications and services).

### 2.3.3 Status of core data recommendations

This document contains recommendations that are not legally binding. However, some recommendations are more important than others. This order is indicated as follow:

#### Core Recommendation X

**It is first priority recommendation, considered as both necessary and achievable in principle. Ideally, it should encourage involved stakeholders to launch short-term actions (typically within a couple of years).**

Core recommendations are usually addressing only technical aspects and are meant for the organisations in charge of producing this theme. The set of core recommendations defines the basic expectations on core data.

#### Good Practice X

It is second priority recommendation; if adopted, it will provide significant added value to core data; it indicates a relevant trend to be adopted as much as possible. It encourages involved stakeholders to take these recommendations into account in long term, if not possible in short term.

NOTE: some of these good practices may be quite easy to achieve and are already effective in some countries whereas some others may be more difficult to achieve. This is typically the case when these good practice recommendations involve other stakeholders in addition to the organisations in charge of producing this theme, and when they address not only technical aspects but also legal or organisational ones.



A “core data set” should contain the minimum data defined by the core recommendations (and ideally also by the good practices) of this deliverable but may of course contain more and/or better information.

## 2.4 Abbreviations

AD	Addresses
AU	Administrative Units
CP	Cadastral Parcels
CRS	Coordinate Reference System
EBM	EuroBoundaryMap
ELF	European Location Framework
IHO	International Hydrographic Organisation
LAU	Local Administrative Units
NUTS	Nomenclature of Territorial Units for Statistics
SDG	Sustainable Development Goal
SU	Statistical Units
UN-GGIM	United Nations initiative on Global Geospatial Information Management
WG A	(UN-GGIM: Europe) Working Group on Core data

## 2.5 Glossary

### 2.5.1 Levels of detail

Global	Level of detail defined by ELF: data to be used generally at scales between 1: 500 000 and 1: 1 000 000, i.e. mainly at international level
Regional	Level of detail defined by ELF: data to be used generally at scales between 1: 100 000 and 1: 500 000; data mainly for national or regional (European or cross-border) actions.
Master level 2	Level of detail defined by ELF: data to be used generally at scales between 1: 25 000 and 1: 100 000; data mainly for regional (sub-national) actions.
Master level 1	Level of detail defined by ELF: data to be used generally at scales between 1: 5 000 and 1: 25 000; data mainly for local level actions.
Master level 0	Level of detail defined by ELF: data to be used generally at scales larger than 1: 5 000; typically, data at cadastral map level, mainly for local level actions.

NOTE: the above definitions are indicative; in practice, detailed data (Master levels) may also be required also by national, European or international users.



## 2.6 Reference documents

INSPIRE Data Specification on Administrative Units– Technical Guidelines 3.1:

<http://inspire.ec.europa.eu/id/document/tg/AU>

ELF Data Specification (chapter 5.3.4):

[http://elfproject.eu/sites/default/files/ELF\\_DataSpecification\\_v0.12\\_20160328.pdf](http://elfproject.eu/sites/default/files/ELF_DataSpecification_v0.12_20160328.pdf)

Core spatial data theme ‘Geographical Names’ – Recommendation for content – Final version 1.1

[https://un-ggim-europe.org/wp-content/uploads/2018/11/UN-GGIM-](https://un-ggim-europe.org/wp-content/uploads/2018/11/UN-GGIM-Europe_WGA_Recommandation_Content-GN-v1.1.pdf)

[Europe\\_WGA\\_Recommandation\\_Content-GN-v1.1.pdf](https://un-ggim-europe.org/wp-content/uploads/2018/11/UN-GGIM-Europe_WGA_Recommandation_Content-GN-v1.1.pdf) (document to be uploaded)

### 3 Overview

#### 3.1 General scope

Definition: Units of administration, dividing areas where Member States have and/or exercise jurisdictional rights, for local, regional and national governance, separated by administrative boundaries [INSPIRE Directive 2007/2/EC, Annex I].

The scope is the same as the one of the INSPIRE theme Administrative Units. It includes both the sub-themes Administrative Units and Maritime Units.

NOTE: To avoid confusion between the theme “Administrative Units” and the sub-theme “Administrative Units”, in the following parts of this document, the sub-theme will be renamed “Land Administrative Units”.

More detailed comparison with INSPIRE is available in the annex A.

#### 3.2 Use cases

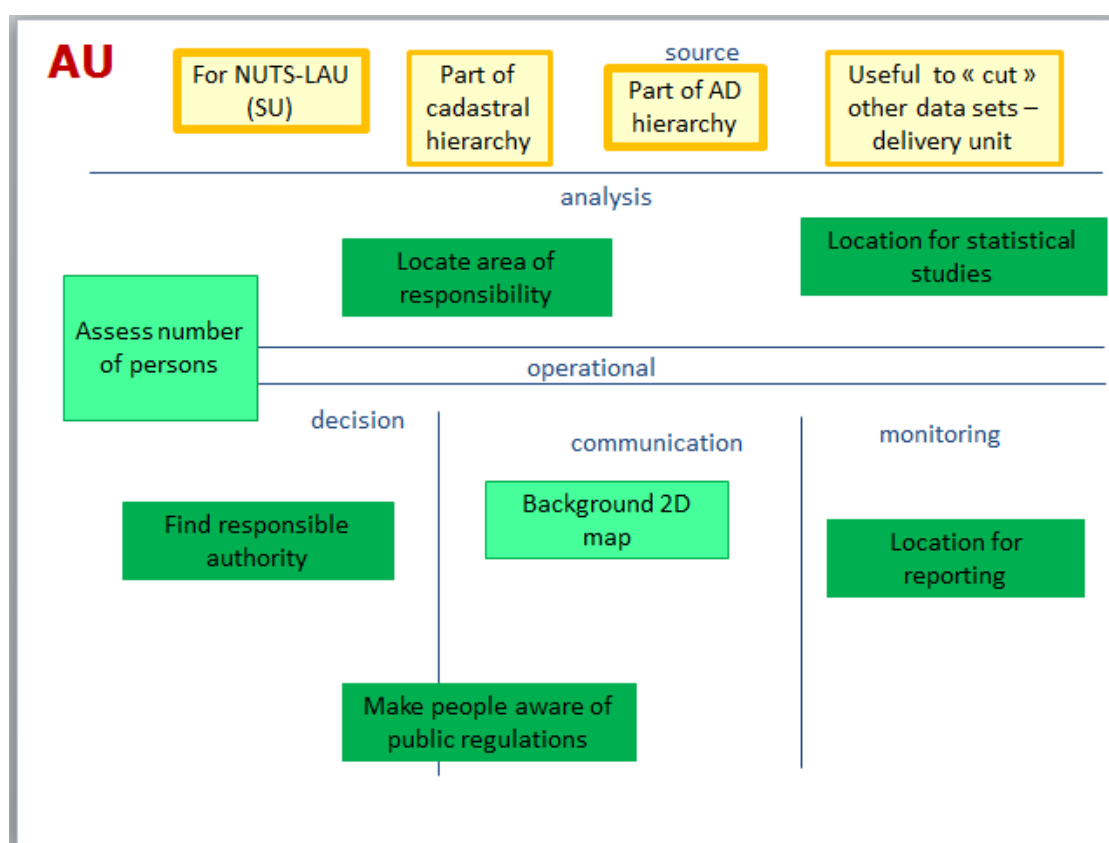


Figure 1: map of use cases for sub-theme Land Administrative Units

Sub-theme ‘Land Administrative Units’ has three main roles:

It represents the territory of responsibility of a competent authority. Administrative units determine unambiguously the responsibilities and competences of the various authoritative entities in relation to any area of a Member State. In the analysis phase, any government has to know the geographic

extend for its expected actions. In the operational phase, it may be necessary to find the responsible authority to manage a located event. For instance, in case of disasters administrative units help to identify the affected areas and thereby to trigger rescue and support measures by the responsible / competent authorities and services. Furthermore they enable selective warnings and information of the affected residents. The key tools of local governments to mitigate risks, to address pollution issues, to ensure energy or water supply and to provide efficient waste management, include land use planning and other regulations (e.g. restrictions of private car traffic and/or industrial emissions): in both cases, it is necessary to know the territory where these regulations have to be designed and where they have to be applied.

It is part of the basic geographic equipment of a country. Administrative units are widely used in the management of geographic information, for instance to “cut” other data sets as delivery units are often based on the country administrative division or as search criteria in gazetteer services, GeoPortals, GeoCatalogues etc. At national level, municipalities are generally used to build the cadastral system and administrative unit names are also basis for the address system. In addition, administrative units are widely used as background data, either in classical topographic maps or to display regulated areas. Typically, administrative units are needed for the area based documentation and visualisation of many different issues and circumstances in order to support political decision-making, like for instance welfare and education, land use, housing, traffic, public money allocation and subsidiaries.

Administrative units are often used as statistical units and therefore enable the combination of geographic information with all kinds of statistical data (population distribution, socio-economic data, health statistics ...). Consequently, administrative units are widely used in the analysis and in the reporting phases: in combination with statistical data they strongly support the monitoring and reporting of the SDG’s indicators. They are of course widely used to display these various indicators and may even be necessary in their computation (e.g. Number and size of Administrative Units with established sanitation and water management - SDG indicator 6.b.1).

The sub theme ‘Maritime Units’ defines the various areas of a Member State sea territory with their associated set of rights (navigation, fishing, exploitation of resources, security ...). The rules of delimitation and the associated rights to each kind of maritime areas are defined in the UNCLOS international law [United Nations Convention on the Law of the Sea].

Maritime Units are key data to ensure well-established and peaceful relations between countries. Careful delimitation of maritime units is also necessary step for establishment of a marine cadastre that might boost the blue economy and contribute to sustainable development of sea.

## 4 Data content

### 4.1 Features types and attributes

#### 4.1.1 Land Administrative Units

##### **Core Recommendation 1**

**Core data should include feature type AdministrativeUnit with following attributes:**

- **geometry (as surface or multi-surface)**
- **unique and persistent identifier**
- **national code**
- **national level and national level name**
- **geographical name(s) with the name itself, i.e. its spelling and with information on its language, status and (if relevant) source.**
- **residence of authority**
- **temporal attributes (in the real world)**

NOTE 1: All these attributes (except temporal attributes in the real world) are defined in the INSPIRE data specifications on themes Administrative Units and GeographicalNames. For more details, see annex A.

NOTE 2: Administrative units are generally organised according to a hierarchical order, generally from country to municipality. This hierarchical order is documented by the attributes 'national level' and 'national level name'.

NOTE 3: The attributes describing the name (language, status, source) should help users to decide on which name(s) are the most relevant to be displayed on a map. The information about "source" is relevant if some sources are considered as more reliable than others. More information is available in the document "Core Spatial data theme Geographical Names –Recommendations for content".

NOTE 4: Temporal attributes in the real world correspond to the validity period of the administrative unit, according to regulations. Administrative Units are often used to display the temporal series of statistics; this is why it is key importance to track real world temporal changes across time.

### 4.1.2 Maritime Units

#### Core Recommendation 2

Core data should include feature types **MaritimeUnit** with the following attributes:

- geometry (as surface or multi-surface)
- unique and persistent identifier
- type
- name (if any)

In addition, it should include the **Baseline** defined by an identifier and by the list of its **Base Map Segments** with their geometry and type.

NOTE 1: For **MaritimeUnit**, the 'type' includes the following values: internal waters, territorial sea, contiguous zone, exclusive economic zone, continental shelf. For the **Base Map Segments**, the type includes the following values: normal, straight, archipelagic. Definitions are provided in the INSPIRE data specifications on Administrative Units.

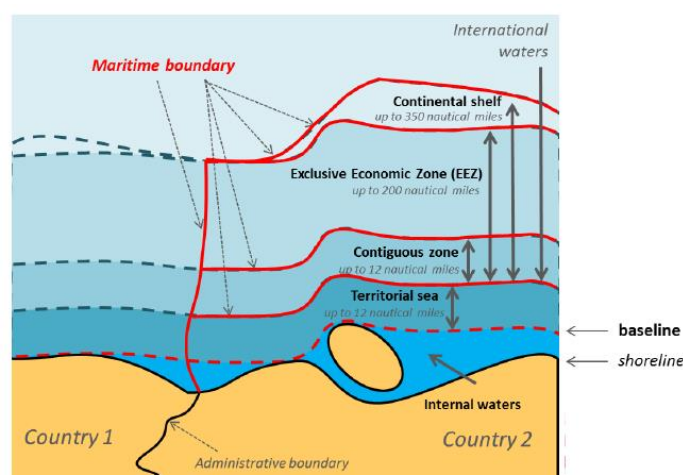


Figure 2: The different types of Maritime Units

NOTE 2: The above figure is just an illustration (from INSPIRE). Rules for delimitation are provided by the UNCLOS convention stating that Exclusive Economic Zone and Continental Shelf are measured from the Baseline (and not from the outer limit of territorial sea).

### 4.1.3 Temporal aspects

#### Core Recommendation 3

Current, valid features are considered as core data.

NOTE 1: In other words, efforts to capture features of the past (historical administrative units) are not considered as a priority. However, core data being minimum data, a data producer may of course also capture features of the past, documenting them with the temporal attributes, recommended in this deliverable.

However, once features have been captured, it is recommended to keep them in the data base, even after their end in the real world.

#### 4.1.3.1 *Temporal attributes in the database*

##### Good Practice 1

It is recommended to manage the history of features, using the mechanism provided by the INSPIRE data specifications: versioning and life-cycle attributes.

NOTE 1: The versioning and life-cycle attributes enable change-only updates; they also enable to retrieve the status of geographic Administrative Units data, at any time of the past (since the adoption of these mechanisms).

NOTE 2: The above Core recommendation and Good practice may look contradictory but in fact they are not. Let us imagine a data producer deciding to implement the core recommendations and good practices of this deliverable from 2020:

- In a first step, according to the above Core recommendation, first priority is to capture the features that are valid (in 2020), as they are both the most useful and the easiest to be captured. For instance, capturing features from the past would require significant efforts for limited benefits.
- In a second step, for instance in 2025, a given entity disappears in the real-world; the related feature – already captured in 2020 – should be kept in the database as “deprecated”, which is documented by the life-cycle attributes of INSPIRE. This may be done quite easily just through proper database management.

#### 4.1.3.2 *Temporal attributes in the real world*

For Land Administrative Units, temporal attributes in the real world are included in core content. However, it should be recognised that it may occur it is not feasible to capture the attributes validFrom and validTo (if any) on all administrative units; typically, this would require, for each administrative unit, to search in old archives (that may have been destroyed or lost) the legal text creating this given administrative unit.

A step-wise approach should be adopted to deal with this issue:

- In a first phase, for the new land administrative units, it is recommended to set up a procedure to capture the real world validity dates.
- In a second phase, if considered as feasible, some efforts may be launched to retrieve the validity dates of the administrative units recently created (e.g. during the last 20 years).
- Last challenge would be to capture validity dates of the administrative units created a long time ago.

##### Good Practice 2

For the new land administrative units, it is recommended to set up a procedure to capture the real world validity dates.

#### 4.1.4 Boundaries status

Administrative units are representing the competence territory of a given government; as a consequence, neighbour governments may have a different view and so, a different data representation, on the administrative boundary delimiting their respective territories. However, different data representations on administrative units (of same level) may entail gaps and overlaps, what is not user-friendly and what is causing some legal uncertainty.

Ideally, there should be neither gaps nor overlaps between the land administrative units of same national level or between maritime units. In INSPIRE terminology, the respective boundaries should be “**technically agreed**” or “**edge-matched**”, i.e. for a given level of detail, there should be a common, single **representation** in GIS of the administrative boundaries provided by data producer(s) – the boundaries of neighbouring administrative units have the same set of coordinates.

In addition, still ideally, the administrative or maritime boundaries should also have legal value. In INSPIRE terminology, the respective boundaries should be “**(legally) agreed**”, i.e. for a given level of detail, there should be a common **definition** of the administrative boundaries by the neighbour competent authorities, e.g. neighbour Member States – the edge-matched boundary has been agreed between neighbouring administrative units and is stable now.

This deliverable recommends in a following paragraph to have both technically (edge-matched) and legally agreed boundaries. However, it should be recognised that in practice, the current situation is heterogeneous according to Member States and to levels of detail. Typically, it may take a long time to get legally agreed international boundaries, in whole Europe.

##### Good Practice 3

It is recommended to provide additional feature types Administrative Boundary and Maritime Boundary in order to document the technical and the legal status of the boundary.

NOTE 1: The relevant attributes of Administrative Boundary are described more in details in annex A.

NOTE 2: This good practice (documenting status at feature level) is especially relevant in case of heterogeneous data. If the boundaries are of same status on whole territory, the information may be provided at dataset level, in metadata.

#### 4.1.5 Maritime Units and Standard S121

The IHO (International Hydrographic Organisation) is preparing a new standard S121 about Maritime Units. This new standard includes a more detailed description of the sub-theme Maritime Units. For instance, it includes the points used to define the boundary and it makes distinction between boundary (line between neighbour countries) and limit (line between different types of Maritime Units).

##### Good Practice 4

Once standard S121 adopted, it is recommended to provide the additional geographic feature types and attributes listed in this standard.



## 4.2 Levels of detail

### 4.2.1 Land Administrative Units

Land Administrative Units should be provided at various scales, in order to enable an easy use by all levels of governments, from local to global.

#### **Core Recommendation 4**

**Core data on Land Administrative Units should be captured at large scale (master level 0 or 1). Other levels of detail (at least Regional and Global) should be derived from the large scale core data.**

NOTE 1: Large scale data on Land administrative Units is considered as Master 1 data because it is used in practice at this level of detail. However, it is often captured from cadastral (Master level 0) and/or from topographical (master level 0) background data.

NOTE 2: The derivation process consists mainly in the generalisation of the geometry. The generalisation process should respect the topological and hierarchical relations between administrative units and ideally with other themes.

NOTE 3: In addition to the generalisation process, it is advised to agree on a common representation of international boundaries at medium and small scales (see core recommendation 7). It is recognised that getting technically agreed, i.e. edge-matched, international boundaries is more easily achievable at Regional and Global levels than at large scale levels.

### 4.2.2 Maritime Units

Common current practice is to deliver only one set of Maritime Units data that may be used for various levels of detail. In practice, the units and boundaries close to the coastline are captured and may be used as large scale data (Master level 1) whereas the other boundaries require less accuracy and are relevant for use at Regional or Global levels.

NOTE: However, there are some user requirements for generalised representations of the coastline and baseline . These requirements should be considered by the marine community.

## 4.3 Geographical extent

The general rule is that sub-theme Land Administrative Units covers the land part of a country (including inland waters) and that the sub-theme Maritime Units covers the sea part of a country.

In most countries, the land administrative units stop at the coastline. However, in other countries, these land administrative units may include coastal areas. As the main use case of administrative units data is to display the territory of a competent authority, the geometry of the administrative units should be provided according to its definition in the national regulation (e.g. with coastal areas in some countries).

#### **Core Recommendation 5**

**Regarding Administrative Units overlapping or not with sea, administrative unit data should reflect the national administrative reality.**



Figure 3: land administrative units stopping or not at coastline, according to countries

NOTE 1: It should be recognised that the expression “Land Administrative Units” is used in this deliverable though some sea part might be included in the land units. This choice has been done to keep a simple terminology, providing the general case but not taking into account a few exceptions.

However, for the other use cases of administrative units, such as mapping or use as statistical units, users generally prefer to display only the land part of administrative units. This may be done by subdividing the administrative units into administrative unit areas, respectively for their sea and land parts, as done by the EBM product or in the ELF application schema for theme Administrative units.

#### Good Practice 5

For countries where (land) administrative units include some coastal areas, it is recommended to provide additional feature type administrative unit area, in order to make distinction between land and sea.

NOTE: For more details, see Annex A (figure 8).

## 4.4 Data capture

### 4.4.1 Land Administrative Units

#### Good Practice 6

Great care has to be taken to ensure that geographic data reflects the relative position of Cadastral Parcels and Administrative Units in the real world.

NOTE 1: All relevant administrative and data capture processes must ensure that there is unambiguity between Cadastral Parcels and Administrative Units. Typically, in most (if not all) countries, a Cadastral Parcel should not overlap with two or more Administrative Units of same national level.

#### Good Practice 7

Great care has to be taken to ensure that geographic data reflects the relative position of topographic data (such as roads, rivers, buildings) and Administrative Units in the real world.

### 4.4.2 Maritime Units

#### Good Practice 8

Great care has to be taken to determine the Baseline and its geographic representation.

NOTE 1: More detailed guidelines may be provided by the future S121 standard. It is advised to follow them, once the standard has been adopted.

## 4.5 Quality

### 4.5.1 Completeness

#### **Core Recommendation 6**

**100 % completeness should be ensured both for land administrative units and for maritime units.**

#### **Core Recommendation 7**

**All official names of land administrative units should be captured and provided.**

NOTE 1: As much as possible, official names of land administrative units (at least for countries) should come from international standards. A potential source is the Terminology Bulletin Country Names and the Country and Region Codes for Statistical Use maintained by the United Nations Statistics Divisions.

NOTE 2: More generally, capture of administrative units names should be done, following the quality recommendations of “Core spatial data theme ,Geographical Names’ – Recommendation for content – Final version 1.1”

### 4.5.2 Topologic consistency

#### **Core Recommendation 8**

**For Regional and Global data, there should a seamless European data set of land administrative units, with technically agreed (edge-matched) administrative boundaries (except on areas under political dispute).**

NOTE 1: This core recommendation has already been (more or less achieved) through the pan-European products of EuroGeographics, mainly EBM. The efforts to maintain such products should be continued in future.

NOTE 2: This core recommendation encourages the availability of a pan-European data set, without gaps and overlaps; this data quality is necessary for mapping or statistical applications.

#### **Core Recommendation 9**

**For large scale data (Master level1), there should be, in each Member State, a national data set of land administrative units, with technically agreed (edge-matched) internal administrative boundaries.**

NOTE 1: The case of international boundaries is not included in this core recommendation because it is recognised that it may take time to be achieved in whole Europe.

Significant progress to get technically (edge-matched) and legally agreed international boundaries international boundaries at large scale has been accomplished due to the efforts of the SBE (State Boundaries of Europe) project and then of the SBE KEN (Knowledge Exchange Network); however, there are still international boundaries not yet legally agreed.

In addition, the large scale geographic representation of the international boundary is often considered as the boundary definition and so Member States prefer to get first legal agreement before publishing a common GIS representation, i.e. before publishing technically agreed (edge-matched) boundaries. And in practice, the legal agreements require lots of negotiations and so lots of time!

#### Good Practice 9

There should be cooperation between neighbour countries in order to legally agree on common international boundaries, both for maritime boundaries and administrative boundaries.

NOTE 1: Legally agreed boundaries are necessary to avoid uncertainties about the link between territories (administrative units) and responsible authorities.

### 4.5.3 Geometric accuracy

Administrative boundaries are artificial lines, generally defined in legal texts. The geometry of administrative units should be conformant with these legal texts. What matters more than geometric accuracy is the fact to have, for a given level of detail, a single data set, agreed by all and used as reference data.

#### Good Practice 10

It is recommended to have reference data on maritime and land administrative units, agreed and used by all stakeholders.

The accuracy should be adapted to the level of detail. For land administrative boundaries, the accuracy should be around a few meters for Master level 1, around 50 m for Regional level and around 250 m for Global level. These figures are just indicative and may be adapted to the type of landscape.

#### Good Practice 11

Data on land administrative units should be consistent with data on cadastral parcels and with data on topographic features (e.g. roads, rivers).

NOTE: In other words, the data should respect the relative positions of administrative units and of cadastral parcels or topographic features in real world. For instance, administrative boundaries are generally not supposed to cross parcels. There should also be geometry sharing of the centreline of a road link and of an administrative boundary, if in real world, the administrative boundary is defined by reference to the road.

### 4.5.4 Update frequency

#### Core Recommendation 10

**There should be temporal consistency between the administrative or maritime unit in the spatial data set and the administrative or maritime unit in the national or international regulations.**

NOTE 1: This recommendation aims to encourage continuous update of the geographic administrative data. For land administrative units, this recommendation applies only for data at Master level 1. A delay of a few days may be acceptable.

NOTE 2: However, some users, mainly for statistic applications, would prefer to get land administrative data, with a reference date (e.g. each first January or each 31 December of each year) in order to ensure reliable link with statistic data.

#### Good Practice 12

Data providers should provide both large scale land administrative data at regular reference dates (considered as convenient by the statistical community) and in its most updated version.

NOTE 2: Regarding Regional and Global levels, a yearly derivation from Master level 1 land administrative data is considered as reasonable.

## 5 Other recommendations

### 5.1 Coordinate Reference System (CRS)

#### 5.1.1 Case of 2D data

#### Good Practice 13

Core data should be stored and managed in a CRS based on datum ETRS89 in areas within its geographical scope, either using geographic or projected coordinates.

NOTE 1: geographical scope of ETRS-89 excludes over-sea territories, such as Canary Islands or French Guyana or Madeira Islands and Azores Islands. In these cases, it is recommended to use a CRS based on ITRS (International Terrestrial Reference System).

NOTE 2: Storing and managing data in CRS based on international datum facilitates the import of measures from modern sensors, ensures that data is managed in a well-maintained geodetic framework and of course, facilitates the export of data into international CRS (e.g. those mandated by INSPIRE).

NOTE 3: If core data at regional and global levels has to be provided as a single data set on an area including over-sea territories, it is recommended to use as CRS geographic coordinates with any realisation of the International Terrestrial Reference System (ITRS), known as International Terrestrial Reference Frame (ITRF). At small or medium scales, all ITRS realisations can be considered as equivalent, as deviations between them are negligible compared to data accuracy.

#### 5.1.2 Case of 2.5D or 3D data

Administrative data is not expected to be supplied as 2.5D data, but just as 2D data.

### 5.2 Metadata

#### Good Practice 14

Core data should be documented by metadata for discovery and evaluation, as stated in the INSPIRE Technical Guidelines for metadata and for interoperability.

NOTE 1: This is an INSPIRE recommendation (only the INSPIRE Implementing Rules are legally binding for the Member States belonging to the European Union, but the Technical Guidelines are considered

necessary to make the European Spatial Data Infrastructure work in practice). For the other countries, this is a way to make their data easily manageable by transnational users.

#### Good Practice 15

The logic and specificities of the national administrative structure should be documented.

NOTE 1: There may be several ways to publish these characteristics. For instance, the recommended information may be integrated in the relevant elements of metadata (such as the abstract); it may also be explained in a national administrative data specification document. Ideally, the documentation should be available both in national language and in English.

NOTE 2: The administrative structure may vary according to countries. Documenting the logic and specificities of national administrative structure is necessary for transnational users and may be also be helpful for national ones.

EXAMPLE 1: In core data and in INSPIRE, there may be up to 6 orders of National Levels, but due to the size of different countries and the administrative organization of each of them, it is needed a clue to know which orders can be equivalent, for instance some countries achieve its lower order in the order 2, while others need the 6 levels.

EXAMPLE 2: In most cases, the land administrative units of same national level should form a partition of land territory. However, there may be exceptions (for instance, only few German “Länder” (AU level 2) are subdivided into “Regierungsbezirke” (AU level 3) – there’s no complete coverage of AU level 3 for Germany).

EXAMPLE 3: Several countries in Europe have overseas territories with different types of legal status. This should be explained; in addition, providing data on these overseas territories may require extension of the proposed common core data model.

### 5.3 Delivery

It is expected that core data will be made available through improved existing products (or new products) or as INSPIRE data, and perhaps as specific core products (delivery issues still have to be investigated by the working group).

#### Good Practice 16

Core data corresponding to INSPIRE theme Administrative Units should be made available according to the INSPIRE Technical Guidelines for interoperability, for metadata and for services.

NOTE 1: This is an INSPIRE recommendation (only the INSPIRE Implementing Rules are legally binding for the Member states belonging to the European Union, but the Technical Guidelines are considered necessary to make the European Spatial Data Infrastructure work in practice). For the other countries, this is a way to make their data easily manageable by transnational users.

NOTE 2: Maritime Administrative Units should also be delivered to UN, according to the UNCLOS conditions.

## 6 Considerations for future

### 6.1 Linked data

In order to maximise the usefulness of core data on Administrative Units, it may be advisable to publish it as linked data. The delivery of administrative units, using the technologies of Linked data, would facilitate re-use of statistical data in general by the community of Web developers and so, the development of applications using statistical units.

However, as this technology is still relatively new, more experience and more feedback on costs and benefits of such practice would be useful to support a potential future recommendation.

### 6.2 Administrative data on administrative units

This deliverable deals only with the geographic part of information on administrative units. However, other information may be of interest for citizens and for e-government applications: knowing who is the competent authority acting on the administrative unit and how to contact it, knowing what are the responsibilities of this authority (for instance, which governmental services it manages), finding easily the regulation text establishing the administrative unit, etc. Setting up such an information system and ensuring its link with the geographic representation of administrative units might also be an objective of Geographic Information Management in future. The ISO 19152 standard “Land Administration Domain Model” may provide the concepts to design this potential future information system. It is already envisaged to use it for the future standard S121 about maritime units to model the set of rights applying to each kind of maritime units.

### 6.3 Geometric consistency

This deliverable recommends land administrative data to be consistent with regulation texts, with cadastral and topographic data and to be legally agreed on international boundaries. However, it should be recognised that these recommendations (even as good practice) are very ambitious and may create conflicts, at least when envisaging short term solutions.

The most efficient way to ensure geometric consistency of administrative data depends of course of the initial situation of each country, for instance if there is one or several data providers or what is the most accurate and reliable data. Research or knowledge exchange activities should be promoted to clarify the possible methodologies and their cost-benefit assessment.

Coordination between data producers of various themes (cadastral, topographic) is also required to ensure cross-theme consistency.

### 6.4 Data from the past

Land administrative units are often used as statistical units. One of the purposes of statistics is to show the trends on a given topic through time. To understand and describe these trends, statisticians use time series, i.e. statistic data related to many years. Of course, this is possible only if the geographic data related to these statistical units are available for the past years.



This may be achieved according two ways. In most favourable case, the data provider has already managed for years the temporal life-cycle attributes in the database and may provide administrative data at a given date of the past. Else, it may require specific and significant efforts to retrieve the administrative data from the past. Several countries have already digitized their old records, both for attributes and for geographical features.

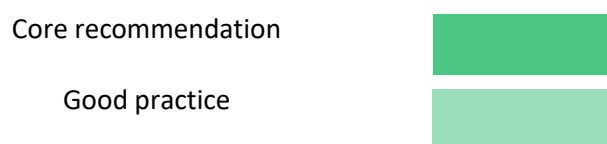
The geographic and the statistic community should cooperate to assess the real requirements of the statistical community (e.g. how far to go in the past?) and to find the most cost-benefit efficient ways to fulfil these requirements. Benchmark with other countries having already achieved historical data digitalisation is also encouraged.

## 7 Annex A: Relationship with INSPIRE

### 7.1 Data model

The UML models provided in this annex are only graphical illustrations of the core recommendations and of the good practices present in this document.

The recommendations for content are represented by highlighted the selected attributes in the following way:



#### 7.1.1 Comparison between Core Data and INSPIRE content

##### 7.1.1.1 Core Recommendation 1

###### Core Recommendation 1

Core data should include feature type **AdministrativeUnit** with following attributes:

- **geometry**
- **unique and persistent identifier**
- **national code**
- **national level and national level name**
- **geographical name(s) with the name itself, i.e. its spelling and with information on its language, status and (if relevant) source.**
- **residence of authority**
- **temporal attributes (in the real world)**

###### Good practice 1

It is recommended to manage the history of features, using the mechanism provided by the INSPIRE data specifications: versioning and life-cycle attributes.

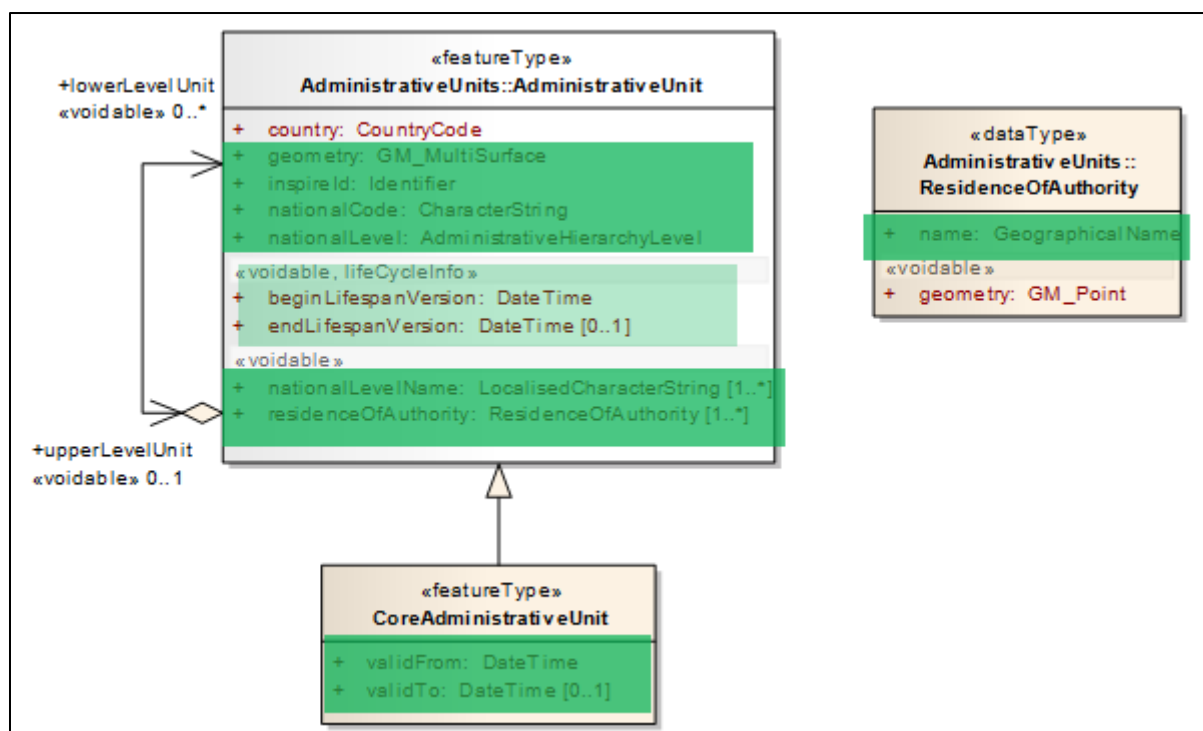


Figure 4: core content from INSPIRE for AdministrativeUnit

The core content is extending the INSPIRE model in order to add the temporal attributes in real world (validFrom and validTo).

The attribute inspire identifier (inspireId) is implementing the unique and persistent identifier of core recommendation 1. It is the identifier of the feature in the database. It has to be different for all levels of detail.

The 'countryCode' that is a mandatory attribute of INSPIRE doesn't need to be managed and stored at feature level and may be provided for INSPIRE in the transformation phase.

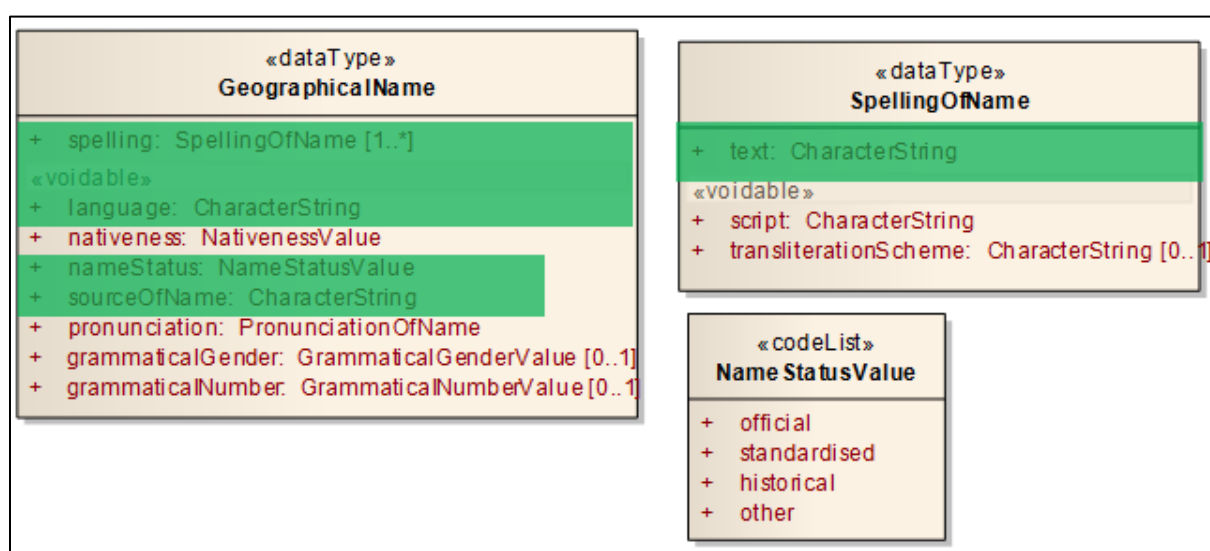


Figure 5: core content from INSPIRE for names of AdministrativeUnit and ResidenceOfAuthority

### 7.1.1.2 Core Recommendation 2

#### Core recommendation 2

Core data should include feature types MaritimeUnit with the following attributes:

- geometry
- unique and persistent identifier
- type
- name (if any)

In addition, it should include the Baseline defined by an identifier and by the list of its Base Map Segments with their geometry and type.

#### Good practice 1

It is recommended to manage the history of features, using the mechanism provided by the INSPIRE data specifications: versioning and life-cycle attributes.

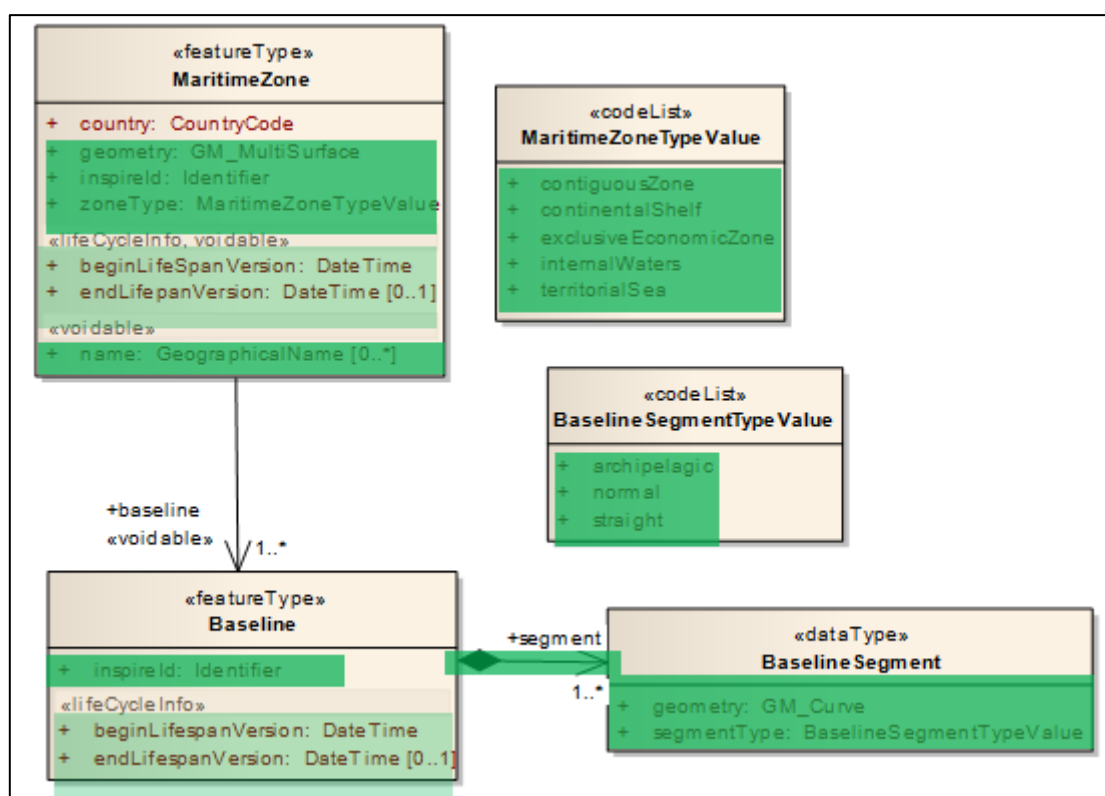


Figure 6: core content from INSPIRE for MaritimeUnit

### 7.1.1.3 Good Practice 1

#### Good Practice 3

It is recommended to provide additional feature types Administrative Boundary and Maritime Boundary in order to document the technical and the legal status of the boundary.

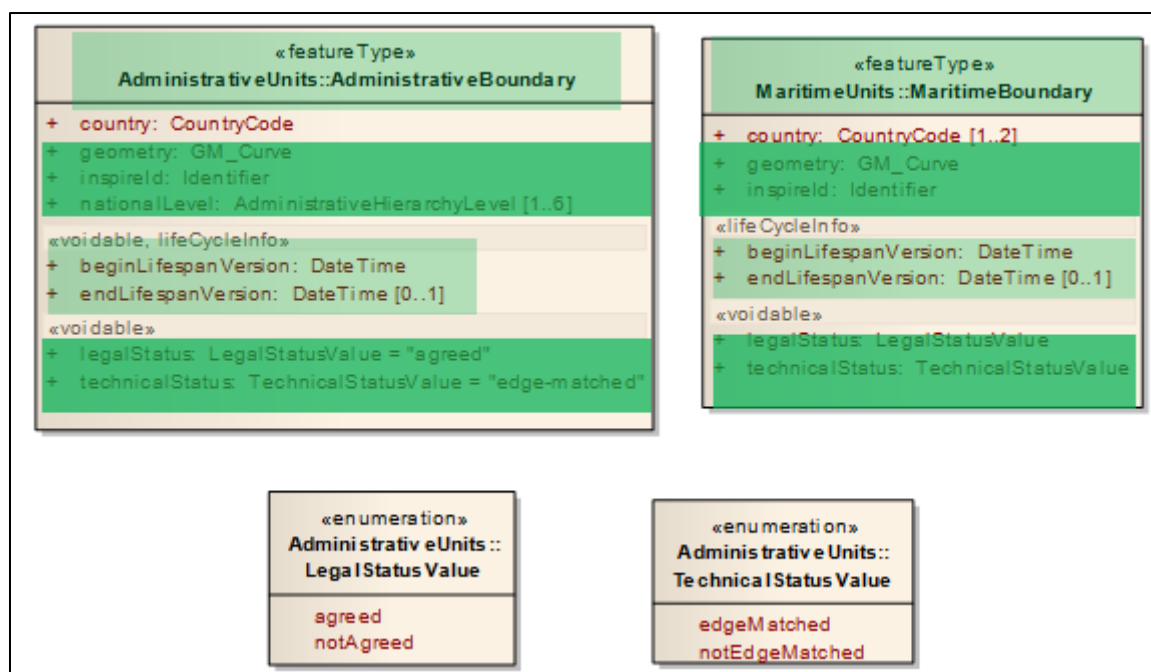


Figure 7: best practice from INSPIRE for AdministrativeBoundary and MaritimeBoundary

These administrative boundaries are provided in order to document their technical and (above all) legal status; however, they should be provided with some other basic attributes, such as geometry and identifier.

#### 7.1.1.4 Good Practice 3

##### Good Practice 5

For countries where (land) administrative units include some coastal areas, it is recommended to provide additional feature type administrative unit area, in order to make distinction between land and sea.

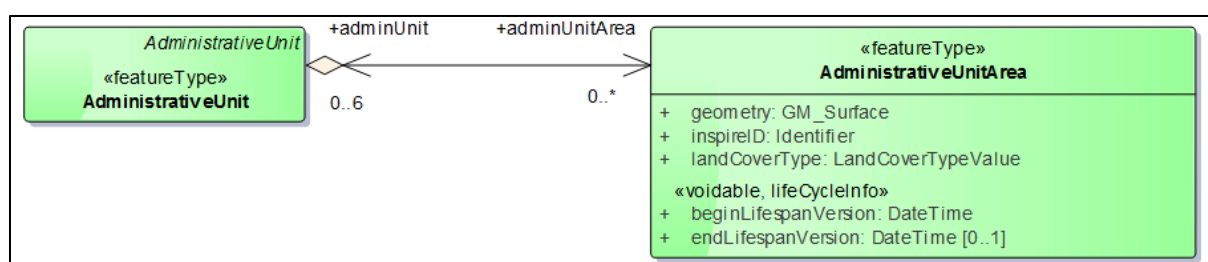


Figure 8: Best practice on administrative unit area.

The feature type AdministrativeUnitArea is in an extension of the INSPIRE application schema AdministrativeUnits. It comes from the ELF project.

In practice, the ELF code list LandCoverTypeValue includes the values 'coastal waters' (for the sea part of administrative areas), 'land area' and 'inland waters'.

## 7.1.2 Alternative implementation data model

### 7.1.2.1 Compact model or not?

The INSPIRE data model has been designed for purpose of data interoperability in Europe; it is a compact model with a single feature type for all land administrative units. However, at least for national use, an alternative data model with a feature type for each national level of administrative units may be considered as more convenient both by data producers and by data users.

Find below an illustration of a potential alternative model for the (theoretical) example of a country having 4 levels of administrative units: country, province, district and municipality.

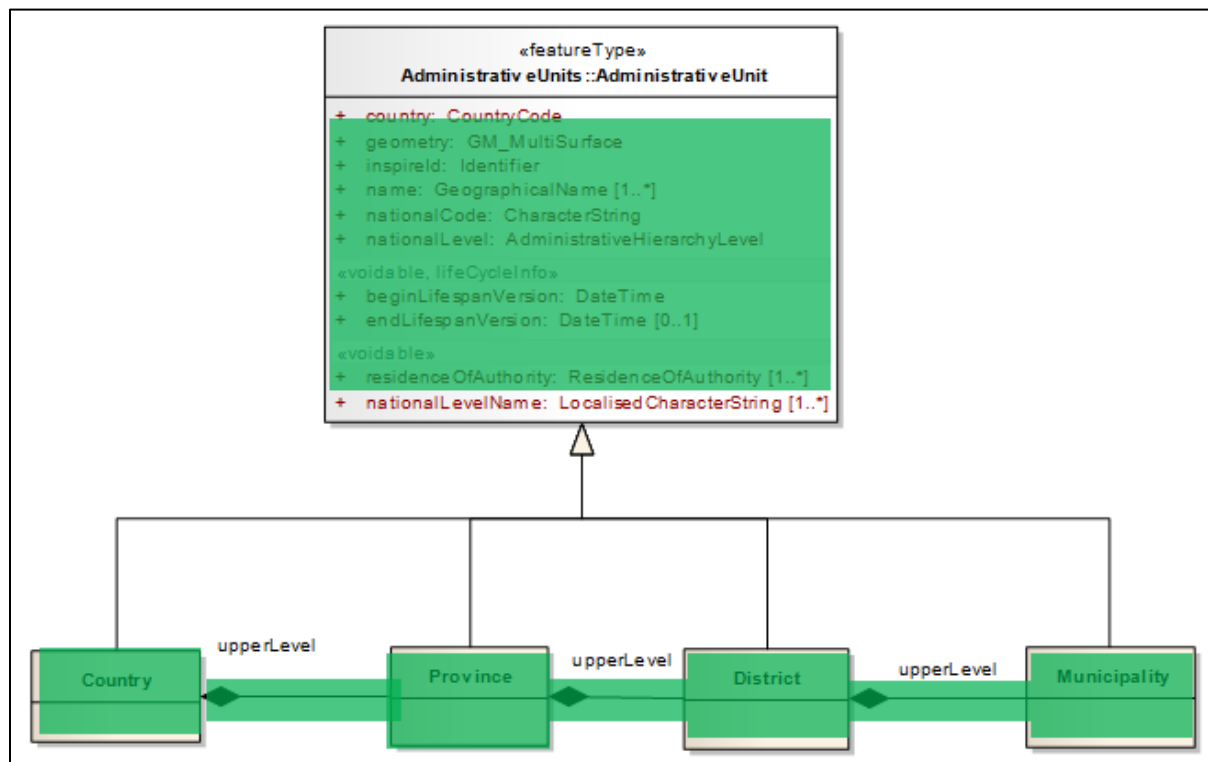


Figure 9: example of alternative model with a feature type for each level of administrative unit

In this alternative model, the nationalLevelName is documented by the name of the child feature types (Country, Province, District, Municipality). This model may also be more explicit about the implementation of the hierarchical relations between administrative units, if the semantic relations are considered as useful.

In a similar way, it is possible to extend the INSPIRE model for feature type AdministrativeBoundary (e.g. by adding children feature types for Country Boundary, for Province Boundary, for District Boundary and Municipality Boundary).

It is also possible to use similar concepts for the Maritime Units and Maritime Boundaries. This is the approach chosen by the future standard S121.

### 7.1.2.2 Residence of Authority

In the INSPIRE data model, the Residence of Authority is considered as an attribute of AdministrativeUnit. This attribute is defined as a data type, including a voidable geometry. In

practice, the Residence of Authority of an Administrative Unit is generally a named place, typically a populated place for Regional and Global levels and a building for Master 1 level.

In order to avoid duplication of data, it may be possible to implement the ResidenceOfAuthority as an association to feature type NamedPlace (in theme GeographicalNames) rather than as a complex attribute (data type).

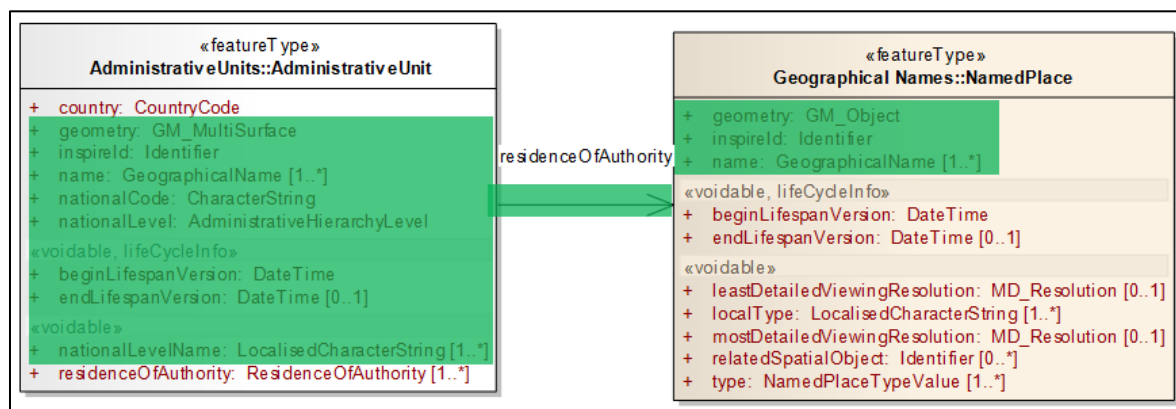


Figure 10: alternative model for ResidenceOfAuthority

## 7.2 Other Topics

### 7.2.1 Levels of detail

INSPIRE data specifications are generally not specifying the expected level(s) of detail. However, in case of land administrative units, there is a quality recommendation about positional accuracy being better than 50 m, i.e. INSPIRE is targeting medium scale data (Regional level or Master level 2).

This deliverable is more ambitious by recommending the provision of land administrative units according to 3 levels of detail: Master level 1, Regional and Global.

### 7.2.2 Quality criteria

Both INSPIRE data specification and this deliverable are recommending topological consistency between administrative units. By the way, the INSPIRE recommendation n° 2 supplies a list of rules to test topologic consistency; these rules might be used also for core data.

This deliverable is more ambitious by recommending other quality criteria, such as completeness or continuous update.



## 8 Annex B: Methodology

Core data specifications have been elaborated based on one hand on user requirements (with focus on the ones related to SDG) and on the other hand on INSPIRE data specifications.

The work has been based mainly on a deep review of the INSPIRE data specifications aiming to raise the open issues to be investigated, such as levels of detail, quality criteria, relation between land and sea.

In addition to the animated discussions conducted within WG A, this deliverable has benefited from the contribution of two other main experiences: the EuroGeographics activities on pan-European products (mainly EBM) and on the ELF project (on theme Administrative Units) and the IHO project of new standard on Maritime Units.