DOCUMENT INFORMATION

Title:	Data product specification document for the zone geographical component
Authors:	Nicola Ferrè, Matteo Mazzucato, Paola Bonato, Paolo Mulatti
Status:	Pending Approval
Description:	This paper describes the data product specification document for the zone geographical component defined according to the WOAH Terrestrial Code Chapter - Zoning and compartmentalisation (WOAH – Terrestrial Animal Health Code, 2023)
Publisher:	Istituto Zooprofilattico Sperimentale delle Venezie
Date:	15/11/2024
Version:	6.0
Language:	English
Relation:	WOAH – Terrestrial Animal Health Code, 2022

Revisions history

Changes to this Product Specification are coordinated by IZSVe

Date	Author	Type
18/05/2022	Matteo Mazzucato	Major changes of data content structure (geographical names, multiple species, and specialized control measures). Version 1.1
23/12/2022	Matteo Mazzucato	Integration of comments derived from the meeting with EpiCentre experts. Version 1.2
25/01/2023	Nicola Ferrè	Integration of comments derived from the meeting with APHIS experts. Version 1.3
28/04/2023	Nicola Ferrè	Integration of comments derived from the meeting with NARO and MAFF experts. Moreover: - Section 2.4.3. Logical consistency – has been added - Paragraph 3.2.4. Zone identifier – has been updated - Chapter 11 – Metadata – has been redefined - Figure 2 – UML diagram – has been updated - Annex A – Zone geospatial data feature catalogue – has been updated - Annex B – Quality measure elements – has been redefined - Annex D – Constraints related to dataset access and use – has been added. Creation of Version 1.4

24/05/2023	Matteo Mazzucato	Major changes of data content structure based on the previous meeting. - Data content and structure – has been updated - Zone geospatial data feature catalogue – has been updated to Version 2.0
31/07/2023	Nicola Ferrè	Content revision and creation of Version 2.1
09/09/2023	Paolo Tizzani	Review and comments at WOAH level
15/09/2023	Nicola Ferrè	Content revision and creation of Version 3.0
29/09/2023	Nicola Ferrè	Data content and structure – has been updated with the "status" and "accuracy" attributes. Creation of Version 4.0
15/04/2024	Nicola Ferrè	Paragraph 3.2.4. Zone identifier, Chapter 8 Data maintenance, Chapter 9 Portrayal, and Chapter 10 Data product delivery – have all been updated. A new annex (Annex E – GeoZone shapefile schema) has been added. Update of code list content Creation of Version 4.1
22/10/2024	Nicola Ferrè	Chapters 2.4.3.2. Spatial relationship and 3.2.6. Temporality representation, and Annex E Use cases after the pilot test results – have all been updated. Creation of Version 5.0
15/11/2024	Federica Sbettega and Sheryl Avery	Proof reading revision and creation of version 0.6
19/11/2024	Eduard Roccatello	Fixed E-R and SQL command error. Revised paragraph 3.2.4. Zone identifier
21/11/2024	Nicola Ferrè	Document prepared for awaiting formal validation by project participants

Data product specification document for zone geographical component
Pending Approval

The purpose of this document is to provide the data product specifications for the geographic component of *zones* defined according to Chapter 4.4 "Zoning and compartmentalisation" of the WOAH Terrestrial Code.

Specifically, this document consists of precise technical requirements that should be fulfilled to represent a *zone* from the geographical point of view. In particular, it includes general information for *zone* characterization as well as information on data content and structure, reference systems, data quality aspects, data capture, maintenance, delivery, and metadata.

The content and structure of this document are consistent with the international standards for data product specifications "ISO 19131:2007/Amd. 1:2011(E) Geographic information – Data product specification".

Table of context

1. Overview

1.1. Title

Data product specification document for the *zone* geographical component.

1.2. Informal description of the data product

According to the WOAH Terrestrial Code – Chapter 4.4 "Zoning and compartmentalisation", a *zone* is *a part of a country defined by the Veterinary Authority, containing an animal population or subpopulation, with a specific animal health status with respect to an infection or infestation for the purposes of international trade or disease prevention or control*[1]. *The extent of a zone and its geographical limits should be established by the Veterinary Authority on the basis of natural, artificial or legal boundaries, and made public through official channels (Article 4.4.3. paragraph 1)*. In order to ensure that the precise meaning of a *zone*'s geospatial data, defined according to Chapter 4.4 of the WOAH Terrestrial Code, is understood and preserved by stakeholders and users, a data product specification for *zone* has been defined.

This data product specification has been produced by a network of WOAH Collaborating Centres with the purpose of establishing a standardized geometric description and a comprehensive set of *zone* attributes. The objective was to define the requirements for exchanging datasets of *zones*, as defined in Chapter 4.4 of WOAH *Terrestrial Code*, which can be shared between WOAH partners and the WOAH headquarters. The data model can and should be extend beyond the requirements set by the network.

1.3. Terms and definitions

Accuracy – Closeness between the result of a test or measurement and the true value [ref.: ISO 19157]. Accuracy usually takes the form of an error estimate, such as standard error (standard deviation of the errors), and is distinguished from precision, which relates to the quality of the operation by which the result is obtained.

Attribute – A property of an entity, (for example, the colour of a building, the width of a road); attributes are either quantitative or qualitative.

Application schema – An application schema provides a description of the semantic structure of the dataset identifying the spatial object types and the reference systems required for a complete description of the geographic information [ref.: ISO 19109].

---

[1] Reference: WOAH glossary - https://www.WOAH.int/fileadmin/Home/eng/Health_standards/tahc/2018/en_glossaire.htm. Accessed 15 April 2024

Coordinate reference system – Coordinate system that is related to an object by a datum. For geodetic and vertical data, it will be related to the Earth [ref.: ISO 19111].

Data – A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or by automated means.

Data format – A specification that defines the order in which data is stored, or a description of the way data is held in a file or record.

Data model – An abstraction of the real world that incorporates only the properties deemed relevant to the application at hand. The data model would normally define specific groups of entities, their attributes, and the relationships between these entities. A data model is independent from a computer system and its associated data structure. A map is one example of an analogue data model [ref.: ISO/TC211 ISO 19109].

Data structure – In the context of data model, the formal organization of data elements, their attributes, and spatial position. The physical structure used to represent the data model.

Data product specification – A detailed description of a dataset or dataset series together with additional information that will enable it to be created, supplied to, and used by another party. It forms the basis for producing or acquiring data. It also can help potential users to evaluate the data product to determine its fitness for use by the users [ref.: ISO 19131].

Data schema – Formal description of a data model [ref.: ISO 19109].

Dataset – An identifiable collection of data.

Domain – A territory over which rule or control is exercised. A sphere of activity, concern, or function [ref.: ISO 19103].

Entity – A real-world feature that is of interest; something about which data is stored.

Exchange (data) – Data exchange is the process of sending and receiving data in such a manner that the information content or meaning assigned to the received data is an accurate representation of the source data.

Feature – Abstraction of a real world phenomenon. It is the starting point for modelling geographic information and a digital representation of a real world entity or an abstraction of the real world. It has a spatial domain, a temporal domain, or a spatial/temporal domain as one of its attributes. Examples of features include almost anything that can be placed in time and space, including desks, buildings, cities, trees, forest stands, ecosystems, delivery vehicles, snow removal routes, oil wells, oil pipelines, oil spills etc. Features are usually managed in groups as feature collections. The terms feature and object are often used synonymously [ref. ISO 19101].

Feature type – A class that specifies sets of spatial objects with common properties and operations applicable to the objects [ref.: ISO 19156].

Feature attribute – Characteristic of a feature. NOTE: A feature attribute has a name, a data type, and a value domain associated to it [ref. ISO 19101].

Geospatial data – Describe objects, events, or other features with a location on the surface of the Earth. Geospatial data typically combine location information (usually coordinates on the Earth) and attribute information (the characteristics of the object, event, or phenomena concerned) with temporal information (the time or life span at which the location and attributes exist).

Item – Anything that can be described and considered separately. An item can be a part of a dataset, such as a feature, feature relationship, feature attribute, or combination of these [ref.: ISO 19157].

Metadata – Information about a resource [ref.: ISO 19115-1].

Object – The physical representation of a feature entity corresponding to a feature and associated attributes.

Portrayal – Presentation of information to humans [ref.: ISO 19117].

Quality – Totality of characteristics of a product that bear on its ability to satisfy stated and implied needs [ref.: ISO 19101].

Schema matching = data matching – Schema matching is the process of identifying whether two objects are semantically related in order to find a possible method/process/software for transformations between the objects.

Semantic – The semantic aspect refers to the meaning of data elements and the relationship between them. It includes developing vocabularies and schema to describe data exchanges, and ensures that data elements are understood in the same way by all communicating parties.

Syntactic – The syntactic aspect refers to describing the exact format of the information to be exchanged in terms of grammar and format.

Service – A computation performed by a software entity on one side of an interface in response to a request made by a software entity on the other side of the interface. A collection of operations, accessible through an interface that allows a user to evoke behaviour of value to the user [ref.: ISO 19119].

Spatial object – An abstract representation of a real-world phenomenon related to a specific location or geographical area.

Standard – Documentation established by consensus and approved by an accredited standards body nationally or internationally recognized by industrial, professional, trade, or governmental organizations. Standards reflect agreements on products, production method, terminology, practices, and services [ref.: ISO/IEC Guide 2:2004, ISO/TS 19159-1].

Transfer (data) – Exchange of any information that is transferred from one location to another through some communication method. Data transfer is most often used to share data among business partners, suppliers, or government agencies for cooperative purposes.

Unified Modelling Language (UML) – An open modelling standard for conceptual schema language defined and maintained by the Object Management Group [ref.: ISO .24622-1].

Universe of discourse – View of the real or hypothetical world that includes everything of interest [ref.: ISO 19101.].

Use case scenario – A possible sequence of real world events used as a test case for specifying or testing information systems designed to help manage such events [ref.: ISO 20077-1].

1.4. International standards

WOAH international standards (Chapter 4.4.)– WOAH Terrestrial Animal Health Code (2024)

ISO 19101: Geographic information — Reference model -- Part 1: Fundamentals

ISO 19103: Geographic information — Conceptual schema language

ISO 19106: Geographic information — Profiles

ISO 19107: Geographic information — Spatial schema

ISO 19108: Geographic information — Temporal schema

ISO 19109: Geographic information — Rules for application schema

ISO 19110: Geographic information — Methodology for feature cataloguing

ISO 19111: Geographic information — Referencing by coordinates

ISO 19115: Geographic information — Metadata -- Part 1: Fundamentals

ISO 19117: Geographic information — Portrayal

ISO 19125-1: Geographic information — Simple feature access — Part 1: Common architecture

ISO 19131: Geographic information — Data product specifications

ISO 19157: Geographic information — Data quality

1.5. Acronyms and abbreviations

Zone (in italic)	Zone defined according to the WOAH zoning procedure as described in Chapter 4.4 of the Terrestrial Code
GeoZone	Data product specifications for the geographic information related to the *zone*
ISO	International Organisation for Standardisation
UML	Unified Modelling Language
GI	Geographic Information
GIS	Geographic Information System
IT	Information and Communications Technology
WOAH	World Organisation for Animal Health

1.6. Data Product Specification - Metadata

Title	Data product specification document for the zone geographical component
Date	21.11.2024
Language	English
Contact	Istituto Zooprofilattico Sperimentale delle Venezie Viale dell'Università,10 35020 Legnaro (PD), Italy https://www.izsvenezie.it/ gis@izsvenezie.it
Maintenance	The product specification is maintained by Istituto Zooprofilattico Sperimentale delle Venezie

1.7. Disclaimer

The views expressed in this document are those of the authors and do not necessarily reflect the views or policies of WOAH.

2. Specification scope

GeoZone aims to enable exchange of *zone* geospatial data among national and international systems and GIS users. The rules defined in this specification ensure transparency and methodological coherence for the creation, verification, and exchange of *zone* geospatial data.

2.1. In scope

GeoZone provides a set of specifications to assist WOAH partners in the semantic and syntactic definition of *zone* attributes and in providing an encoding solution to enable the exchange of *zone* geospatial data between partners (e.g., bilateral recognition of country or *zone* status by trading countries. Reference Article 4.4.8.) and to a centralized information system.

2.2. Field of application

Zone geospatial data organized according to the GeoZone specifications can be used in GIS applications for inventory[2] and visual explorative spatial analysis[3] purposes.

---

[2] A GIS inventory is essentially a catalogue of geospatial data. Its primary purpose is to track the availability and the status of collected spatial data. A GIS inventory for a zone's geographical component (i) provides spatial and non-spatial information about a zone, (ii) enables the representation, through choropleth maps, of the spatial distribution of zones according to the defined zone's characteristics (e.g., disease, type of zone), and (iii) enhances the accuracy and organization of the stored *zone* data.

[3] The visual explorative spatial analysis of zone spatial data enables the evaluation of the spatial and temporal evolution of zones, both as a preliminary step towards the study of spatial patterns of zones and for identifying global trends and local outliers.

2.3.   Out of scope

The specification of information that is not relevant to the geographical characterization of a *zone* is out of GeoZone's scope. In particular, GeoZone is not designed to acquire and manage detailed information about disease response, biosecurity plans, surveillance procedures[4], animal traceability, or any other activity performed by the Veterinary Authority within a *zone*.

This data product specification does not specify the production process, but only the resultant data product. Nevertheless, it includes maintenance aspects necessary to describe the dataset exchange among WOAH partners and for transfer to a centralized information system.

2.4.   Modelling assumptions

The data model proposed in this specification is the outcome of analysing a set of use cases that were defined within a network of WOAH Collaborating Centres. The use cases are presented in Annex F – Use cases.

2.4.1. Zone characterization

A *zone* is characterized by an area, a designation period, the animal disease of concern, and the type of *zone* established (e.g., free zone, infected zone).

2.4.2. Operational requirement

1. This standard has been produced with the assumption that each partner uses different hardware, software, and data structure to manage *zone* geospatial data, including different coordinate reference systems (sometimes more than one in each partner), languages, and character sets.

2. Each partner manages their *zone* geospatial data to meet national and international requirements.

3. Correspondences between a partner's existing *zone* geospatial data and the data structure defined in this specification can be established by various data matching tools (e.g., data mining, formal specifications) and transformations (e.g., generalization, matching geometries).

4. Geographic staff involved in the development of *zone* geospatial data are encouraged to recognize the benefits of aligning with these specifications their data structures, feature coding schemes, and attribute coding schemes.

5. This standard has been optimized to facilitate the transfer of zone datasets.

2.4.3. Logical consistency

Logical consistency deals with logical rules of structure and attributes for spatial data and describes the compatibility between dataset items. In this data product specification, the definition of the spatial data integrity rules is provided as free text in natural language in order that the rules are readable and easily understood.

The data integrity rules are classified in four classes: (I) operation, (II) spatial relationship, (III) temporal integrity, (IV) attribute data integrity.

2.4.3.1. Operation.

Operations express specific actions for geographic data. Operations are as follows:
- New *zone*. Used to create a geospatial data for a zone different (in coverage and/or attribute values) from existing zones established by a partner.
- Update the geometry of an existing *zone*. Used to close an existing *zone* by setting an "end date" value and so allowing the creation of a new *zone*.

---

[4] All regular activities aimed at ascertaining the health status of a given population with the aim of early detection and control of animal diseases of importance to national economies, food security, and trade.

- Update the attributes of an existing *zone*. Used to close an existing *zone* by setting an "end date" value and the creation of a new *zone.*
- Close an existing *zone*. Used to set an "end date" value to the attribute "zone date validity" of an existing *zone*.
- Amend incorrect data. Used to replace existing *zone* values with correct values.
- Remove a wrong zone. Used to delete a *zone* from the dataset.

2.4.3.2. Spatial relationship.

Spatial relationships are used to describe the state between two spatial objects. The spatial relationships are given as follows:

- Within. *Zones* must be within the country boundary that established the *zone*.
- Equal. Two active *zones* can have the same geometry only if the disease and/or the *zone* type values are different.
- Overlaps or contains. The spatial relationships among zones designated for specific diseases must be evaluated based on the criteria and particularities outlined in the relevant chapters of the Terrestrial Code. Consequently, it is not feasible to formulate a universal principle of spatial relationship among zones for all diseases. However, it can be determined that, according to Articles 4.4.4. to 4.4.7., free zones and protection zones must not overlap with infected zones.

2.4.3.3. Temporal integrity.

The "end date" value of an existing *zone* must be greater than the "begin date" value.

2.4.3.4. Attribute data integrity.

All the mandatory attributes must have a valid value.

3. Data content and structure

3.1. Description

A single spatial type of object called "ZoneGeospatialData" has been defined to spatially represent the *zone*. ZoneGeospatialData contains the following[5]:

3.1.1. **Geometry** [M]: The geometry represents the spatial extent of ZoneGeospatialData. The geometry has be represented as multiple polygons (MultiPolygons)[6]. A multiple polygon corresponds to a collection of polygons. A polygon is defined as "a simple planar surface with one exterior boundary and none or more interior boundaries. Each interior boundary represents a hole in the polygon"[7].

The assertions for the geometry property (the rules that define a valid *zone*) are as follows:

3.1.1.1. A *zone* can be composed of one or more polygons.

3.1.1.2. The polygon/s boundary/ies represent(s) the *zone* limit.

3.1.1.3. The polygon boundary can be created with multiple segments or as a result of a buffer function.

3.1.1.4. A *zone* can coincide with one or more administrative boundaries.

---

[5] "M" indicates that the element is mandatory; an "O" indicates that the element is optional.
[6] Multiple polygon (MultiPolygon) is the instantiable subclass of MultiSurfaces whose elements are polygons. MultiSurface is introduced as abstract/non-instantiable superclass in clause 6.1.12 of ISO 19125 Geographic information — Simple feature access — Part 1: Common architecture.
[7] Reference: Geographic information – Simple feature access – Part 1: Common architecture; Clause 6.1.13.

3.1.1.5.   A *zone* can coincide with the entire territory of a country, meaning the *zone* is the entire country

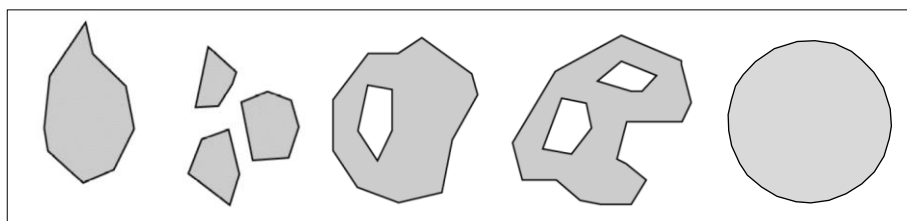3.1.1.6. Examples of valid geometry are presented in Figure 1:

Figure 1. Examples of geometric objects representable as instances of MultiPolygons

3.1.2.   **Accuracy** [M]: For some data providers and for some *zone* types (e.g., infected zones), confidentiality of zone geographical limits must be ensured. Therefore, representation of inexact zone boundaries is allowed. This attribute is used to inform users whether the *zone* boundaries are "accurate" (so follow the *zone* boundaries exactly) or "inaccurate" (so are not in agreement with real *zone* boundaries).

3.1.3.   **Zone type** [M]: Provides classification of the *zone* according to the definition included in the WOAH Terrestrial Code. In particular, this attribute refers to the type of *zones* described in Articles 4.4.4 (Free zone), 4.4.5 (Infected zone), 4.4.6 (Protection zone), and 4.4.7 (Containment zone) of the WOAH Terrestrial Code. However, other types of *zones* can be established by partners for the purposes of disease control and/or trade. For this reason, the zone type list should be an extensible WOAH-governed code list[8]. An extensible zone type code list enables partners to propose any dataset they identify that falls within the scope of Chapter 4.4 of the WOAH Terrestrial Code.

3.1.4.   **Zone Subtype** [O]: This allows more specific classification of the *zone* (e.g., negligible risk zone, controlled risk zone for BSE free zone). The *zone* subtype list is an extensible WOAH-governed code list.

3.1.5.   **Zone Status** [O]: This attribute is used only for free *zones* and for African horse sickness (AHS), classical swine fever (CSF), contagious bovine pleuropneumonia (CBPP), peste des petits ruminants (PPR), bovine spongiform encephalopathy (BSE), and foot and mouth disease (FMD) diseases. It specifies whether the zone is at "proposed" status, or is "officially recognized" by WOAH.

3.1.6.   **Disease** [M]: A disease is at the basis of the decision to establish a *zone*. The disease list is a WOAH-governed code list[9].

3.1.7.   **Species** [M]: List of species considered in the *zone*. It refers to the concept of "animal subpopulation[10]" defined in Chapter 4.4 (i.e., avian, bees, bovines, equines, lagomorphs, sheep and goats, swine, other animals, wild animals).

---

[8] Code lists are used extensively in the GeoZone data models. All GeoZone code lists are governed by WOAH (i.e., stored, managed, and updated by WOAH). They can be classified according to their extensibility:
-   Not extensible (none)
-   Extensible with narrower values (narrower).

[9] The WOAH Terrestrial Code - Chapter 1.3 – Diseases, Infections and Infestations listed by the WOAH. Can be used as reference for the disease list definition.

[10] Subpopulation: means a distinct part of a population identifiable in accordance with specific common animal health characteristics. [reference: https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/?id=169&L=1&htmfile=glossaire.htm#terme_sous_population].

3.1.8. **Designation period** [M]**:** The time when the *zone* is legally designated or become effective. The designation period requires a *start* and an *end* date.

The assertions for the designation period attribute (the rules that define a valid *zone*) are:

3.1.8.1. The "start" date must be defined (i.e., a date is provided) from the beginning (i.e., when the *zone* is established).

3.1.8.2. Usually, when a *zone* is established, it does not have a value for the "end" date. An "indeterminate position" value is used in the "end" date to signify that the *zone* is still in effect.

3.1.8.3. The designation period information is used to represent the status of a *zone* (e.g., ongoing, closed).

3.1.9. **Control measures** [M]**:** Measures are implemented within a *zone*. The list of measures are defined in accordance with the relevant disease-specific chapter of the WOAH Terrestrial Code.

3.1.10. **Local identifier** [M]**:** A local identifier, assigned by the data provider. This is the spatial object identifier within the transferred dataset.

3.1.11. **Country** [M]: Name of the partner and non-partners that established the *zone*. The list of countries is a WOAH-governed code list.

3.1.12. **Geographical names** [O]: Geographical name is used to identify the *zone* in the real world. It provides a 'key' for implicitly associating different representations of the object. If the *zone* coincides with one or more administrative boundaries, this attribute can be used to provide the list of administrative units' names.

3.2. UML overview

The application schemas included in this section are specified in UML version 2.3 class diagrams.

3.2.1. Stereotypes

Above the name of classes in the application schema of Figure 2, there is a stereotype name in quotes. Stereotypes are used to extend the basic UML elements and give them different meanings. In the ZoneGepospatialData application schema, four types of stereotypes are used:

- **FeatureType**: Represents geographic object types. FeatureType is an XML element whose XML schema-type is derived from gml:AbstractFeatureType (ISO 19136);
- **DataType**: XML element with a complex content model;
- **Abstract**: An abstract class is used as a basis for creating specific objects that conform to its protocol, or the set of operations it supports. Abstract classes are not instantiated directly;
- **CodeList**: Stereotype that represents an extensible list of possible values.

3.2.2. Code list

A code list type is a list of valid identifiers of named literal values which can be extended only in conformance with specified rules. These classes will be managed at WOAH level.

3.2.3. Language
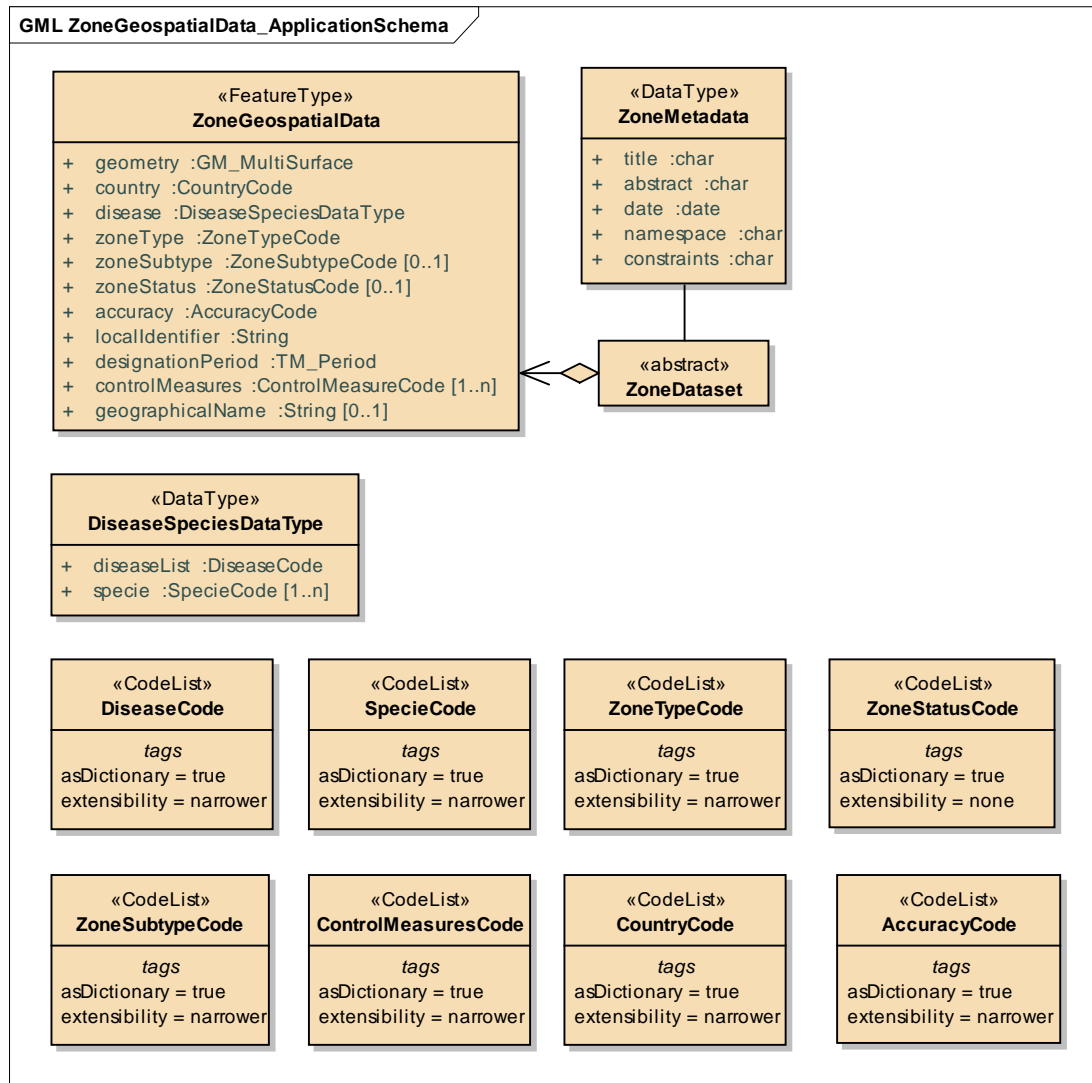
The language used in the code lists classes is English.

Figure 2. UML class diagram: overview of the *zone* application schema

3.2.4. *Zone identifier and the External Object Identifier*

The GeoZone data specifications uses the *localIdentifier as* the unique object identifier within the transferred dataset. If it is necessary to aggregate zones from multiple datasets, the *localIdentifier* cannot be considered a unique identifier. For this purpose, the external object identifier[11] can be obtained as the combination of the *nameSpace* included in the metadata and the *localIdentifier*:

- A namespace to identify the data source (the value in the *namespace* attribute of metadata data type);
- A local identifier assigned by the data provider (the value in *localIdentifier* attribute of GeoZone feature type).

The namespace identify the data source. It can consist of two parts: the first part identifies the country, and the second part is used to distinguish between different data sources maintained and provided by the country.

---

[11] External Object Identifier: An external unique object identifier is a globally unique identifier assigned to an object or entity that remains consistent and recognizable across different systems, datasets, or organizations. It ensures that the object can be distinctly identified and referenced, even when integrated or shared in external environments or across diverse contexts.

A local identifier is assigned by a data provider and is unique within the namespace (i.e., no other spatial object carries the same unique identifier). It is the responsibility of the data provider to guarantee uniqueness of the local identifier within the namespace.

3.2.5. *Geometry representation*

Geometry representation (indicated in the Zoning featureType as GM_Object) refers to the Simple Feature spatial schema as defined in ISO 19107.

This specification restricts the spatial schema to multi polygons (MultiPolygons).

3.2.6. *Temporality representation*

The designationPeriod uses the TM_Period property following ISO 19108:2006. This property distinguishes the "beginPosition" from the "endPosition". The "beginPosition" attribute specifies the date when the zone becomes valid, while the "endPosition" attribute specifies the date when the zone ceases to be valid.

The Gregorian calendar is used as temporal reference system, in accordance with ISO 19108.

The data format can be both the extended format "*YYYY-MM-DD*" or in the basic format "*YYYYMMDD*".
- [YYYY] Indicates a four-digit year, 0000 through 9999.
- [MM] Indicates a two-digit month of the year, 01 through 12.
- [DD] Indicates a two-digit day of that month, 01 through 31.

For example, 27 June 1968 is represented as either "1968-06-27" in the extended format or as "19680627" in the basic format.

3.3. Feature catalogue

The feature catalogue elements are presented in Annex A – Feature catalogue.

4. Coordinate reference system

The coordinate reference system used for this product specification is World Geodetic System 1984 (WGS 84), which is defined by the European Petroleum Survey Group (EPSG) code 4326 (https://epsg.io/4326).

5. Temporal reference system

The purpose of this data model is to provide a clear, well-defined method for representing dates. This will avoid misinterpretation in numeric date representations, especially during data transfer between partners with different conventions. Therefore, the data are organized so the largest temporal term (the year) appears first in the data string, progressing to the smallest term (the second).

Example. 1968-06-27 is used to refer to 27 June 1968[12].

6. Data quality

Zone geospatial data is always compiled from the best available sources, and undergoes specific checks by the data producer prior to release. These checks include data format validation, checks on conformance to standards, and logical consistency checks. Detailed checks are listed in Annex B – Quality measure elements.

The approach to organizing information about data quality is based on ISO 19157 Geographic information – Data quality.

---

[12] ref: ISO 19108 clause 5.4.4.1.

7. Data capture

Data providers collect zone geospatial data using their own processes, ensuring necessary transformation to meet the current specifications. If a zone coincides with administrative limits, data providers should refer to the most recent WAHIS GADM geospatial dataset. To promote information sharing and ensuring confidentiality, mechanisms for providing inexact zone boundaries are allowed, including scaling administrative limit[13], generalization, and masking.

8. Data maintenance

GeoZone provides a set of specifications to enable the exchange of zone geospatial data. The exchanged dataset should be considered to contain in-force and valid zones until a new dataset is issued by the data provider. The zone data is in effect as of the date of submission and contains only valid zones.

Data updates will be made through new editions of exchanged zone datasets. The maintenance and update frequency of the exchanged zone datasets should be defined by the data provider in agreement with the recipient of the datasets.

This data product specification does not specify the zone data management process. Nevertheless, to facilitate the correct use of exchanged zone data, any zones that need updating from the previous issued dataset (the type of data update is defined in paragraph 2.4.3.5 – Operation class) must be set as closed, and a new zone is issued. Using this approach, every dataset is self-contained and allows for data usage without the need to know the previous state of the zone.

If individual instances of features require updating, maintenance of histories, or change tracking, then the methods for update, history management, change tracking, and display are left to a centralized application or production system. In Annex E – GeoZone shapefile schema, a specific section describes a possible solution to manage the data updating process.

9. Portrayal

This clause defines the styles for portraying *zones* based on attributes such as *zoneType*, *ZoneSubType* and *zoneStatus*. Styles for the layer are provided in Annex C – Styles for the main zone classification values.

10. Data product delivery

Standard encoding will be performed using an XML grammar, defined by an XML Schema in accordance with the data scheme. Geographic data will be serialized using the MultiSurface type of the ISO GML standard, restricted to 2D polygons. The employ of GML is aimed at expressing geographical features with a common standard, empowering open exchange of data.

All software services will accept XML data as their data source. However, in order to improve data exchange with organizations missing a deep knowledge of geographic data manipulation, alternative data formats, based on ESRI shapefile (SHP) or Well Know Text format (WKT), are possible.

Annex E – GeoZone shapefile schema provides a means to implement the GeoZone data model into a shapefile data format.

---

[13] List the administrative units involved in the zone or use a less fine administrative limit (e.g., province instead of municipality).

11. Metadata

This section defines metadata elements for describing the *zone* dataset exchanged. The core metadata elements are listed in Table 2, where M indicates the element is mandatory and O indicates the element is optional.

GeoZone implementing rule	Description	Obligation
Title	Dataset title. Name by which the dataset is known.	M
Abstract	Brief narrative summary of the content of the dataset.	O
Date	Date when the dataset was created.	O
Namespace	Identification of the information system used to manage the zone. Namespace uniquely identifies the data source of the spatial object. The namespace is owned by the partner Country.	M
Constraints	Lists constraints related to access and use of dataset. A list of possible different categories of constraints applicable to the dataset is provided in Annex D.	O

Table 1. Metadata list of elements

Annex A – Zone geospatial data feature catalogue

Feature catalogue

Name:	Zone geospatial data Feature Catalogue
Scope:	Zone geospatial data
Version number:	5.0
Version date:	2023-10-24

Feature type: ZoneGeospatialData

Name:	ZoneGeospatialData
Definition:	Area defined by a Veterinary Authority that represents the territorial extent where some specific measures or activities are in place for disease prevention or control and/or international trade purposes.
Attributes	
Name:	**Geometry**
Value type:	GM_Object
Definition:	The geometry represents the spatial extent of a zone. A GM-Object must be encoded as a GM_MultiPolygon.
Multiplicity:	1
Name:	**Country**
Value type:	CountryCode
Definition:	Country that established the zone.
Multiplicity:	1
Name:	**Disease**
Value type:	DiseaseCode
Definition:	Information about the disease at the basis of the decision to establish the zone. WOAH governs the list of terrestrial animal diseases.
Multiplicity:	1
Name:	**zoneType**
Value type:	ZoneTypeCode
Definition:	Provides the classification of the zone according to the definition included in the WOAH Terrestrial Code. In particular, this attribute refers to the type of zones described in Chapter 4.4 of the WOAH Terrestrial Code.
Multiplicity:	1
Name:	**zoneSubtype**
Value type:	ZoneSubtypeCode
Definition:	Additional classification value that further specifies the zone type. NOTE: This value must be derived from a relevant domain-specific controlled vocabulary EXAMPLE: for a bovine spongiform encephalopathy (BSE) zone, where the zoneType value = "free", the zone could be further classified as either: zoneSubtype = NegligibleRisk zoneSubtype = ControlledRisk
Multiplicity:	0..1
Name:	**Accuracy**
Value type:	accuracyCode
Definition:	This attribute is used to inform whether the zone boundaries are "accurate" (so follow the zone boundaries exactly) or "inaccurate" (so are not in agreement with real zone boundaries)
Multiplicity:	1

Name:	**ZoneStatus**
Value type:	ZoneStatusCode
Definition:	This attribute is used only for free zones. It specifies whether the free zone is at "proposed" status, or is "officially recognized" by WOAH (this is applied to AHS, BSE, CSF, CBPP, FMD and PPR diseases only), or if the free zone is self-declared (according to Article 1.6.3 of the WOAH Terrestrial Code)
Multiplicity:	1
Name:	**designationPeriod**
Value type:	TM_Period
Definition:	Specifies the date when the zone is legally designated or becomes effective. DesignationPeriod uses the ISO 19108 TM_Period, which is comprised of two properties – gml:beginPosition and gml:endPosition. If the zone has to remain in force for an indeterminate period of time, then the endPosition/indeterminatePosition="unknown" can be used to state that the zone is still effective.
Multiplicity:	1
Name:	**controlMeasures**
Value type:	ControlMeasuresCode
Definition:	Measures that are implemented within the zone.
Multiplicity:	1..*
Name:	**localIdentifier**
Value type:	Char
Definition:	Identifier published by the data provider. The localIdentifier value cannot be used as a unique identifier of a zone's spatial object.
Multiplicity:	1
Name:	**geographicalName**
Value type:	Char
Definition:	GeographicalName is used to identify the zone in the real world. The geographical name can coincide with the administrative unit(s) limit. If a zone coincides with a geographical unit, the geographicalName value is equal to the administrative unit's name. If the zone coincides with two or more geographical units, the geographicalName value is the list of the administrative units' names (comma separated). If the zone coincides with the whole country the geographicalName value is the name of the country.
Multiplicity:	0..*

Data type: Zone dataset Metadata

Name:	**ZoneMetadata**
Definition:	Contains metadata information about the zone dataset.
Attributes	
Name:	**Title**
Value type:	Char
Definition:	Name by which the dataset is known by the data provider.
Multiplicity:	1
Name:	**Abstract**
Value type:	Char
Definition:	Brief narrative summary of the content of the dataset.
Multiplicity:	0..1
Name:	**Date**
Value type:	Date
Definition:	Date when the dataset was established.

Multiplicity:	0..1
Name:	**Namespace**
Value type:	Char
Definition:	Identification of, and means of communication with the organization associated with the dataset. The information about the contact must be aligned with the principles related to processing of personal data.
Multiplicity:	1
Name:	**Constraints**
Value type:	Char
Definition:	Lists possible different categories of constraints (separated by a semicolon, ;) applicable to the dataset.
Multiplicity:	0..1

Data type: DiseaseSpecieDataType

Name:	**DiseaseSpecieDataType**
Definition:	This data type contains the information specifying the disease and the related species.
Attributes	
Name:	**diseaseList**
Value type:	DiseaseCode
Definition:	Information about the disease at the basis of the decision to establish the zone. WOAH governs the list of disease values. Chapter 1.3 of the WOAH Terrestrial Code is considered as the basis of the WOAH disease list (but the valid disease list can be greater than the list in Chapter 1.3 of the WOAH Terrestrial Code).
Multiplicity:	1
Name:	**Specie**
Value type:	SpecieCode
Definition:	List of susceptible animal species populations, domestic or wild, considered in the zone. WOAH governs the list of valid Specie values
Multiplicity:	1..*

Abstract: ZoneDataset

Name:	**ZoneDataset**
Definition:	Abstract class used to link the geospatial dataset with the related metadata.

Code list: accuracyCode

Name:	**AccuracyCode list**	
Description:	List defining the zone's accuracy. It defines the degree of concordance of the zone boundaries represented in the feature with respect to the official boundary limits.	
Extensibility:	None	
Values:	*Label*	*Description*
	ACCURATE	The zone exactly follows the official boundaries.
	INACCURATE	The zone is not in agreement with the official boundaries. Inaccurate boundary is used when the data provider is unable to share the extent of a zone (e.g., infected zone) to third parties.

Code list: ZoneTypeCode

Name:	**ZoneTypeCode list**
Description:	Defines the type of zone. Four types of zones are already defined by WOAH: Free, Infected, Protection, and Containment. Partners can establish different types of zones. Therefore, the list is extensible, but is governed by WOAH. The code list is extensible to enable data providers to publish any type of zone they identify that falls within the scope of Chapter 4.4.
Extensibility:	Narrower

Values:	Label	Description
	INFECTED	An infected zone is one in which either an infection or infestation has been confirmed, or that is defined as such in the relevant chapters of the Terrestrial Code (Article 4.4.5.).
	CONTAINMENT	In the event of outbreaks in a country or zone previously free from a disease, a containment zone can be established to minimize the impact on the rest of the country or zone. A containment zone includes all epidemiologically linked outbreaks and is managed in such a way that commodities for international trade can be shown to have originated from either inside or outside the containment zone (Article 4.4.4.).
	FREE	A free zone is one in which the absence of a specific infection or infestation in an animal population has been demonstrated in accordance with the relevant requirements of the Terrestrial Code (Article 4.4.4.).
	PROTECTION	A protection zone can be established to preserve the animal health status of an animal population in a disease-free country or a disease-free zone by preventing the introduction of a pathogenic agent of a specific infection or infestation from neighbouring countries or zones of different animal health status (Article 4.4.4.).

Code list: ZoneSubtypeCode

Name:	**Zone subtype code**
Description:	Additional classification value that further specifies the type of zone.
Extensibility:	Narrower

Values:	Label	Description
	BSE_NEGLIGIBLE_RISK	Commodities from the cattle population of a country or zone pose a negligible risk of transmitting the BSE agent if the conditions expressed in Article 11.4.3 are met.
	BSE_CONTROLLED_RISK	Commodities from the cattle population of a country or zone pose a controlled risk of transmitting the BSE agent if the conditions expressed in Article 11.4.4 are met.
	BSE_UNDETERMINED_RISK	The cattle population of a country or zone poses an undetermined BSE risk if it cannot be demonstrated that it meets the requirements of another category.

Code list: ZoneStatusCode

Name:	**ZoneStatusCode list**
Description:	Defines the status of a free zone for African horse sickness (AHS), bovine spongiform encephalopathy (BSE), classical swine fever (CSF), contagious bovine pleuropneumonia (CBPP), foot and mouth disease (FMD) and peste des petits ruminants (PPR) diseases.
Extensibility:	None

Values:	*Label*	*Description*
	OFFICIALLY_RECOGNISED	According to Article 1.6.1 of the WOAH Terrestrial Code, a country or a zone can be officially recognized by WOAH for freedom from AHS, CSF, CBPP, FMD, and PPR or for its risk status with regard to BSE
	OFFICIAL_RECOGNITION_PROPOSED	In the frame of the Standard Operating Procedure, when a partner Country requests official recognition of animal health status for a zone, the geographical boundary of the proposed zone must be clearly defined. The geospatial data that represent the geographical boundary of the proposed zone are set to "proposed" until the zone is officially recognized

Code list: CountryCode

Name:	**CountryCode list**
Definition:	Specifies the name of the WOAH partner country that established the zone. The three-letter code (alpha-3) of ISO 316 - Country Codes is used to define the country code
Extensibility:	None

Values:	*Label*	*Description*
	AFG	Afghanistan
	ALB	Albania
	DZA	Algeria
	…	…

Code list: DiseaseCode

Name:	**Disease code list**
Definition:	Specifies the disease at the basis of the decision to establish a zone. This code list will be totally aligned with a future WOAH governed disease list.
Extensibility:	None

Values:	*label*	*Description*
	1	Anthrax
	2	Infection with Aujeszky's disease virus
	3	Infection with bluetongue virus
	…	…

Code list: SpecieCode

Name:	**SpecieCode list**
Definition:	List of the affected animal subpopulation(s). Multiple species of animals can be listed. This list provides the allowed animal species.
Extensibility:	None

Values:

Label	Description
1	Avian
2	Bees
3	Bovines
4	Equines
5	Lagomorphs
6	Sheep and goats
7	Swine
8	Other animals
9	Wild animals

Code list: ControlMeasuresCode

Name:	**ControlMeasuresCode list**
Definition:	This code list defines the types of control measures implemented by a partner in a zone at the time of its establishment. A partner can implement different types of measures in a zone. The list is extensible to enable partners to publish any measure they implement in a zone.
	The list of possible control measures should be derived from the relevant Terrestrial Code articles.
Extensibility:	Narrower

Values:

Label	Description	Definition
1	Stamping-out	A policy designed to eliminate an outbreak by carrying out the following under the authority of the Veterinary Authority: 1) Killing animals that are affected and those suspected of being affected in the herd or flock and, where appropriate, those in other herds or flocks exposed to infection by direct animal-to-animal contact or indirect contact with the causal pathogenic agent. Animals should be killed in accordance with Chapter 7.6.; 2) Disposing of carcasses and, where relevant, animal products by rendering, burning, burial, or by any other method described in Chapter 4.13.; 3) Cleansing and disinfecting establishments through procedures defined in Chapter 4.14. The measure also includes the depopulation of outbreaks, selective killing of animals within the farm/establishment (e.g., test and cull), and preventive/pre-emptive culling of at-risk animals and/or farms.
2	Movement control	Restrictions on the movement of one or more animal species (e.g., standstill, ban on housing) and their associated commodities, and on different types of fomites (e.g., people, clothing, vehicles, equipment) (Article 4.19.7.).

3	Biosecurity	To avoid the spread of the pathogenic agent outside the affected establishment or infected zone, strict biosecurity measures must be applied (Article 4.19.9.) (e.g., housing order, netting/fencing, access restriction, disinfection, sanitation, transport controls). This measure includes both the biosecurity measures adopted on-farm to prevent the introduction/spread of a specific disease, and the extraordinary measures implemented following the identification of outbreaks.
4	Vaccination and treatment	Vaccination as part of an official control program should be conducted in accordance with Chapter 4.18. Treatment can also be used as part of an official control program (Article 4.19.10.).
5	Animal identification	The combination of the identification and registration of an animal individually, with a unique identifier, or collectively by its epidemiological unit or group, with a unique group identifier (Glossary)
6	Animal traceability	The ability to follow an animal or group of animals during all stages of its life (Glossary)
7	Contact tracing	Trace-back/trace-forward activities to follow the movements of live animals and other commodities, fomites, and people, to demonstrate connection between outbreaks and other establishments (Article 4.4.7).
8	Surveillance	The systematic ongoing collection, collation, and analysis of information related to animal health and the timely dissemination of information so that action can be taken (Glossary). The measure includes both the 'ordinary' surveillance done in peace-time, and extraordinary activities following the detection of specific pathogens. It also includes specific surveillance for susceptible wildlife species and vectors (Chapter 1.4, 1.5).
9	Awareness campaigns	Communication through awareness campaigns targeted at all concerned stakeholders, the media, consumers, and the general public

Annex B - Quality measure elements

Data quality elements facilitate the assessment and improvement of how effectively a dataset, created by a data producer, fulfils over time the criteria outlined in the data product specification.

The data producer must apply the criteria listed below during the dataset creation process, including a quality evaluation procedure at the dataset production stage.

Inspection for conformance of a received dataset to a data product specification's quality evaluation is not specified in this document.

The table below indicates the identified data quality measures and their applicability in this data product specification.
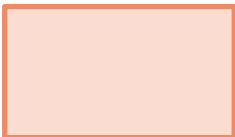
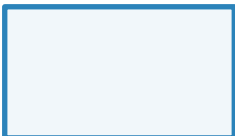| Data quality element and sub element	Description	Example
Excess item	A zone is incorrectly present in the data	*Feature with identical attributes and geometry*
Missing value	Mandatory attribute has a missing value	*Information regarding the control measure implemented in the zone is not reported*
Logical consistency	This data quality measure requires that all items in the dataset must not be stored in conflict with the spatial relationships rules described in section 2.4.3.2.	*A zone is not completely within the country boundaries*
Format consistency	Physical structure conflict	*Dataset is stored in a wrong file format, such as text, instead of shapefile or GML*
Invalid sliver	Zone defined according to one or more administrative boundaries creates a sliver with respect to the WAIHS GADM data	*The border of a zone does not align with the borders of the respective WAIHS GADM data*

Annex C – Styles for the main zone classification values
(Informative)

This annex describes various types of layers that are utilized to represent the spatial object types based on the different values:
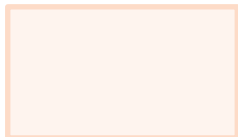
Style name	Zone.InfectedZone.Default
Spatial object type	zoneType = infectedZone
Abstract	The geometry is rendered with a wine red (#B2182B) fill that has a transparency of 70%, along with a solid wine red (#B2182B) outline with a 2-pixel stroke width.
Rule	zoneType = 'INFECTED'
Example	

Style name	Zone.ContainmentZone.Default
Spatial object type	zoneType = ContanimentZone
Abstract	The geometry is rendered with a coral (#EF8A62) fill that has a transparency of 70%, along with a solid coral (#EF8A62) outline with a 2-pixel stroke width.
Rule	zoneType = 'CONTAINMENT'
Example	

Style name	Zone.FreeZone.Default
Spatial object type	zoneType = FreeZone
Abstract	The geometry is rendered with an azureish white blue (#D1E5F0) fill that has a transparency of 70%, along with a solid azureish white blue (#D1E5F0) outline with a 2-pixel stroke width.
Rule	zoneType = 'FREE' and status = 'IS NULL' and subtype = 'IS NULL'
Example	

Style name	Zone.ProtectionZone.Default
Spatial object type	zoneType = ProtectionZone
Abstract	The geometry is rendered with an unbleached silk (#FDDBC7) fill that has a transparency of 70%, along with a solid unbleached silk (#FDDBC7) outline with a 2-pixel stroke width.
Rule	zonetype = 'PROTECTION'

Annex C – Styles for the main zone classification values
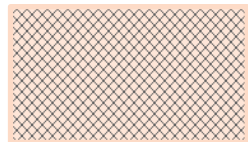
Example	

Style name	Zone.FreeZone.NegligibleRisk
Spatial object type	zoneSubType = NegligibleRiskFreeZone
Abstract	The geometry is rendered with a midnight blue (#005686) fill that has a transparency of 70%, along with a solid midnight blue (#005686) outline with a 2-pixel stroke width.
Rule	zonetype = 'FREE' and subtype = 'NEGLIGIBLE_RISK' and disease = '29'
Example	

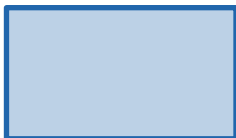| Style name	Zone.FreeZone.Proposed
Spatial object type	zoneStatus = ProposedFreeZone
Abstract	The geometry is rendered with a solid blue (#2B83BA) "BDiagonal" textured fill along with a solid blue (#2B83BA) outline with a 2-pixel stroke width.
Rule	zonetype = 'FREE' and status = 'PROPOSED'
Example	

Style name	Zone.FreeZone.OfficialyRecognised
Spatial object type	zoneStatus = OfficialyRecognised.FreeZone
Abstract	The geometry is rendered with a solid blue (#2B83BA) "Diagonal X" textured fill along with a solid blue (#2B83BA) outline with a 2-pixel stroke width.
Rule	zonetype = 'FREE' and status = 'OFFICIALLY_RECOGNISED' and (disease = '58' or disease = '29' or disease = '63' or disease = '35' or disease = '9' or disease = '44')
Example	

Style name	Zone.ProtectionZone.Proposed
Spatial object type	zoneStatus = ProposedProtectionZone
Abstract	The geometry is rendered with a solid grey (#636363) "BDiagonal" texture filled with unbleached silk (#FDDBC7) at 70% transparency, along with a solid unbleached silk (#FDDBC7) outline with a 2-pixel stroke width.
Rule	zonetype = 'PROTECTION' and status = 'PROPOSED'

Example	

Style name	Zone.ProtectionZone.OfficialyRecognised
Spatial object type	zoneStatus = OfficialyRecognised.ProtectionZone
Abstract	The geometry is rendered with a solid grey (#636363) "Diagonal X" texture filled with unbleached silk (#FDDBC7) at 70% transparency, along with a solid unbleached silk (#FDDBC7) outline with a 2-pixel stroke width.
Rule	zonetype = 'PROTECTION' and status = 'OFFICIALLY_RECOGNISED' and (disease = '58' or disease = '29' or disease = '63' or disease = '35' or disease = '9' or disease = '44')
Example	

Style name	Zone.FreeZone.ControlledRisk
Spatial object type	zoneSubType = ControlledRiskFreeZone
Abstract	The geometry is rendered with a han blue (#4E6DBD) fill that has a transparency of 70%, along with a solid han blue (#4E6DBD) outline with a 2-pixel stroke width.
Rule	zonetype = 'FREE' and subtype = 'CONTROLLED_RISK' and disease = '29'
Example	

Style name	Zone.FreeZone.UndeterminedRisk
Spatial object type	zoneSubType = UndeterminedRiskFreeZone
Abstract	The geometry is rendered with a lapis lazuli blue (#2166AC) fill that has a transparency of 70%, along with a solid lapis lazuli blue (#2166AC) outline with a 2-pixel stroke width.
Rule	zonetype = 'FREE' and subtype = 'UNDETERMINED_RISK' and disease = '29'
Example	

Annex D – Constraints related to dataset access and use

In the metadata class, it is possible to provide restrictions on the access and use of the related dataset. These constraints can be defined based on one or more of the following items:

Constraint	Description	Example
Specific usage	Description of the only ways in which the resource is used	*Used to provide WHOA with an up-to-date status and the extent of active free zones throughout the country*
Classification code	The resource can be classified as (I) unclassified, (II) restricted, (III) confidential, (IV) secret	*Confidential*
Use limitation	Information on the limitations of the dataset usage (i.e., describes how the resource must not be used)	*Must not be used by or disseminated to any other entities including the public*
Legal constraint	Restrictions and legal prerequisites for accessing and using the resource	*User agreement must be signed before accessing the resource*
Access constraint	Ensures the protection of privacy or imposes special restrictions or limitations on obtaining the resource	*The dataset is subject to the open data and Creative Commons license.*

Annex E – GeoZone physical schema

(Informative)

The conceptual schema described in Section 3 – Data Content and Structure were implemented using a physical schema in ESRI Shapefile and a database solution in GeoPackage format.

ESRI shapefile

The shapefile format is a geospatial vector data format developed and regulated by ESRI. It is, by far, the most common geospatial file format. All commercial and open source geospatial programmes accept shapefiles; therefore, this annex provides a description of the possible implementation of the GeoZone scheme in shapefile format.

GeoZone shapefile description

| SHP attribute name	GeoZone feature catalogue name	Description	Example
countryf	Country	Country that established the zone. The three-letter code (alpha-3) of ISO 316 - Country Codes is used to define the country code	ITA
disease	Disease	Information about the disease that prompted the decision to establish the zone. WOAH governs the list of terrestrial animal diseases. The value is derived from a disease code list	1
s_avian	Species	Avian	1
s_bee		Bees	1
s_bovine		Bovines	1
s_equine		Equines	1
s_lago		Lagomorphs	1
s_sh_go		Sheep and goats	1
s_swine		Swine	1
s_other		Other animals	1
s_wild		Wild animals	1
zonetype	zoneType	Classification of the zone according to the definition included in the WOAH Terrestrial Code. Refers to the types of zones described in Chapter 4.4 of the WOAH Terrestrial Code. The possible values are: INFECTED, FREE, CONTAINMENT, PROTECTION	PROTECTION
subtype	zoneSubtype	Additional classification value that further specifies the zone type. For a bovine spongiform encephalopathy (BSE) zone, and for which the zoneType value is "free" the possible values are BSE_NEGLIGIBLE_RISK, or BSE_CONTROLLED_RISK, or BSE_UNDETERMINED_RISK	BSE_NEGLIGIBLE_RISK
accuracy	accuracy	Indicates whether the zone boundaries are "accurate" (follow the zone boundaries	ACCURATE

		exactly) or "inaccurate" (do not agree with the real zone boundaries)	
status	zoneStatus	Used only for free and protection zones. Specifies whether the zone is at "proposed" status, or is "officially recognised" by WOAH (this is applied to AHS, BSE, CSF, CBPP, FMD and PPR diseases)	OFFICIALLY_R ECOGNISED
datebegin	designationPeriod	Specifies the time when the zone is legally designated or becomes effective	25/12/2023
dateend		Specifies the time when the zone is no longer effective	31/03/2024
m_stmout	controlMeasures	Stamping-out measure	1
m_mov		Movement control measure	1
m_biosec		Biosecurity measure	1
m_vactrt		Vaccination and treatment measure	1
m_animidm		Animal identification measure	1
m_antrace		Animal traceability measure	1
m_ctrace		Contact tracing measure	1
m_surv		Surveillance measure	1
m_aware		Awareness campaign measure	1
localid	localIdentifier	Identifier published by the data provider. The local identifier value can be used as unique identifier within the transmitted dataset	ITA_AI_0001
geoname	geographicalName	Used to identify the zone in the real world. If the zone coincides with a geographical unit, the value is equal to the administrative unit's name. If the zone coincides with two or more geographical units, the value is a comma-separated list of the administrative unit's names. If the zone coincides with the whole country, the value is the name of the country	ITALY

GeoPackage

GeoPackage is an open, standards-based data format designed for the efficient storage, sharing, and transfer of geospatial information within a single, lightweight database file. In QGIS and ArcMap, GeoPackage serves as a versatile, open-source format for storing and managing geospatial data, supporting seamless editing, analysis, and the sharing of multiple layers within a single file.
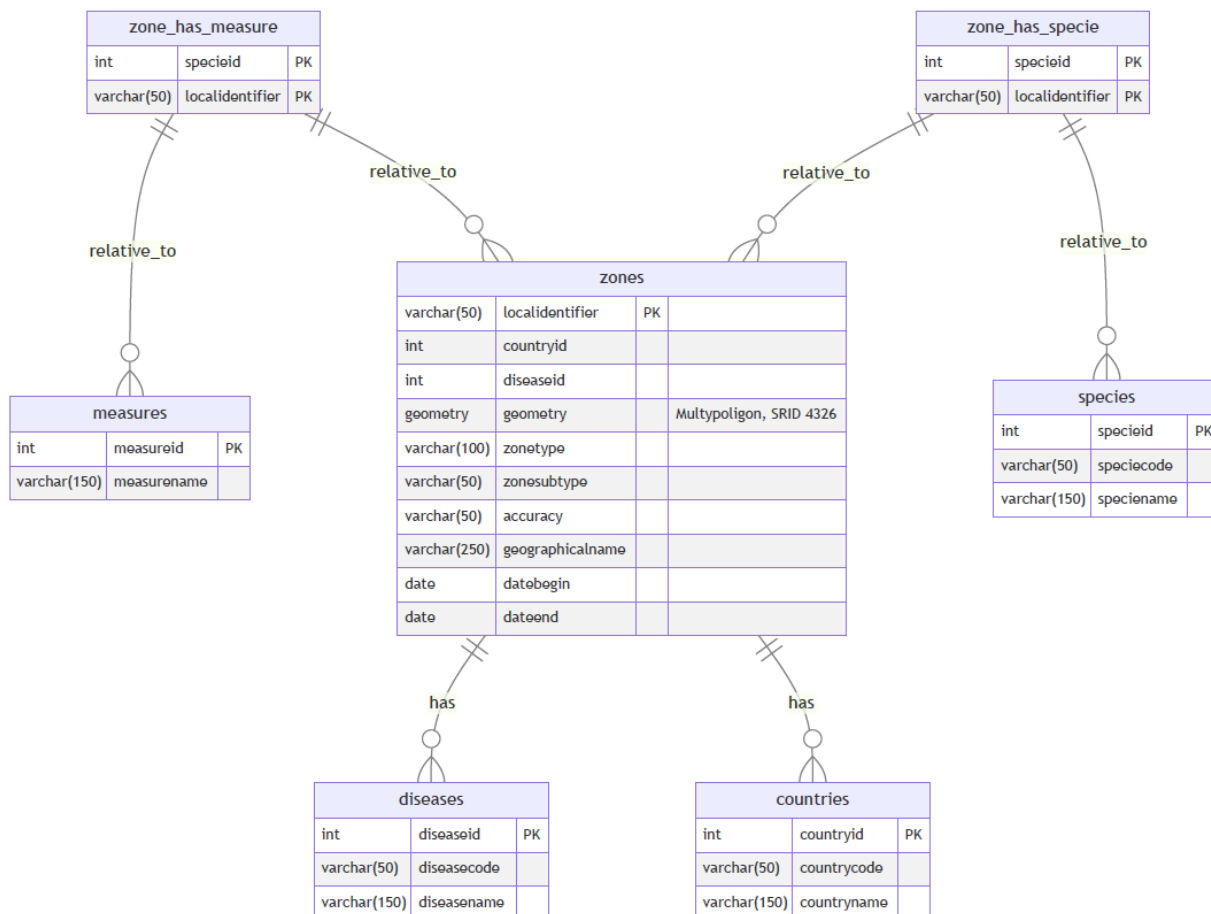
Schema ER

An Entity-Relationship (ER) schema defines the structure of the data, organizing the data into entities (such as spatial features or attribute tables) and their relationships.
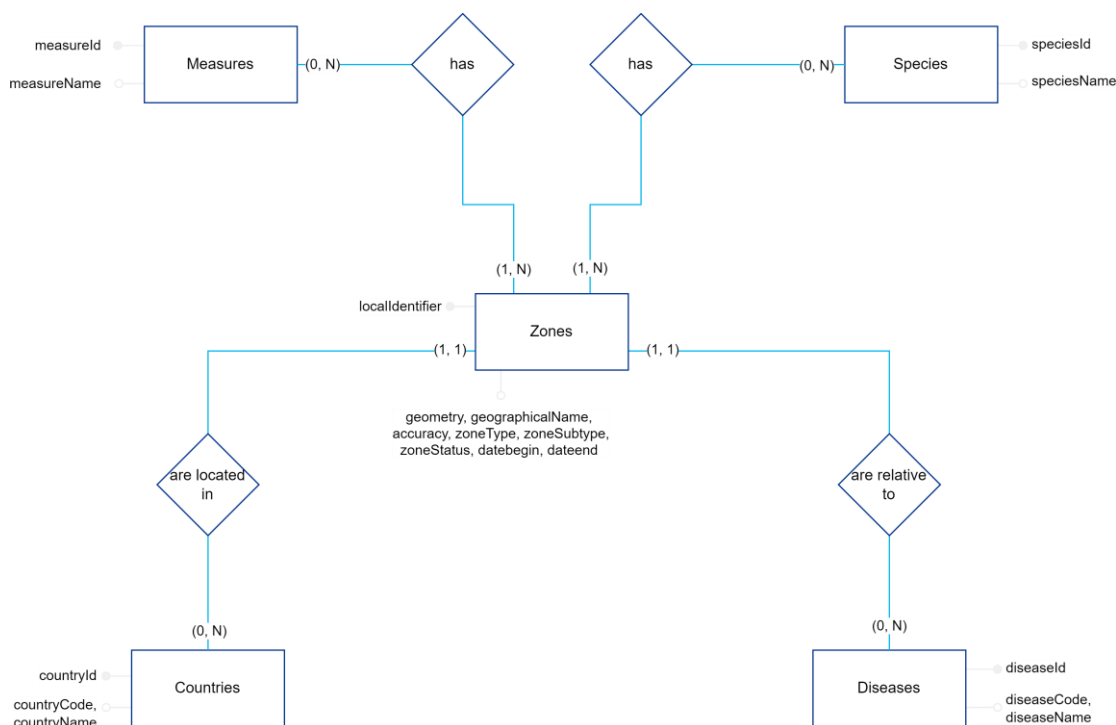
Physical schema

A physical schema defines the actual storage structure of geospatial data within the database, detailing how tables, columns, data types, and spatial indexes are organized to optimize data access, storage efficiency, and performance within the GeoPackage file.

SQL commands to create the GeoZone schema in GeoPackage

The following SQL commands can be used to generate the GeoZone schema in a GeoPackage database.

```sql
-- Create Countries table
CREATE TABLE Countries (
    countryId SERIAL PRIMARY KEY,
    countryCode VARCHAR(50),
    countryName VARCHAR(150)
);
-- Create Diseases table
CREATE TABLE Diseases (
    diseaseId SERIAL PRIMARY KEY,
    diseaseCode VARCHAR(50),
    diseaseName VARCHAR(150)
);
-- Create Species table
CREATE TABLE Species (
    specieId SERIAL PRIMARY KEY,
    specieName VARCHAR(150)
);
-- Create Measures table
CREATE TABLE Measures (
    measureId SERIAL PRIMARY KEY,
    measureName VARCHAR(150)
);
-- Create Zone table with spatial data
CREATE TABLE Zone (
    geometry GEOMETRY(MULTIPOLYGON, 4326),
    localIdentifier VARCHAR(50),
    countryId INTEGER,
    diseaseId INTEGER,
    zoneType VARCHAR(100),
    zoneSubtype VARCHAR(50),
    zoneStatus VARCHAR(50),
    accuracy VARCHAR(50),
    geographicalName VARCHAR(250),
    datebegin DATE, -- designationPeriod start
    dateend DATE, -- designationPeriod end
    PRIMARY KEY (localIdentifier),
    FOREIGN KEY (diseaseId) REFERENCES Diseases(diseaseId),
    FOREIGN KEY (countryId) REFERENCES Countries(countryId)
);
-- Create Zone_has_Specie table
CREATE TABLE Zone_has_Specie (
    localIdentifier VARCHAR(50),
    specieId INTEGER,
    PRIMARY KEY (specieId, localIdentifier),
    FOREIGN KEY (localIdentifier) REFERENCES Zone(localIdentifier),
    FOREIGN KEY (specieId) REFERENCES Species(specieId)
);
-- Create Zone_has_Measure table
CREATE TABLE Zone_has_Measure (
    localIdentifier VARCHAR(50),
    measureId INTEGER,
    PRIMARY KEY (measureId, localIdentifier),
    FOREIGN KEY (localIdentifier) REFERENCES Zone(localIdentifier),
    FOREIGN KEY (measureId) REFERENCES Measures(measureId)
);
```

Annex F – Use cases after the pilot test results

(Informative)

This annex details the use cases that formed the basis for the requirements analysis development and were also used to test the completeness, applicability, and sustainability of the data product during a pilot test exercise. The use cases were developed by a network of WOAH Collaborating Centres as part of a WOAH collaborating project titled "GeoZone - Development of a standard for the collection and sharing of zone geographic component".

1. Create the zone dataset to transfer to a Member

1.1. User story.

In the live animal import/export unit, our goal is to effectively communicate information about active avian disease zones within our country to a Member. We aim to compile a dataset of these zones based on selected avian species or avian diseases. The final output will be a feature file, which will be transmitted to the Member for further processing.

1.2: UML use case diagram.
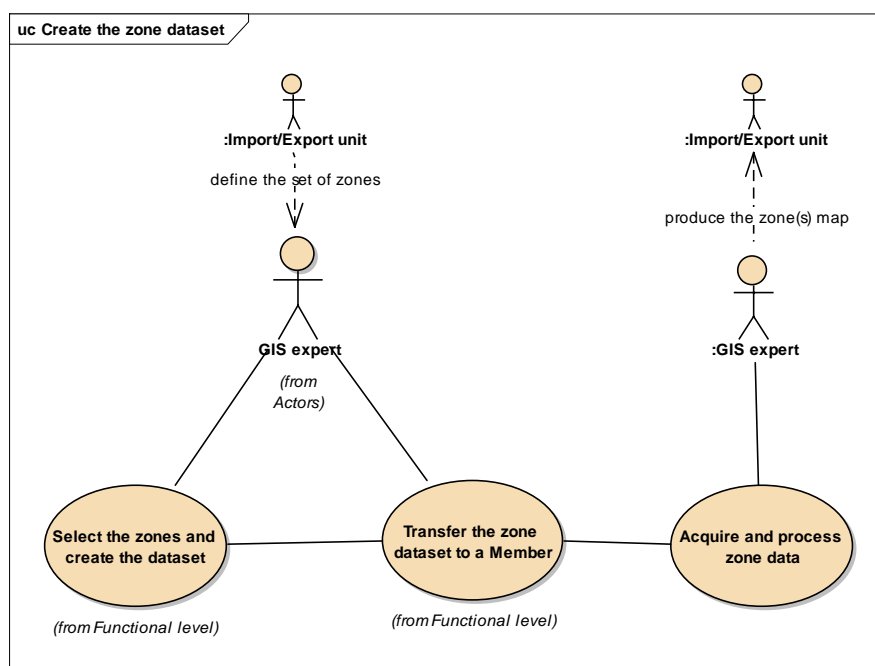
1.3: Use case description table.

| ID: 1	
Name	Share zone geospatial data with a trade partner
Actor	Import/Export Unit: Primary actor
Goal	Acquire a zone(s) geospatial data to evaluate the zone spatial distribution within a trade partner's territory.
Level	User.
Description	Process for acquiring zone maps to be integrated into the animal import/export dossier.
Pre-condition	• The exporting partner has a GIS solution that manages zone data compliant with the GeoZone data schema;

	• The importing partner has the ability to manage and process the received zone data.
Post-condition	The importing partner's staff has organized the acquired data into a dedicated repository to produce maps and perform spatial analysis.
Relationship with other use cases	• User discovers and visualizes zone; • Schema matching.

Flow of Events (successful scenario) – the importing trade unit has the zone(s) displayed in the GIS software.	
Step 1	The exporting trade unit prepares a list of zones to share with the trade partner.
Step 2	The exporting trade partner produces and shares the zone(s) dataset with the trade partner.
Step 3	The importing trade partner acquires the zone geospatial data.
Step 4	The importing GIS expert uses GIS software to process the zone data, produce zone maps, and conduct the necessary spatial data analysis.

2. User discovers and visualizes zone[14]

2.1: User story.

The Veterinary Authorities plan to review the status of zones managed within the GIS system to identify the zones that will be communicated to a Member. Using the GIS system's functionalities, they conduct searches, apply filters, analyze the data, and generate maps to validate the information before transmission.

2.2: UML use case diagram.

---
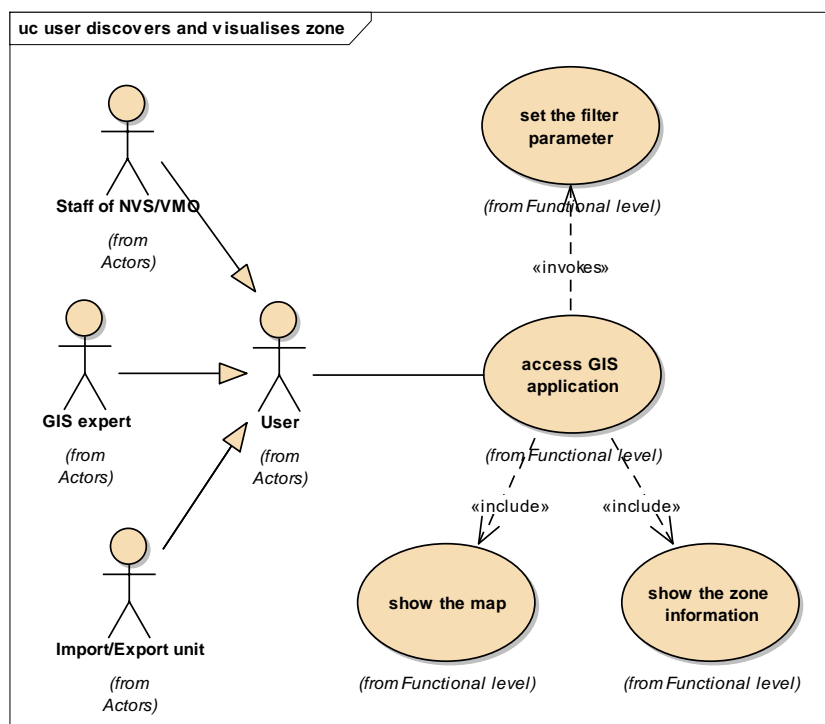
[14] The purpose of this use case is to emphasize that attributes are used to characterize zones from an inventory and ESDA (Exploratory Spatial Data Analysis) perspective. The chosen approach views attributes/characteristics as elements essential for identifying and selecting zones. In other words, these characteristics help differentiate one zone (or a set of zones) from others. They can also be used to create thematic maps of the zones or develop analytical processes related to the geographic relationships between the features.
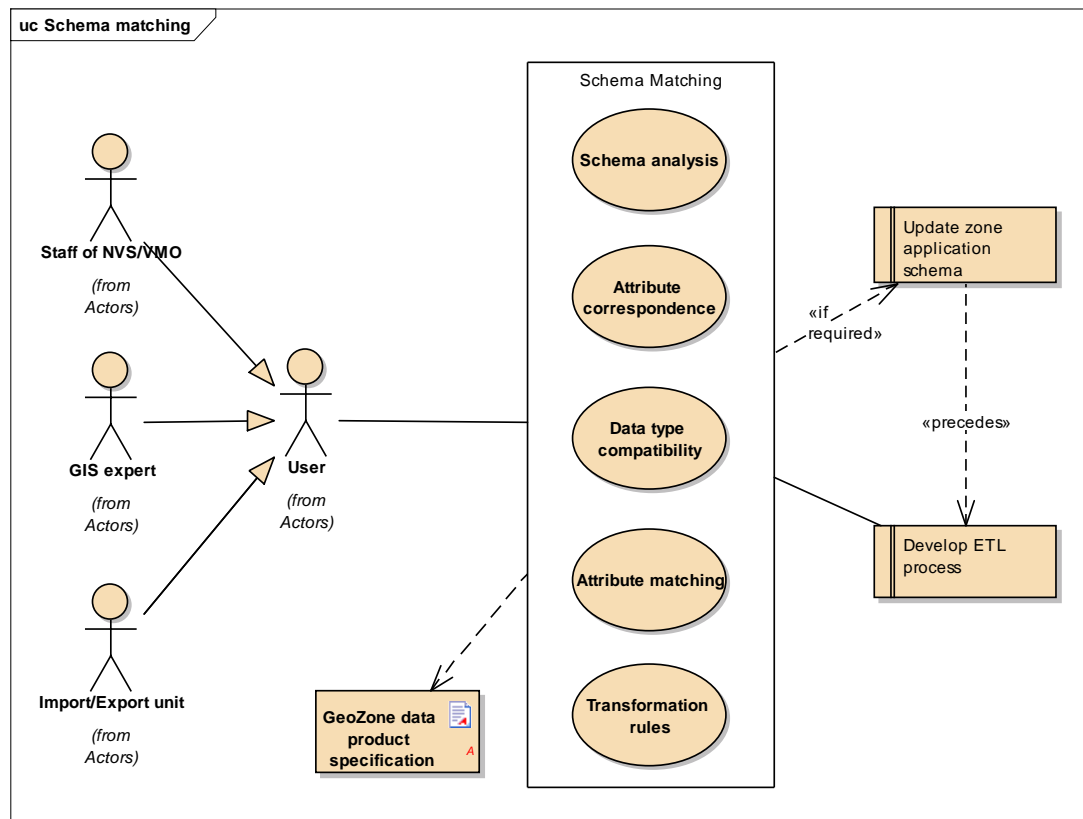
2.3: Use case description table.

ID: 2	
Name	User discovers and visualizes zones
Actor	• GIS Expert: Primary actor • Other users: Import/Export Unit and NVS/VMO staff
Goal	To analyze the geospatial data of zones stored in the GIS application and verify their validity before transferring a subset of zones to a Member.
Level	Functional.
Description	Process aims to identify the criteria that could be used to determine the zones that should be transferred to the Member. The elements to be used for search and filtering operations will be included as attributes of the feature.
Pre-condition	• The exporting partner has a GIS solution dedicated to manage zone data compliant with the GeoZone data schema; • The importing partner is able to manage and process the received zone data.
Post-condition	All zone characteristics used for search and filtering operations are included in the featured schema.
Relationship with other use cases	• Create the zone dataset to transfer to a Member.
Flow of Events (successful scenario) – The data schema contains all the information needed to identify the zones	
Step 1	The exporting partner's Import/Export Unit defines the criteria to be used for selecting the zones to include in the dataset to be transmitted to the trade partner.
Step 2	The GIS technician uses the criteria defined by the Import/Export Unit to select the zones to include in the dataset to be transmitted to the importing partner.
Step 3	The GIS technician produces maps and other outputs useful for the unit to validate the list of selected zones.

3. Schema matching

3.1: User story.

A Veterinary Authority has a system that manages information related to zones. The authority decides to use the system to extract the zones to be communicated by a Member. To this end, technicians develop a process aimed at verifying the correspondence between the data in use (in terms of syntax and semantics) and the data required by the common GeoZone scheme.

3.2: UML use case diagram

3.3: Use case description table.

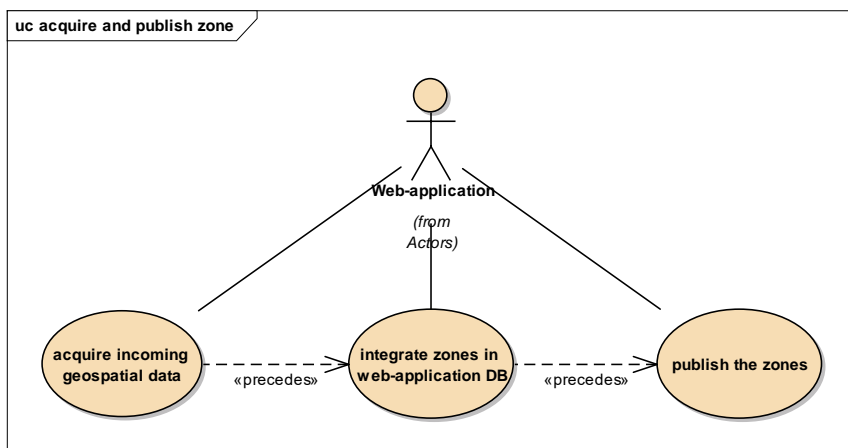| ID: 3	
Name	Schema matching
Actor	- Primary actor: GIS Expert - Other users: Import/Export Unit and NVS/VMO staff
Goal	Define the schema matching process to extract, transform, and create a *zone* dataset compliant with the GeoZone data model.
Level	User.
Description	A Veterinary Authority intends to use the current zone management system to extract *zone* data for transfer to a Member according to the GeoZone data model, which requires schema matching. This process involves several steps: first, the NVS/VMO staff and the GIS technician analyse the structure of both the GeoZone and local system structures to understand their names, data types, and meanings. Next, they identify which attributes from the local system match those in GeoZone, such as matching "pathogen" to "disease." The GIS technician ensures compatibility of the data types, and they collaboratively map attributes, considering naming and structural differences. Finally, the GIS technician defines the transformation rules to convert the data into the required format.
Pre-condition	- The Import/Export Unit and NVS/VMO staff understand the semantic and syntactic definitions of the current *zone* management system; - The Import/Export Unit, NVS/VMO staff, and GIS technician are familiar with the GeoZone data model; - The current system can be extended to include information required by GeoZone, but that is not currently part of the data schema.

Post-condition	The current *zone* management system can extract the *zone* data, and a transformation procedure can produce a dataset that conforms to the GeoZone data model.
Relationship with other use cases	- Create the *zone* dataset for transfer to a Member; - User discovers and visualizes the zone.
Flow of Events – (1) The current system requires no modifications to comply with the GeoZone data model	
Step 1	The GIS expert, alongside the Import/Export Unit and NVS/VMO staff, review the structure of the GeoZone (target schema) and local system (source schema), including names, data types, and semantics.
Step 2	NVS/VMO staff identify attributes in the source schema that correspond to those in the target schema, such as matching the "pathogen" field to the "disease" field.
Step 3	The GIS technician ensures that the matched attributes' data types (e.g., strings, integers, dates) are compatible for transformation and integration.
Step 4	NVS/VMO staff and the GIS technician map individual attributes from the source schema to the target schema, considering naming conventions, semantics, and structural differences.
Step 5	The GIS technician defines rules or processes for transforming data from the source format to the target format.
Flow of Events – (2) The current system lacks information required by GeoZone.	
Step 1	The GIS expert with the Import/Export Unit and the NVS/VMO staff review the structure of the GeoZone (target schema) and local system (source schema), focusing on names, data types, and semantics.
Step 2	NVS/VMO staff work with the GIS expert to identify attribute gaps between the target and the source schemas.
Step 3	The GIS technician collaborates with the zone information system manager to plan the system adjustment to meet GeoZone specifications.
Step 4	The zone information system manager implements necessary modifications to the current system based on specifications defined with the GIS technician.
Step 5	The GIS technician defines the rules or processes required to transform data from the source format to the target format.

4. Publish a zone's data by means of the web-application

4.1: User story.

The web-application system acquires the incoming information and subsequently initiates the process to verify, integrate, and publish the received data.

4.2: UML use case diagram.

4.3: Use case description table.

ID: 4	
Name	Publish a zone's data
Actor	Web-application: Primary actor
Goal	Publish a zone's geospatial data using the web-application.
Level	Functional.
Description	Process to acquire and publish zone geospatial data.
Pre-condition	A protocol has been established to acquire, verify, integrate, and publish zone geospatial data.
Post-condition	The web-application successfully publishes the zone geospatial data.
Relationship with other use cases	Transmit a zone to the web-application.
Flow of Events – Successful scenario – acquire and publish geospatial data of a new zone	
Step 1	The web-application receives a set of geospatial data.
Step 2	The web-application verifies the data compliance with the GeoZone data schema.
Step 3	The web-application verifies the quality of the received data.
Step 4	The web-application successfully stores the received data in its database.