OIE Cooperation Project

Capacity development for implementing a Geographic Information System (GIS) applied to surveillance, control and zoning of avian influenza and other emerging avian diseases in China

Workshop

The development of a standard for the zoning geographical component

- Report -

Beijing, 17th October 2018

List of contents

List of abbreviations and acronyms

AI	Avian Influenza
BVD	Bovine Viral Diarrhoea
CAHEC	China Animal Health and Epidemiology Centre (China)
CAIQ	Chinese Academy of Inspection and Quarantine (China)
CC	Collaborating Centre
CIRAD	Centre International en Recherche Agronomique pour le Développement (France)
EpiCentre	(New Zeeland)
GeoZone	First-cut data product specification document for the zone geographical component developed by IZSVe and CAIQ within the framework of the OIE Cooperation Project
GIS	Geographic Information System
HPAI	Highly Pathogenic Avian Influenza
IZSVe	Istituto Zooprofilattico Sperimentale delle Venezie (Italy)
ISO / TC	International Standardisation Organisation / Technical Committee
NARO	National Institute of Animal Health (Japan)
ND	Newcastle Disease
OGC	Open Geospatial Consortium
PRRS	Porcine Respiratory and Reproduction Syndrome
SPS	Sanitary and Phytosanitary Standards
TB	Tuberculosis
USDA-APHIS-VS-CEAH	United States Department of Agriculture - Animal and Plant Health Inspection Service - Centre for Epidemiology and Animal Health (USA)
WGS84	World Geodetic System 1984
WTO	World Trade Organisation

Reference documents

The workshop has a technical content outlined in the document called “Technical workshop Program” (Annex 5.1 - Technical workshop - Program) which was developed and shared with the participating institutes and with the OIE. In order to effectively contribute to the workshop objective participants were briefed in advance by means of the document “Technical Workshop - Scope statement” (Annex 5.2 -

Technical workshop - Scope statement). One of the workshop output was the endorsement of the document “First-cut data product specification document for the zone geographical component: Zone - Data product specification” (Annex 5.3 - Zone - Data product specification).

Overview

This workshop, called “Capacity development for implementing a GIS applied to surveillance, control and zoning of avian influenza and other emerging avian diseases in China”, which was jointly organised by the Chinese Academy of Inspection and Quarantine (CAIQ) and the CC for Epidemiology, Training and Control of Emerging Avian Diseases - Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe) at the CAIQ HQ in Beijing the 17th October 2018, stems out from the OIE Cooperation Project between the two project partners. The workshop was designed for OIE CCs dealing with epidemiology and aimed at:

- Providing chances for sharing GIS experiences applied to the zoning procedure described in chapter 4.3 of the OIE Terrestrial Code.
- Exchanging knowhow about the application of international geographical standards.
- Assessing the validity, applicability, sustainability, appropriateness and opportunity of a spatial data model for a zone based on the OIE Zoning procedure jointly developed by IZSVe and CAIQ.

Workshop scope

The overall objective of the workshop was to provide an opportunity for OIE CCs to increase their awareness on zoning geographic components and to brainstorm on the importance of the geographic data model for sharing geo-referenced animal health information. The discussion started from a proposal of data product specification for the zone geographic component proposed by IZSVe and CAIQ (Annex 5.3 - Zone - Data product specification).

The workshop aimed also at discussing and learning from each other by sharing experiences about the challenges and opportunities in using spatial data with the final purpose to promote transparency, consensus and methodological coherence on the geographic information shared among OIE Member Countries.

Further information about the workshop scope are provided in the scope statement document (Annex 5.2 - Technical workshop - Scope statement).

Workshop participants

List of speakers

Nicola Ferrè	Head of the GIS office at IZSVe (Italy)
Masatsugu Okita	OIE Second Vice President of OIE Terrestrial Animal Health Standard Commission (Japan)
Matthew Stone	OIE Deputy Director General "International Standards and Science” (France)
Paolo Tizzani	Veterinary Epidemiologist at the OIE headquarter (France)

List of OIE CC attending scientists

Name	**OIE CC**	**at**
Flavie Goutard	Diagnosis, Epidemiology and Control of Animal Diseases in Tropical Regions	Centre International en Recherche Agronomique pour le Développement (France)
Kang Jingli	Veterinary Epidemiology and Public Health	China Animal Diseases Control Centre (China)
Stefano Marangon	Epidemiology, Training and Control of Emerging Avian Diseases	IZSVe (Italy)

Jennifer Siembieda	Animal Disease Surveillance Systems, Risk Analysis and Epidemiological Modelling	USDA-APHIS-VS-CEAH Centres for Epidemiology and Animal Health (USA)
Art Subharat	Veterinary Epidemiology and Public Health	EpiCentre (New Zealand)
Yumiko Shimizu	Diagnosis and Control of Animal Diseases and Related Veterinary Product Assessment in Asia	National Institute of Animal Health (Japan)

List of invited scientists

Daniele Bernardini	IZSVe General Director (Italy)
Alessandro Cristalli	IZSVe consultant (Italy)
Matteo Mazzucato	GIS specialist at the IZSVe GIS office (Italy)
Matteo Morini	Veterinary Epidemiologist at the OIE headquarter (France)
Manlio Palei	President of IZSVe Board of trustees and Head of the Veterinary Service Office at the Friuli Venezia Giulia Region (Italy)
Dou Shulong	General Administrations of Customs of the People's Republic of China (P.R. China)
Qiu Song-yin	Chinese Academy of Inspection and Quarantine (P.R. China)

Workshop agenda

Information about the workshop agenda is provided in the technical workshop program document (Annex 5.1 - Technical workshop - Program).

Content of the workshop

The workshop was composed of four sessions:

1. Welcome and introduction
2. International standards - Geographic information/Geomatics
3. Presentation of the zone spatial data model developed by IZSVe and CAIQ
4. General discussion.

The first session stated the objectives of the workshop. The second session had the scope of setting the key concepts and the terminology of zoning and geomatics. The third session was designed for the presentation of the data product specification for the zone geographical model developed by IZSVe and CAIQ. The fourth and final session capitalised on the other sessions and triggered a brainstorming about the validity, applicability, sustainability, appropriateness and opportunity of implementing the proposed data product specification.

Session "Welcome and introduction"

The Workshop was opened by Stone who highlighted the importance of geographic standards and the key role of the CCs for making available their expertise. The introduction of each participant followed so that all the attending scientists presented themselves and their institution. After the round of introduction, Tizzani delivered his presentation.

Presentation "Introduction of Workshop objects" by Paolo Tizzani

Tizzani set the terms of evaluation of the proposed data product specification for the zone geographical component jointly developed by IZSVe and CAIQ.

The participating scientists were briefed on the tools to be used for assessing the proposed data model, and in particular the model was evaluated against the following four dimensions:

- Applicability
- Sustainability

- Appropriateness
- Opportunity.

The following slides were used.

Introduction to the Workshop Objectives

Workshop - The development of a standard for the zone geographical component
Beijing 17 October 2018

Dr Paolo Tizzani
Veterinary epidemiologist
World Animal Health Information and Analysis Department

Workshop objectives

- Exchange knowhow about the use of **international geographical standards**
- Share experiences on **zoning**
- Assess the
  - Appropriateness
  - Applicability
  - Opportunity
  - Sustainability

of implementing a **data product specification** for the **zone** geographical component (Chapter 4.3 of the *OIE Terrestrial Animal Health Code*)

Sub-objective 1 – Appropriateness

Points to discuss:

In order to be appropriate the model should:

1. provide **spatial and non-spatial information** about zones
2. enable the **representation of the spatial distribution** of zones according to the zone characteristics (e.g.: disease, type of zone, etc.)
3. enhance the **accuracy** and the **organization** of the spatial data
4. enable **spatial and temporal analysis**

Sub-objective 2 – Applicability

Points to discuss:

1. Applicability of the data model, within the framework of the Veterinary Authority, for the management of zones
2. Complexity to implement the physical schema of the data model, including technological and architecture considerations
3. Evaluate if the data model is **configurable**, **customizable**, and **upgradable**

Sub-objective 3 – Opportunity

Points to discuss :

1. types of **change management** for the Veterinary Autority (minor, normal, major)
2. evaluation of the **benefits** compared to the **costs**

Sub-objective 4 – Sustainability

Points to discuss :

1. **Priority** of the data model for zoning among the other activities of the Veterinary Authority
2. Level and degree of **acceptability**
3. Post-implementation and monitoring strategies (e.g. coaching, training)

Open discussion on workshop objectives

Stone facilitated all the invited CCs to share their experiences on the data model adopted in their country for the zone geographical component based on the OIE zoning procedure.

Shimizu described the Japanese system used to draw zones. She outlined that it uses information stored in a cloud system combined with a farm database. A metadata catalogue associated to the zones is used. The coordinate reference system is the Japanese Geodetic Datum.

Goutard described the French system emphasising the interaction between different databases. The WGS84 system with Lamber projection is used as the coordinate reference system. Proprietary software (MapSignal, MapSigal, CartoGIP) along with generalist GIS software (e.g.: QGIS) are used to draw zones.

Subharat reported that in the New Zealand system zoning is very important for aquaculture, for BVD and Bovine TB especially for the identification the areas where TB vaccination is compulsory. Other important uses are applied to the traps for wild life control. Challenges are posed by the links between databases. The geographic reference systems used are the WGS84 and the New Zealand Transverse Mercator 2000. Software such as R spatial packages, QGIS, and IRIS are used.

Jingli reported that in China webGIS is used to manage zones but a new system is being developed. Important uses of zoning were applied to the spatial analysis of the AI subtype H7N9 epidemic where tracing back and forward exercises were performed. Zoning is also very relevant for PPRS.

Siembieda outlined some zoning cases for controlling HPAI and ND in California. Here polygons are drawn as delimited by roads.

Marangon presented the system used by IZSVe (AI and ND Italian reference laboratory) to manage AI restriction zones. The system is based on a geodatabase combined with a webGIS application. The coordinate reference system is WGS84.

Session “International standards - Geographic information/Geomatics”

In this session Okita, and Tizzani provided the most updated information about the international standards for building, identifying and defining the zoning.

Presentation “The zoning procedure of the OIE Terrestrial Code, its use and implementations” by Okita

Okita outlined a presentation starting from the concept of zoning and compartmentalisation and then going through chapter 4.3 of the OIE most updated terrestrial code where zoning and compartmentalisation are standardised. He framed the zoning in the WTO SPS agreement and then touched upon how zones are planned and implemented in Japan.

The following slides were used.

The zoning procedure of the OIE Terrestrial Code, its use and implementations

Dr Masatsugu Okita, DVM

2nd Vice President of
OIE Terrestrial Animal Health Standards Commission

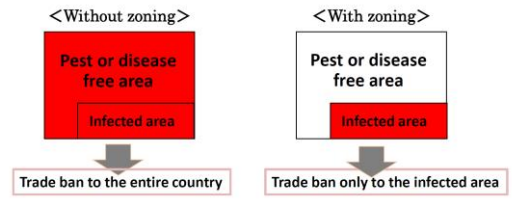
Contents

1. **What is zoning?**
2. **International standards on zoning**
3. **Zoning procedure of the OIE Code**
4. **Example of zoning application (Japan)**

2

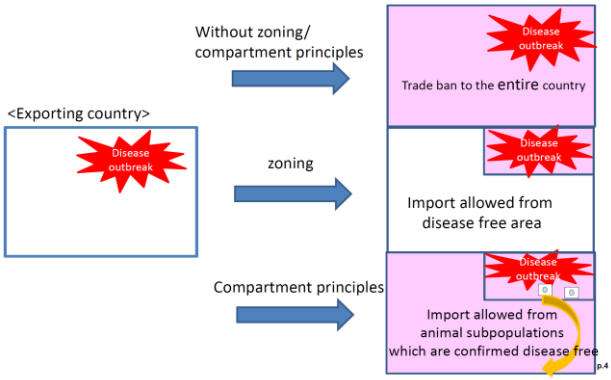
What is zoning?

Since it is not necessarily appropriate to adopt the same measures to all agricultural products originated from various countries in related to climate, pests or diseases, SPS Agreement provides Member Countries shall adapt their SPS measures to the situations.



p.3

zoning and compartment principles



p.4

WTO SPS Agreement - regionalisation

The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement)

Article 6
Adaptation to Regional Conditions, Including Pest- or Disease-Free Areas and Areas of Low Pest or Disease Prevalence

1.Members shall ensure that their sanitary or phytosanitary measures are adapted to the sanitary or phytosanitary characteristics of the area - whether all of a country, part of a country, or all or parts of several countries…
2.Members shall…recognize the concepts of pest — or disease-free areas… Determination of such areas shall be based on factors such as geography, ecosystems, epidemiological surveillance, and the effectiveness of sanitary or phytosanitary controls.

WTO SPS Agreement - Regionalisation

The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement)

Article 6
Adaptation to Regional Conditions, Including Pest- or Disease-Free Areas and Areas of Low Pest or Disease Prevalence

3. Exporting Members… shall provide the necessary evidence… to objectively demonstrate...that such areas are...pest— or disease—free areas… For this purpose, reasonable access shall be given…, upon request, to the importing Member for inspection, testing and other relevant procedures.

p.6

OIE Code - zoning

OIE Terrestrial Animal Health Code (OIE Code)

Chapter 4.3.
Zoning and compartmentalisation

Article 4.3.1. Introduction
...there may be benefits to a Member Country in establishing and maintaining a subpopulation with a distinct health status within its territory.... Subpopulations may be separated by natural or artificial geographical barriers or, in certain situations, by the application of appropriate management practices.

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OIE Code - zoning

OIE Terrestrial Animal Health Code (OIE Code)

Chapter 4.3.
Zoning and compartmentalisation

Article 4.3.1. Introduction

...While zoning applies to an animal subpopulation defined primarily on a geographical basis, compartmentalisation applies to an animal subpopulation defined primarily by management and husbandry practices related to biosecurity. In practice, spatial considerations and appropriate management, including biosecurity plans, play important roles in the application of both concepts.

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OIE Code - zoning

OIE Terrestrial Animal Health Code (OIE Code)

Chapter 4.3.
Zoning and compartmentalisation

Article 4.3.2. General considerations

The Veterinary Services, including laboratories, should be established and should operate in accordance with Chapters 3.1. and 3.2., to provide confidence in the integrity of the zone or compartment. The final authority over the zone or compartment, for the purposes of domestic and international trade, lies with the Veterinary Authority.

p.9

Zoning procedure of the OIE Code

1. Establishment of a zone
2. Maintenance of the subpopulation
   - Epidemiological separation
   - Surveillance
   - Movement control
   - Identification and traceability
3. Contingency plan
   - Early detection
   - Disease control (stamping out, vaccination, disinfection)
   - Containment zone/Protection zone

p.10

Zoning procedure of the OIE Code

1. Capability of Veterinary Service
   - Human resources
   - Veterinary legislations
   - Laboratory
   - Identification and traceability
2. Relevant OIE standards
   - Notification
   - Surveillance
   - Quality of Veterinary Services
   - Vaccination
   - Disease specific chapters

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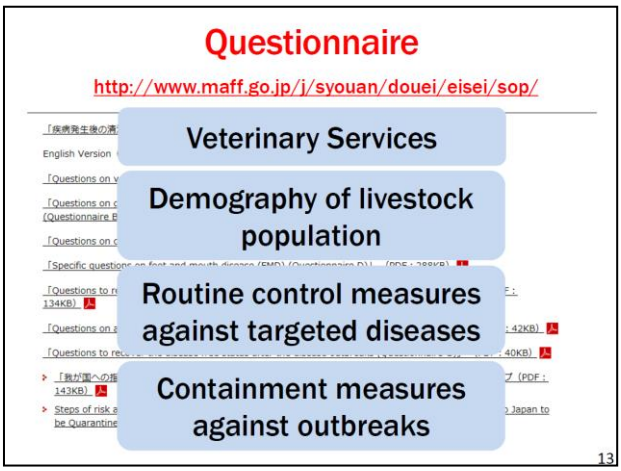
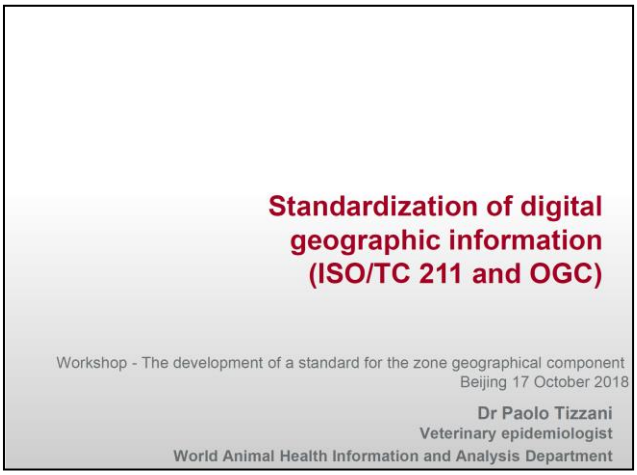
Standard Procedure for risk assessment for zoning application in Japan

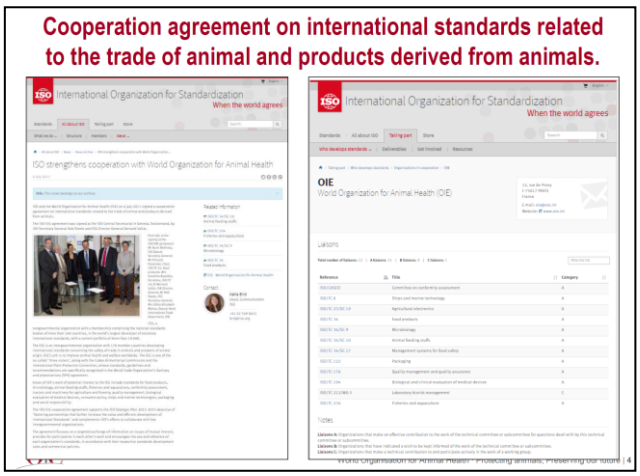


Presentation “Standardization of digital geographic information (ISO/TC 211 and OGC)” by Tizzani

In order to move from the norms which legally define zoning and compartmentalisation to their digital geographic reporting and sharing, Tizzani delivered a presentation on the standardisation of the digital geographic information following the ISO/TC and OGC standards.

The following slides were presented.





Standards in digital geographic information?

https://committee.iso.org/home/tc211

ISO/TC 211

Field of reference Geomatic: discipline of gathering, storing, processing, and delivering geographic information or spatially referenced information

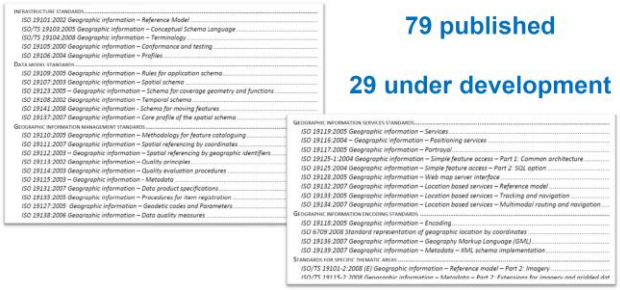
Scope

- Standardization in the field of **digital geographic information**.
- Establish a structured set of standards for information concerning objects or phenomena that are directly or indirectly associated with a **location relative to the Earth**.
- Standards may specify, for **geographic information**, **methods**, **tools** and **services** for **data management** (including definition and description), **acquiring**, **processing**, **analyzing**, **accessing**, **presenting** and **transferring** such data in digital/electronic form.

Overall objectives of ISO/TC 211

- Increase the **understanding** and **usage** of geographic information
- Increase the **availability**, **access**, **integration**, and **sharing** of geographic information
- Promote the **efficient**, **effective**, and **economic use** of digital geographic information and associated hardware and software systems

Current situation of ISO geographic standards



79 published

29 under development

Open Geospatial Consortium (OGC)

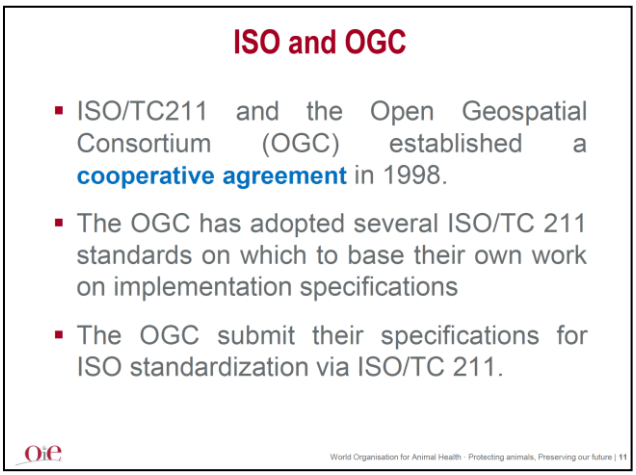
The Open Geospatial Consortium (OGC) is an international no profit organization of over 519 companies committed to making quality **open standards** for the global geospatial community

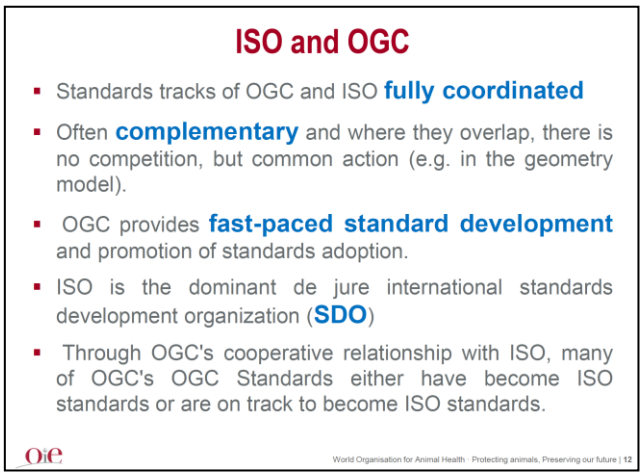
Open Geospatial Consortium (OGC)

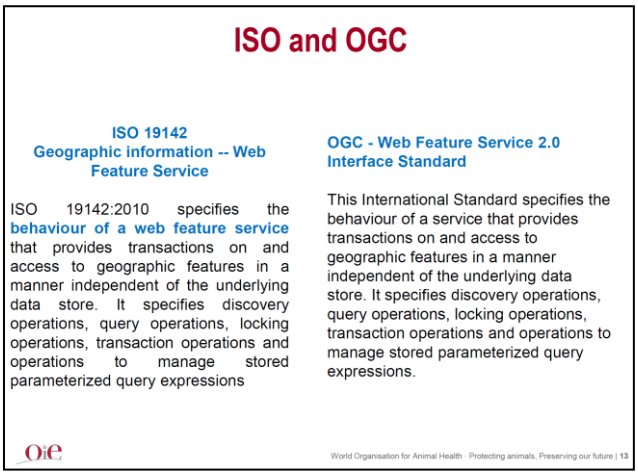
30 standards

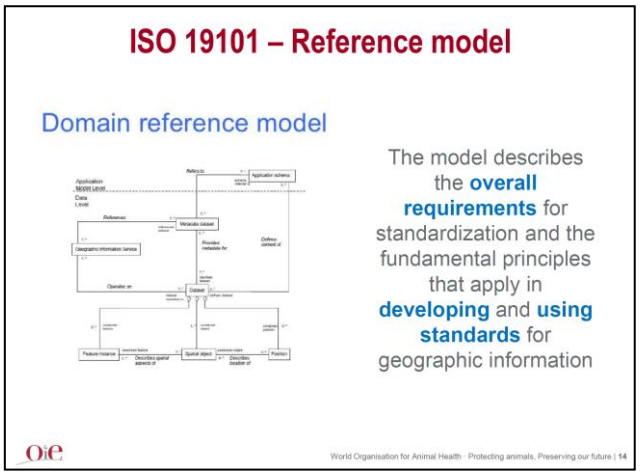
The OGC standards baseline comprises more than **30 standards**, including:

- CSW – Catalog Service for the Web: access to catalog information
- **GML – Geography Markup Language:**
- **KML – Keyhole Markup Language:**
- O&M - Observations and Measurements
- OLS – Open Location Service (OpenLS)
- OGC Web Services Context Document
- OWS – OGC Web Service Common
- SensorML – Sensor Model Language
- SensorThings API
- SFS – Simple Features – SQL
- **SLD - Styled Layer Descriptor**
- **SRID, an identification for spatial coordinate systems**
- WaterML - model for the representation of hydrological observation data
- **WCS – Web Coverage Service**.
- WCPS – Web Coverage Processing Service.
- **WFS – Web Feature Service: for retrieving or altering feature descriptions**
- **WMS – Web Map Service: provides map images**
- **WMTS – Web Map Tile Service: provides map image tiles**
- **WPS – Web Processing Service: remote processing service**
- GeoSPARQL – Geographic SPARQL Protocol.
- WTS – Web Terrain Service (WTS)









Session "Presentation of the IZSVe-CAIQ zone spatial data model"

This session builds on the concepts and norms of zoning in chapter 4.3. of the OIE Terrestrial Code, then resources to the ISO/TC and OGC standards for the digital geographic information and subsequently describes the GeoZone in a properly called "first-cut" (i.e. a first proposal) of the specification of the data for the zone geographical component. After the presentation, the speakers, the session chairman, and the GIS IZSVe team enhanced the participants to raise questions.

Presentation "Proposal of a "first cut" data product specification for the zone geographical" by Ferrè

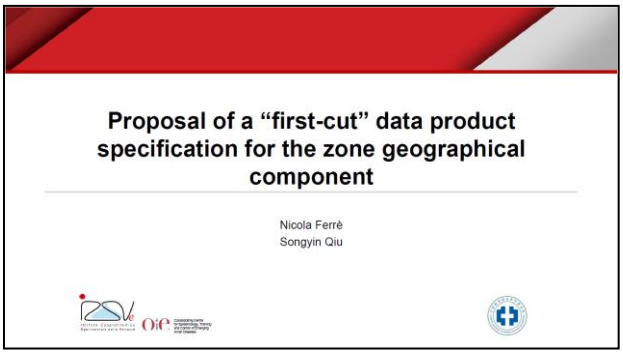
Ferrè delivered a presentation on the GeoZone that covered the following aspects of the data product:

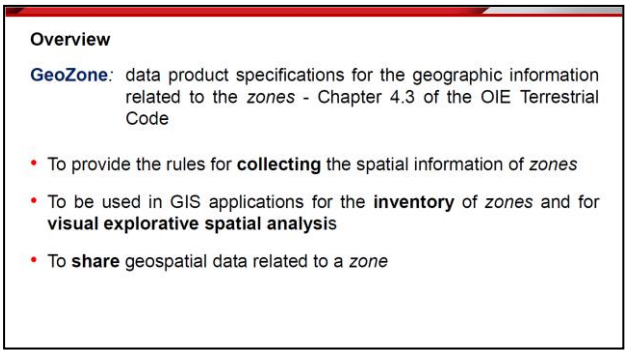
- Overview

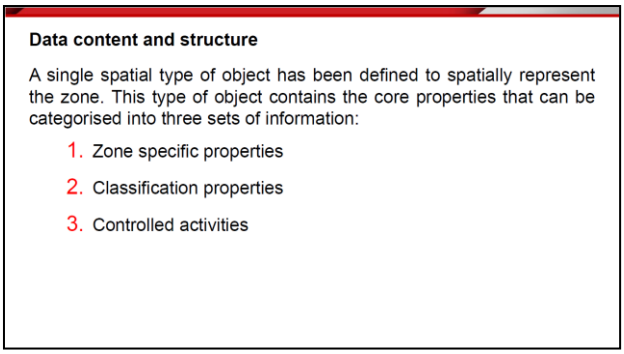
- Data content and structure
- UML overview
- Geometry representation
- Temporal and coordinate reference system
- Use cases.

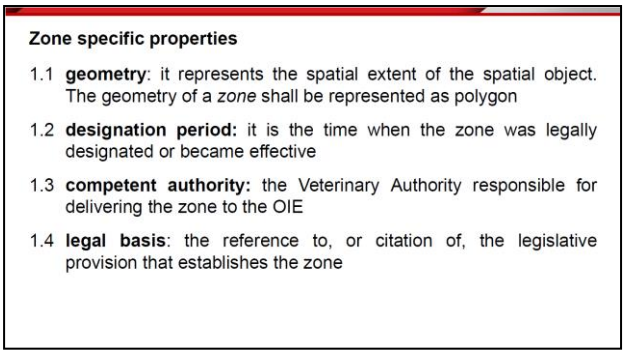
The “overview” section covers information about the data product specific purposes, the “data content and structure” describes of the feature-based data product in terms of application schema and feature catalogue, the “UML overview” is the session that presents the diagram used to describe the data product, the “geometry representation” session describes the type of geometry used to represent the data product, the “temporal and coordinate reference system” contains information about the temporal and spatial rules to represent the data product, and finally the “use cases” session presents the use cases used to determine the data product representation and behaviour.

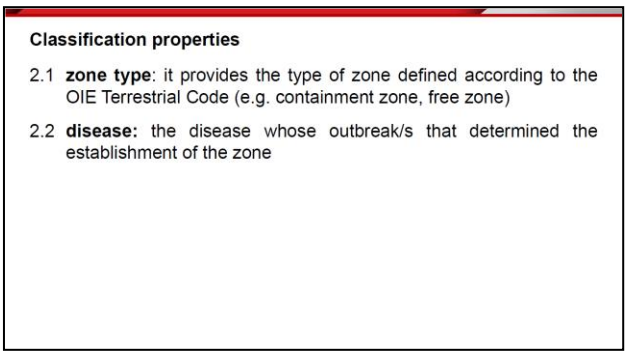
The following slides were used.

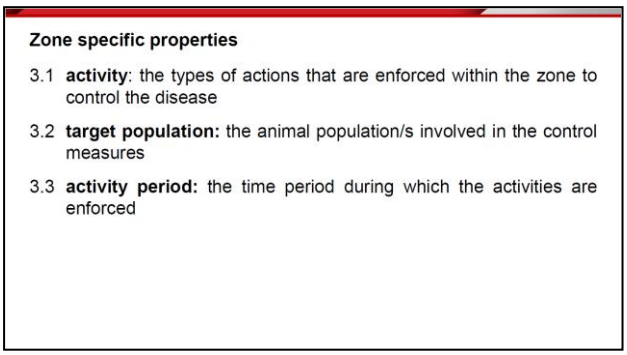




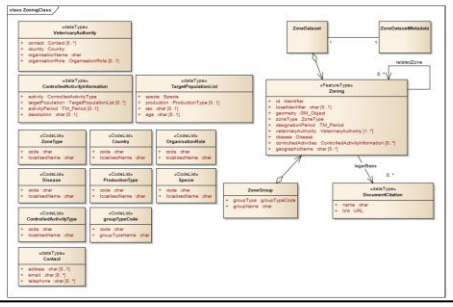




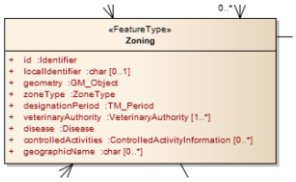




UML overview

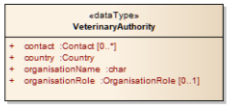


Zoning

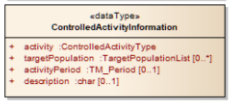


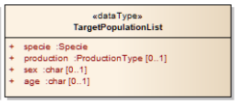
Attribute	Description
id	Identifier (e.g. UUID)
localIdentifier	Code given by the data producer
geometry	Geometry representing the spatial extent of the zone
zoneType	Classification of zone (e.g. containment zone, free zone, infected zone)
designationPeriod	When the zone is legally designated or became effective
veterinaryAuthority	Veterinary Authority that is responsible for delivering the zone data
disease	Disease
controlledActivities	Activities or control measures put in place in the zone
geographicName	Geographical name that is used to identify a zone

dataType



The code list related to the data types shall be compliant to I18N technologies





Geometry representation

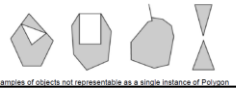
The geometry representation (indicated in the Zoning feature type as GM_Object) refers to the ISO standard **Simple feature spatial schema** (ISO19107)

This specification restricts the spatial schema to polygons.

A polygon is a planar surface defined by 1 exterior boundary and 0 or more interior boundaries. Each interior boundary defines a hole in the polygon.

Examples of polygons with 1, 2 and 3 rings, respectively

Where a *zone* is comprised of multiple parts, the geometry of every single part should be provided



Examples of objects not representable as a single instance of Polygon

Temporality representation

The **designationPeriod** and the **activityPeriod** use the TM_Period property (ISO19108).

This property defines the “beginPosition” and the “endPosition”.

- beginPosition: the date at which the zone or the activity became valid
- endPosition: the date at which the zone or the activity is no longer valid

The data shall be organised in a way that the largest temporal term (the year) appears first in the data string and progresses to the smallest term (the second)

Example. 1968-06-27 shall be used to refer to 27th June 1968

Coordinate reference system

Spatial data set shall be made available using the **WGS84** coordinate reference system

The data model proposes the use of the http URIs provided by the Open Geospatial Consortium as coordinate reference system identifiers. These are based on and redirect to the definition in the EPSG Geodetic Parameter Registry (http://www.epsg-registry.org/).

The WGS84 is coded in the EPSG registry with the code 4326.

Zone portrayal

Style name	Zoning.InfectedZone.Default
Spatial object type	zoneType = InfectedZone
Abstract	The geometry is rendered using a red (#FF0000) fill with a transparency of 50% and a solid red (#FF0000) outline with a stroke width of 2 pixels
Example	

Style name	Zoning.FreeZone.Default
Spatial object type	zoneType = FreeZone
Abstract	The geometry is rendered using a light green (#33CC33) fill with a transparency of 50% and a solid light green line (#33CC33) outline with a stroke width of 2 pixels
Example	

Style name	Zoning.ContainmentZone.Default
Spatial object type	zoneType = ContainmentZone
Abstract	The geometry is rendered using a light brown (#CDAA66) fill with a transparency of 50% and a solid light brown (#CDAA66) outline with a stroke width of 2 pixels
Example	

Style name	Zoning.ProtectionZone.Default
Spatial object type	zoneType = ProtectionZone
Abstract	The geometry is rendered using a mango (#FFD37F) fill with a transparency of 50% and a solid mango (#FFD37F) outline with a stroke width of 2 pixels
Example	

Use cases - 1

Use Case Description	
Name	Draw Avian Influenza infected zones
Primary actor	Spatial planner in the Member Country
Goal	To draw the zone’s boundary and to store the related characteristics of an Avian Influenza infected zones.
System under consideration	Animal disease control
Description	The spatial planner defines the extent of the zone and draw the boundary according to a protocol derived from the legislation of the Member Country. A set of zone’s characteristics are stored in the attribute of the zone spatial object. Information about a set of appropriate control measures established by the Veterinary Authority within the zone can be stored in the attribute of the zone spatial object.
Pre-condition	Information about the Avian Influenza outbreaks are obtained/generated from local data sources. Ancillary spatial data (e.g. river branches, major roads, administrative boundaries, etc.) are available to the spatial planner. The spatial planner uses a GIS software and follow a protocol to draw the zone boundary and register the related characteristics of an Avian Influenza infected zones.
Flow of Events – Basic Path	
Step 1	The spatial planner verifies the quality and format of the spatial information about the Avian Influenza outbreak and if necessary, performs the spatial transformation of this data in order to overlay the spatial information with the ancillary spatial data.
Step 2	According to the protocol derived from the legislation of the Member Country, the spatial planner displays the spatial data (e.g. ancillary data, outbreaks data) in a GIS software and performs the spatial function to edit the zone boundary and the zone characteristics.
Step 3	The spatial planner activates the procedure for the validation of the zone borders and the related characteristics. If one or more information are not validated by the Veterinary Authority, the process envisages to perform again step 2.
Step 5	At the end of the validation process, the spatial planner activates the procedure for transferring the zone data to WHAIS+.

Use Case Description	
Name	Finding zones in a Member Country
Primary actor	Analyst
Goal	Identifying a list of zones and including the map in a report.
System U. C.	Risk analysis
Description	An analyst from a Veterinary Authority needs to perform a risk analysis for importing domestic animals from a given country. The analyst needs to acquire information about the spatial distribution of zones of a given disease in the interested area/ region.
Pre-condition	WHAIS+ provides zone spatial data by means of a file transfer process or a web service. The analyst has the ancillary spatial data (e.g. administrative boundaries, major roads, etc.) for the interest area.
Post-condition	The maps derived from the analysis are included in a specific report.
Flow of Events – Basic Path	
Step 1	By using a GIS software, the analyst accesses the zone dataset provided by WHAIS+.
Step 2	The analyst queries the zones for a given set off criteria (e.g. disease, period of time).
Step 3	The analyst organizes the layers for the analysis and develops the required maps from the queried data.
Step 4	The analyst activates the procedure for the validation of the output and for its inclusion in a specific report.

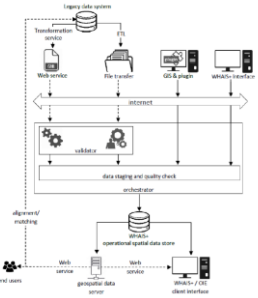
Use Case Description	
Name	Management of Avian Influenza infected zone validity period.
Primary actor	Spatial planner
Goal	To manage the date when an Avian Influenza infected zone is not in force any more.
System U. C.	Animal disease control
Description	According to the legislation, the spatial planner updates the value of the endPosition property of a specific Avian Influenza infected zone.
Pre-condition	The OIE zone has already been constituted and transmitted to the OIE.
Flow of Events – Basic Path	
Step 1	By using a GIS software, the analyst accesses the zone dataset provided by WHAIS+.
Step 2	The analyst queries the zones for a given identifier.
Step 3	The spatial planner updates the designation period value, in particular the endPosition property.
Step 4	The spatial planner activates the procedure for the validation of the updated value.
Step 5	At the end of the validation process, the spatial planner activates the procedure to send the zone with the updated values to WHAIS+.

Use cases - 2

Use Case Description	
Name	Modify the spatial information of an Avian Influenza infected zones
Primary actor	Spatial planner
Goal	If the spatial information of a zone that has been already sent to WHAIS+ needed to be modified, a new spatial object must be uploaded in the WHAIS+. All the previous information of the zone shall be versioned (the management and storage of the changes applied to the zone, allowing the chronologic reconstruction of the zones spatial distribution) and the new version of the zone is stored.
System under consideration	Animal disease control
Description	The spatial planner, among the zones already sent to WHAIS+, identifies the zone with the not correct value (either geometry or attribute) and edit the end date of zone validity in order to create an old version of the zone. After this operation the spatial planner performs the activities of the “To draw Avian Influenza infected zones” use case
Pre-condition	The correct information about the zone is provided to the spatial planner. Information about already defined zones are available in WHAIS+.
Flow of Events – Basic Path	
Step 1	By using a GIS software, the analyst accesses the zone dataset provided by WHAIS+
Step 2	The analyst queries the zones for a given identifier.
Step 3	The analyst verifies the zone information of the identified zone.
Step 4	The spatial planner modifies the end of validity of the identified zone (to create an old version of the identified zone) and save the edit.
Step 5	The analyst activates the procedure for the validation of the update value and, subsequently, activates the procedure for sending the zone data to WHAIS+.
Step 6	The spatial planner starts the process described in the “To draw Avian Influenza infected zones” use case

Use Case Description	
Name	Group of zones by epidemic
Primary actor	Epidemiologist and Analyst
Goal	To define a logical list of zones which are grouped or related together by a single characteristic.
System under consideration	Animal disease control
Description	The epidemiologist identifies a list of zones according to a given characteristic. It is not mandatory for a zone to be part of a group.
Pre-condition	Two or more zones for a given disease have been already defined in WHAIS+. The epidemiologist defines the characteristic/ criteria for grouping the zones.
Flow of Events – Basic Path	
Step 1	By using a GIS software, the analyst accesses the zone dataset provided by WHAIS+ and identifies the zones that should be grouped together.
Step 2	The analyst verifies if a group with the same characteristic is already stored in the acquired dataset in order to avoid duplications.
Step 3	The analyst queries the zones for the specific characteristic provided by the epidemiologist.
Step 4	The analyst, for each queried spatial object, assigns the group code in order to include them in the group. The group code is stored in the attribute of the zone spatial object.
Step 5	The epidemiologist validates the data modified by the analyst.
Step 6	At the end of the validation process, the spatial planner activates the procedure for transferring each zone with the updated values to WHAIS+.

Data supply chain



Open discussion on the proposed first-cut data product specification considering specific countries experiences on zoning

Ferrè provided the guidance for the revision of the use cases included in the data product document with the scope of refining the data product application schema, the functionalities and the system requirements. In particular, his request was for a general revision of the use cases developed by the IZSVe and CAIQ, and the inclusion of new use case. For instance, new use cases from developing Countries would better complete the analysis. The discussion provided ideas around Countries bordering China.

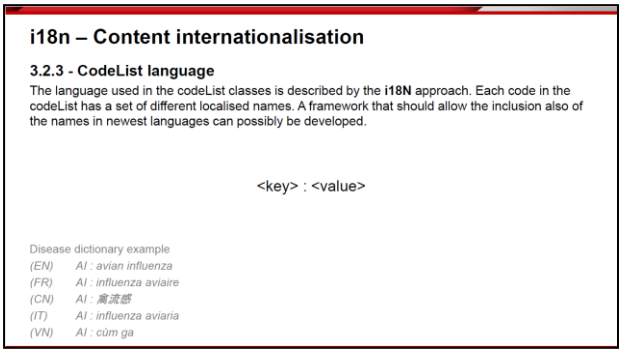
During the discussion, it appeared clear that if a use case has to be implemented in developing Countries then the Country must be provided with the means to do it. Tizzani noted that some developing Countries do not even have the geographical information on their boundaries (first administrative level), while Goutard noted that it should be difficult to implement a zone in Countries with limited GIS background and/or geographical information.

Session “General Discussion”

Stone chaired this session that was dedicated to the assessment of the applicability, the sustainability, the appropriateness and of the opportunity of implementing the GeoZone.

The IZSVe team presented an organised list of questions and answers collected during the previous sessions and used them to drive and enhance the answers from the participants in a brainstorming session. The questions recorded during the morning sessions were framed into the elements of appropriateness, applicability and sustainability.

The following slides were used.



ZoneDataset

Represents a collection of instances of the zone defined by the spatial object type Zoning. This class is essentially used to associate the metadata information to the collection of zones.

- *Unique dataset by country?*
- *Send the entire dataset every time? Or only changes?*

ZoneDatasetMetadata

Contains metadata information. This way of handling metadata is used to carry information about the zone dataset and is, therefore, not necessarily linked to Zoning feature class.

- *Metadata?*

7 Metadata

This chapter provides a structure for describing digital *zone* dataset and defines metadata elements and the common set of metadata terminology. The core metadata elements are listed below (mandatory and recommended optional) as required for describing a dataset. An “M” indicates that the element is mandatory. An “O” indicates that the element is optional. A profile of the ISO 19115 Geographic information — Metadata standard was used.

1. Citation (dataset title): name by which the resource is known. [M]
2. Abstract: brief narrative summary of the content of the resource. The description may include (but is not limited to) abstract, keywords, area or location covered by the dataset, information about the source data used in creating the dataset. [M]
3. Purpose: the purpose for which the dataset has been issued (e.g. new dataset, re-issue, update, etc.). [M]
4. Date: reference date for the cited resource. [M]
5. PointOfContact: name and position information for an individual or organization that is responsible for the resource. [M]
6. Language: language used in the dataset. [M]
7. characterSet: full name of the character coding standard used for the dataset. [O]
8. dataExt: geographical extent of the dataset described with bounding box. [M]
9. ReferenceSystem: spatial reference system used by the source data [M]

ZoneGroup – Group zones by a common attribute

Represents collections of zones according to a given parameter. This feature type is essentially used to group zones according to the characteristics of the disease, affected population, disease pattern, etc.

- *1 group – 1 attribute/parameter?*

- **Group type**
  The parameter used to group the zone could be epidemic, year, surveillance program, etc.

  year = 2010, 2016, 2018 …
  epidemic = H5N8, H7N9 …

- **Group name**
  A name is used to identify the group. The name must be written in English.

  Virgo, H5N8-1, H5N8-wave1 …

DocumentCitation

The Veterinary Authority defines a zone by means of a legal document.

- *In which language? Original name?*
- *Is important to store the original file? Or only the reference(link)?*

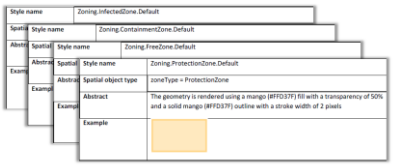
- **Name**
  The name of the document

- **Link**
  Url of the original online document

Zone Style

Styles for the main Zoning classification values. Refer to ZoneType.

- *Could be possible a default colour definition?*



Data quality

Quality of the dataset

1. **Number of excess items**
2. **Number of missing elements**
3. **Number of items not compliant with the rules of the conceptual schema**
4. **Mean value of positional uncertainties**

Use case – To draw Avian Influenza infected zones

- *Questions*

Use case – Finding zones

- *Which zones? Validated by OIE?*

Use case – Group of zones by epidemic

- *Questions?*

Use case – To modify the spatial information of an Avian Influenza infected zone

- *Which zones? Validated by OIE?*

Use case – Management of Avian Influenza infected zone validity period

- *Questions?*

What is mandatory

- Id
- geometry
  - Polygon
- zoneType
- designationPeriod
  - beginPosition
  - endPosition
- vetrinaryAuthority

Question and answers are reported below in the form of Q&A.

Q&A on Issues of appropriateness

Q1: A zone is designed by different authorities of different administrative and technical levels in each Member Countries. Who is responsible of the design of the zone in front of the OIE?

A1: Even if the zone is drown by people appointed at the local level with a mandate from the central level, OIE engages in communications only with the national focal point and not with sub-administrative level authorities.

Stone reminded that, the information transmitted to OIE must respect the "chain of command" that includes the OIE delegate and the focal point(s). The OIE considers the official OIE delegate to be the unique representative of the country. The delegate can designate one or more national focal point to comply with national obligation. Tizzani stressed that the national focal point is in charge of providing the information about the disease, but not the geographic information.

Tizzani underlined that the information included in the element "authority" of GeoZone is already present in the OIE database and that name, address, email and telephone number are included in WHAIS+.

Since it is not clear at this stage whether we need to keep the information "authority" in the data specification, Ferrè suggested to postpone the decision and to address it in a dedicated extended gap analysis of the GeoZone specification.

Q2: Which colour do we use to graphically represent the different types of zone? How do we visually distinguish whether a free zone is with or without vaccination for instance?

A2: The two questions refer to the style that should be used to represent a feature in a map (e.g. colour, transparency, outline). Ferrè stated that the examples presented in the GeoZone Portrayal annex represent an attempt elaborated by IZSVe, while the choice about the feature styles must be carefully analysed in a dedicated extended gap analysis of the GeoZone specification because colours have psychological effects in communication which shall be considered.

Q3: Can we enlarge the list of diseases included in the GeoZone? Do we want to provide complete flexibility here? Who will manage the list of diseases?

A3: These questions refer to the disease list included in the GeoZone. Ferrè specified that the disease list, likewise the other lists included in the application schema (e.g. zone type, controlled activities) are used and uniquely identified by language-neutral mnemonic codes for computers. From the technical point of view, there are different types of list (e.g.: enumeration, code list) and each with different purposes or functions (e.g. fixed lists, lists governed by data providers).

During the discussion emerged that: (i) the disease list should be governed by the OIE and must align to already existing lists, (ii) a network of CCs should cooperate with the OIE for the maintenance of the lists according to a well-defined procedure. From the technical point of view, the changes that this procedure should allow should be the addition, deprecation or supersession of values (i.e. no value will ever be deleted, but only receive different statuses).

Q&A on issues of <u>applicability</u>

Q5: How do we call the zones developed with the geographic data model when transmitted to the OIE? Is there a semantic rule to define the zone code?

A5: These questions make reference to the identification elements included in the GeoZone. Ferrè reminded that the GeoZone does not include a language-neutral element to identify the zone, two different identification elements are used instead: the Id (i.e. the spatial object identifier) and the local identifier. Moreover, he mentioned that a zone can be also identified by means of the core information of the zone (i.e. disease, zone type, country, and designation period).

Goutard reminded that the local ID could be the ID zone at national level. This means that, at the OIE level, there will be zones with the same local ID. It was suggested that to identify zones based on the local ID the information about the country element should be included (i.e.: the local ID + country code identify a zone).

Q6: Can we define the geographical error to represent a zone? How big this error could be?

A6: These questions refer to the data quality issues of GeoZone, which proposes to adopt a series of quality elements derived from an ISO standard (ref.: ISO 19157 Geographic information – Data quality). Among these elements the "Mean value of positional uncertainties" is the one that refers to the geographical error

in representing a zone. Ferrè reminded that the estimated geometric accuracy proposed in the GeoZone (ref. chapter 6 – Data quality) is portrayed as an estimated value based to the scale of the data. The values are derived form a table elaborated by a European framework (INSPIRE directive [Directive 2007/2/EC]. https://inspire.ec.europa.eu/), but other values can be revised with a dedicated extended gap analysis of the GeoZone specification.

Tizzani stated that the geographical error must be carefully considered in any geographical data model and reported the difficulties the OIE faces in representing the Country boundaries in case of conflict areas or in cases were the OIE delegate is not able to provide a good quality spatial information.

Q7: Is the geographic data model applicable to areas that are comprised in territories representable only with multiple polygons like states constituted by multiple islands?

A7: The question refers to the zone geometry representation issue. In the GeoZone specification, it is stated that a zone is a "simple polygon" designed according to the OGC simple feature standard. This means that every single zone is represented by a polygon and that a polygon represents a zone. Ferrè informed the participants that the decision to use a simple polygon geometry to represent a zone instead of a complex geometry (i.e. multipolygon, geometry collection) is mainly due to the fact that making multipolygon tagging and processing is much more complicated than doing these operations with a simple polygon. Ferrè suggested that the issue of multipolygon vs polygon could be evaluated in a specific use case exercise.

Q8: When Member Countries transfer geographic information to the OIE they should convert the original data into WGS84 system. Is this appropriate?

A8: The subject is represented by the coordinate reference system that should be used by the Member Countries for transmitting the zone geographical data to OIE. In the GeoZone specification, it is stated that spatial data set shall be made available by Member Countries using the WGS84 coordinate reference system. Ferrè stated that it should be difficult for an organisation to accept data from different subjects each one with its own reference system and then to transform them in a unique reference system because specific conversion parameters for every input system are needed. Moreover, coordinate transformation is never error free, it always introduces errors in the measures and these errors are directly linked with the quality of the parameter used for the conversation. Ferrè suggested that each Member Countries should take the responsibly to (eventually) transform their data from their national reference system into a global reference system as the WGS84 (or another standard identified at the OIE level) using the parameters that their national geodetic service can provide to them in order to reduce as much as possible the error introduced in the conversion operation.

Q9: Can we say that the WGS84 should be the standard used at country level?

A9: Ferrè stated that almost each Country has its own coordinate reference system from which to draw maps and calculate measures. A Country can also make use of WGS84 in parallel with the national reference system in order to have the possibility to manage the geographic information with the GPS technology.

Q&A on Issues of <u>sustainability</u>

Q10: For some Member Countries the implementation of GeoZone is more a matter of capacity building than of training.

A10: Ferrè stated that for every organisation the introduction of new technologies or processes has an impact on the IT service management. Therefore the issue of IT change management service should be taken into account if the GeoZone is adopted within the OIE information system. The change in the management can be graded according to the IT and GIS maturity of the organisation that implementing the

standard. The grade can range from the classical IT documentation and test platform to specific capacity building programmes.

Once the WHAIS+ platform will be in place, regular training programs for its usage shall be organised for OIE focal points. These programs can eventually be extended and include also GIS issues and the GeoZone standard. Training could be done also back-to-back or merging with other trainings (for instance together with the FMD trainings which help designing containment zones). We will have also to keep up trainings to catch the continuous software development.

Q11: How do we implement and diffuse the use of the proposed geographic data model?

A11: GeoZone has been developed according to an ISO standard, to implement the module into the OIE system a revision is required. The revision should follow the requirements defined by the application or system that will incorporate the geographic data model. WAHIS+ seems to be the most appropriate system to include GeoZone.

The compliance of countries to the proposed standard requires time and investments in human resources, training and eventually technologies, which should be clearly identified and evaluated before the implementation process. In order to assess the technological and organisational constraints and to evaluate the feasibility and sustainability of the proposed standard, it is necessary to implement a pilot that should take into account different conditions and users.

Q&A on Issues of <u>opportunity</u>

Q12. Is the diffusion of a standardised geographic data model an opportunity?

A12: Standards or guidelines to collect, manage and share spatial information are required for all aspect of GIS in order to achieve high levels of interoperability and to maximise the reuse of the information.

A general consensus was reached between the invited participants and the OIE regarding the importance to produce and adopt standards or guidelines. It was also recognised that the adoption of a standard can be a hard challenge for an organisation therefore training or capacity building programs should be defined within the implementation process.

Workshop conclusion and proposed follow up

Stone closed the workshop requesting the CCs to cooperate to the model refinement and validation within a pilot project that IZSVe shall develop in close collaboration with OIE.

A consensus was reached on the implementation of a pilot project for the “implementation of a standard for the collection and sharing of zone geographic component”, with the aim to test and validate the draft data model and to allow applicability in the real world. The following four-steps approach was proposed:

- Revision of the model considering the feedback from the technical workshop.
- Participation in the pilot study of OIE CCs attending the workshop.
- Member Countries shall be directly involved in the pilot in order to collect data for an overall evaluation (e.g.: cost-effectiveness analysis).
- Incorporation in the sets of technological standards for WAHIS +.

IZSVe will develop and forward to the OIE a project proposal.