Geografische UAS-Gebiete

Dokumentation «Geodatenmodell»

Aktenzeichen: BAZL-155.44-10/3

Projektgruppe

Zuständiger Fachbereich	UAS Bewilligung und Aufsicht (UAS) & Strategie und Innovation (LESI)
Projektleitung	Sandra Bodmer, Benoit Curdy (BAZL)
Modellierung	Pascal Imoberdorf, Pascal Bircher (BAZL)

Dokumenteninformation

Inhalt	Das Dokument beschreibt das Geodatenmodell für «geografische UAS-Gebiete», welche aufgrund der Sicherheit und Gefahrenabwehr, des Schutzes der Privatsphäre oder der Umwelt festgelegt werden. Basierend auf dem Standard ED-269 "Minimum Operational Performance Standard for Geofencing" der EUROCAE wurde dafür ein CH-spezifisches IN-TERLIS-Modell definiert.
Autoren	Pascal Imoberdorf, Pascal Bircher (BAZL)
Status	Verabschiedet

Dokumentenhistorie

Version	Datum	Bemerkungen
1.0	12.04.2022	Freigegebene Version
1.0	22.03.2023	Definitive gesetzliche Grundlage (Kap. 2)

Inhalt

Abkürzungen

AMC/GM	Acceptable Means of Compliance and Guidance Material
BAZL	Bundesamt für Zivilluftfahrt
CH1903+	Bezugssystem; Schweizer Koordinatensystem
CHBase	Basismodule des Bundes für minimale Geodatenmodelle
CTR	Controlled traffic region / control zone; Kontrollzone
EASA	European Union Aviation Safety Agency; Europäische Agentur für Flugsicherheit
EPSG	Codierungssystem für Koordinatensysteme und Projektionen
EU	Europäische Union
EUROCAE	European Organization for Civil Aviation Equipment
GeoJSON	Offenes Format für geografische Daten basierend auf der Java-Script Object Notation
GKG	Koordinationsorgan für Geoinformation des Bundes
INTERLIS	Beschreibungs- und Transfermechanismus für Geodaten gemäss eCH-0031-Standard
KOGIS	Koordination, Geo-Information und Services
LV95	Bezugsrahmen für Schweizer Landeskoordinaten (1995)
MTOM	Maximum take-off mass; höchstzulässige Startmasse
UAS	Unmanned aircraft system; unbemanntes Luftfahrzeugsystem
WGS84	World Geodetic System 1984; geodätisches Referenzsystem

Referenzierte Dokumente

[1]   EUROCAE (2020): ED-269 "Minimum Operational Performance Standard for Geofencing". Version Juni 2020

[2]   GKG (2011): Basismodule des Bundes für "minimale Geodatenmodelle" (CHBase), Version 1.0 vom 30.08.2011

1 Einleitung

Das Geodatenmodell für «geografische UAS-Gebiete» (engl. *UAS geographical zone*) stellt eine wichtige Grundlage für den Aufbau des Systems unbemannter Luftfahrzeuge (UAS) dar.

Ein „geografisches UAS-Gebiet" (ugs. auch Beschränkungsgebiet für Drohnen) ist ein von der zuständigen Behörde zu Geo-Sensibilisierungszwecken festgelegter Teil des Luftraums, der den UAS-Betrieb ermöglicht, einschränkt oder ausschliesst, um den mit dem UAS-Betrieb verbundenen Risiken bezüglich Sicherheit, Schutz der Privatsphäre oder der Umwelt Rechnung zu tragen.

Ziel der Geo-Sensibilisierung (engl. *geo-awareness*) ist es, eine potenzielle Verletzung der Luftraumgrenzen zu erkennen und zu vermeiden.

2 Rahmenbedingungen

Die Kommission der Europäischen Union (EU) hat am 24. Mai 2019 die Durchführungsverordnung (EU) 2019/947 über die Vorschriften und Verfahren für den Betrieb unbemannter Luftfahrzeuge erlassen. Artikel 15 der neuen EU-Verordnung legt Betriebsbedingungen für geografische UAS-Gebiete fest und verpflichtet die Mitgliedstaaten, geografische UAS-Gebiete für Geo-Sensibilisierungszwecke auszuweisen und dafür zu sorgen, dass die Informationen über diese geografischen UAS-Gebiete und auch deren Geltungsdauer, in einem einheitlichen digitalen Format veröffentlicht werden. Die Durchführungsverordnung (EU) 2019/947 kommt in der EU bereits seit 2021 zur Anwendung. In der Schweiz erfolgte deren Übernahme zeitgleich mit dem Inkrafttreten der revidierten Verordnung des UVEK über Luftfahrzeuge besonderer Kategorien (VLK) am 1. Januar 2023.

Die EASA hat unter Schweizer Beteiligung die technischen Grundlagen und Rahmenbedingungen für die Umsetzung festgelegt. Im Rahmen der «Acceptable Means of Compliance» (AMC) und dem «Guidance Material» (GM) wird als Standard für ein gemeinsames, einheitliches, digitales Datenformat das «UAS Geographical Zone Data Model» der EUROCAE angewendet (siehe [1], Abschnitt 8). Darin sind Inhalt und Struktur der geografischen UAS-Gebiete definiert.

Das vorliegende Geodatenmodell stellt eine Umsetzung in INTERLIS 2 dar, welche dem Schweizer Standard zur Beschreibung von Geodaten entspricht. Im Weiteren kommen die Basismodule des Bundes (CHBase) [2] zur Anwendung. Dabei handelt es sich um eine Sammlung einheitlicher, allgemeiner INTERLIS-Definitionen, welche die technische und inhaltliche Datenharmonisierung unterstützen. Die Modellierungssprache ist Englisch.

Das Geodatenmodell basiert auf dem Bezugsrahmen LV95 im Bezugssystem CH1903+. Da die Bereitstellung der Daten letztendlich im Bezugssystem «World Geodetic System» (WGS84) und im Format GeoJSON zu erfolgen hat, müssen sie abschliessend mit entsprechenden Werkzeugen transformiert bzw. konvertiert werden.

3 Konzeptionelles Datenmodell - Objektkatalog

Im nachfolgenden Objektkatalog deutet *Kursivschrift* auf Inhalte von CHBase hin. Auf eine Beschreibung dieser Elemente wird in diesem Dokument verzichtet.

Die Beschreibungen zu den Inhalten des Objektkatalogs wurden direkt dem «UAS Geographical Zone Data Model» entnommen und sind daher in englischer Sprache gehalten.

In Abweichung zum «UAS Geographical Zone Data Model» wird auf einzelne Elemente verzichtet (vgl. Anhang 7.4), welche in der Schweiz derzeit keine Anwendung finden. Daraus resultiert ein spezifisches «CH-Profil», welches mit dem europäischen Standard bzw. den AMC/GM vollständig kompatibel ist.

3.1 Wertebereiche – Datentypen

Wertebereich für Datentypen (Domains)

CodeZoneIdentifierType	
A coded identifier of an UAS zone.	
Typ	**Beschreibung**
TEXT*7	A string of maximum 7 characters.

TextShortType	
A free text.	
Typ	**Beschreibung**
TEXT*200	A string of maximum 200 characters.

GeoShapeType	
A series of 4 or more coordinates and dimensions that define a geometrical shape by means of polygons.	
Typ	**Beschreibung**
SURFACE	A polygonal shape using the CH1903+ coordinate reference system (EPSG:2056). There must be a single exterior and no circles. Interior holes are allowed. The last coordinate of the polygon needs to be equal to the first one.

DateTimeType	
A date and time instant.	
Typ	**Beschreibung**
XML DATE/TIME	The date and time format shall follow the ISO 8601, in the form YYYY-MM-DDThh:mm:ss.ss.

TimeInterval	
A period of time.	
Typ	**Beschreibung**
TEXT*11	Time period expressed according to the ISO 8601, in the format PnnDTnnHnnM (Example: P5DT or PT12H). - P indicates that the value is a time interval (mandatory). - nnD indicates the number of days comprised in the interval. - T indicates the start of the time block (mandatory). - nnH indicates the indicates the number of hours comprised in the interval. - nnM indicates the indicates the number of minutes comprised in the interval. The maximum number is 99.

TimeType	
A time instant type.	
Typ	**Beschreibung**
XML TIME	Time format shall follow the ISO 8601 standard, in the form hh:mm:ss.ss.

3.2 Wertebereiche - Codelisten

Wertebereiche für Aufzählungen/Codelisten

CodeAuthorityRole	
A coded list of values indicating the role that an authority has in relation with the UAS zone.	
Werte	**Beschreibung**
AUTHORIZATION	The designated authority shall be contacted to get an authorisation before accessing the UAS zone.
INFORMATION	The designated authority is a general purpose point of contact for the UAS in the zone. This applies when no special permission is required (see attribute restriction of class UASZoneVersion).

UomDistance	
A list of units of measurement used for distances. In Switzerland only meters are used.	
Werte	**Beschreibung**
M	Meters

CodeZoneType	
A code that indicates that a zone is provided with its common definition.	
Werte	**Beschreibung**
COMMON	The zone is provided with its common definition, valid for any UAS and operator.

CodeRestrictionType	
A coded indicator of the restriction level for the zone.	
Werte	**Beschreibung**
REQ_AUTHORISA-TION.MTOM_ALL	Indicates that the flight of UAS (independent of their weight) is subject to explicit authorisation requirements during the time of applicability.
REQ_AUTHORISA-TION.MTOM_FROM	Indicates that the flight of UAS (from a specific weight) is subject to explicit authorisation requirements during the time of applicability.
REQ_AUTHORISA-TION.CTR	Indicates that the flight of UAS within CTR (above 120m AGL) is subject to explicit authorisation requirements during the time of applicability.
NO_RESTRICTION	Indicates that the zone may be used during the applicability time without any special permissions or restrictions.

CodeZoneReasonType	
A coded indication of a reason that justifies the existence of an UAS zone.	
Werte	**Beschreibung**
AIR_TRAFFIC	Due to the presence of air traffic.
NATURE	Due to the presence of a wildlife/nature sanctuary or another area with sensitive nature/fauna.
SENSITIVE	Due to the presence of a sensitive site, in the vicinity of which the presence of drones could be considered a potential risk.

CodeVerticalReferenceType	
A coded value that indicates a vertical reference system.	
Werte	**Beschreibung**
AGL	Height above ground/surface level.
AMSL	Altitude above Mean Sea Level.

CodeWeekDayType	
A coded value indicating a day/days of the week.	
Werte	**Beschreibung**
MON	Monday
TUE	Tuesday
WED	Wednesday
THU	Thursday
FRI	Friday
SAT	Saturday
SUN	Sunday
Any	Any day of the week

CodeYesNoType	
A coded value that indicates a choice between a positive (yes) or a negative (no) applicability.	
Werte	**Beschreibung**
Yes	The situation is true, according to the property default definition.
No	The situation is not true.

Message	
The value of a code which is a generic placeholder and refers to the corresponding entry in the multilingual code list for predefined and generic message text elements, which may be used as display texts. Only values that exist in the code list should be used.	
Typ	**Beschreibung**
MSG01	Code as placeholder for predefined message text 1
MSG02	Code as placeholder for predefined message text 2
MSG03	Code as placeholder for predefined message text 3
MSG04	Code as placeholder for predefined message text 4
MSG05	Code as placeholder for predefined message text 5
MSG06	Code as placeholder for predefined message text 6
MSG07	Code as placeholder for predefined message text 7
MSG08	Code as placeholder for predefined message text 8
MSG09	Code as placeholder for predefined message text 9
MSG10	Code as placeholder for predefined message text 10

Restriction
The value of a code which is a generic placeholder and refers to the corresponding entry in the multilingual code list for predefined and generic restriction text elements, which may be used as display texts. Only values that exist in the code list should be used.

Typ	Beschreibung
RST01	Code as placeholder for predefined restriction text 1
RST02	Code as placeholder for predefined restriction text 2
RST03	Code as placeholder for predefined restriction text 3
RST04	Code as placeholder for predefined restriction text 4
RST05	Code as placeholder for predefined restriction text 5
RST06	Code as placeholder for predefined restriction text 6
RST07	Code as placeholder for predefined restriction text 7
RST08	Code as placeholder for predefined restriction text 8
RST09	Code as placeholder for predefined restriction text 9
RST10	Code as placeholder for predefined restriction text 10

3.3 Strukturen

3.3.1 Struktur «LocalisedUri»

Structure containing localised Uniform Resource Identifier (URI)

Attribut	Multi-plizität	Datentyp (Wertebereich)	Beschreibung
Language	1	International-Codes_V1.Language-Code_ISO639_1	Standard language code (ISO639_1) based on the CHBase [2] model convention
Text	1	URI	Uniform Resource identifier (URI)

3.3.2 Struktur «MultilingualUri»

Structure containing multilingual elements of localised Uniform Resource Identifier (URI)

Attribut	Multi-plizität	Datentyp (Wertebereich)	Beschreibung
LocalisedText	1..*	UASGeographical-Zone_V1.LocalisedUri	Text as localised Uniform Resource Identifier (URI)

3.4 Thema «CodelistTexts»

Topic for code lists with unique object identification (UUID)

3.4.1 Klasse «MessageText»

Class containing a multilingual code list for predefined and generic message text elements.

Attribut	Multi-plizität	Datentyp (Wertebereich)	Beschreibung
Code	1	Message	A message code which refers to an enumeration of codes.
Description	1	Localisa-tionCH_V1.MultilingualText	Multilingual text based on the CHBase model convention [2].

3.4.2 Klasse «RestrictionText»

Class containing a multilingual code list for predefined and generic restriction text elements.

Attribut	Multi-plizität	Datentyp (Wertebereich)	Beschreibung
Code	1	Restriction	A restriction code which refers to an enumeration of codes.
Description	1	Localisa-tionCH_V1.MultilingualText	Multilingual text based on the CHBase model convention [2].

3.5 Thema «UASZones»

Topic for geographical UAS zones with unique object identification (UUID)

3.5.1 Klasse «UASZoneVersion»

Class representing an airspace of defined dimensions, above the land areas or territorial waters of a State, within which a particular restriction (or condition; not applicable herein) for UAS flights applies.

Attribut	Multi-plizität	Datentyp (Wertebereich)	Beschreibung
identifier	1	CodeZoneIdentifierType	A string of characters that uniquely identifies the UAS zone within the State/Territory identified by the country attribute. Guideline: use of an abbreviation (max. 4 characters) specific for the organization or a canton as a prefix, followed by a 3- or 4-digit sequence number (max. 7 characters in total)
country	1	International-Codes_V1. CountryCode_ ISO3166_1	A 3 letter identifier of a country or territory using the ISO 3166-1 alpha-3 standard (CHE for Switzerland) based on the CHBase model convention [2]. The State that has the authority to declare the zone.

name	1	Localisa-tionCH_V1.Mul-tilingualText	A multilingual text name by which the zone may be known by the public or by the UAS community.
type	1	CodeZoneType	An indication that the zone is provided with its common definition (whereas a customised definition for a particular user is not applicable herein).
restriction	1	CodeRestric-tionType	An indication if flying in the zone is restricted or unrestricted (whereas prohibited or conditional are not applicable herein).
restrictionConditions	1	Restriction	An indication to be displayed to the user of the zone. Contains a code concerning to the restriction conditions.
reason	1	CodeZoneRea-sonType	A coded indication for the reason that led to the establishment of the zone.
message	1	Message	A message to be displayed to the user of the zone. Contains a code concerning the granting authority.
regulationExemption	0..1	CodeYesNo-Type	This is an (possible) extension point. It allows adding additional attributes of national interest through this element.
additionalProperties	0..1	Zeichenkette (TEXT*40)	Indicates (possible) exemptions from the national or European regulations.

3.5.2 Klasse «AirspaceVolume»

The definition of the airspace volume comprised by the zone, in the form of a cylinder with a horizontal projection and vertical limits.

Attribut	Multi-plizität	Datentyp (Wertebereich)	Beschreibung
uomDimensions	1	UomDistance	The unit of measurement used for the vertical dimensions and also for the horizontal Projection.
lowerLimit	0..1	Number (0..99999)	The lowest level included in the zone. If not specified, it means that the zone starts from surface (ground).
lowerVerticalReference	1	CodeVerticalRe-fernceType	The vertical reference system used for expressing the lower limit. Note: If lowerLimit is not specified, the required value will be "AGL".
upperLimit	0..1	Number (0..99999)	The highest level included in the zone. If not specified, it means that the zone

			extends to any possible level (unlimited).
upperVerticalReference	1	CodeVerticalRefernceType	The vertical reference system used for expressing the upper limit
horizontalProjection	1	GeoShapeType	The shape of the zone in the Swiss projection. The coordinate resolution should be at least 1 meter, whereas not more than 3 decimal places (means milimeter) should be provided.

3.5.3 Klasse «TimePeriod»

Defines the applicability dates and times of the zone, including its eventual usage permissions/restrictions. If the restriction varies in time, separate time periods must be defined.

Attribut	Multiplizität	Datentyp (Wertebereich)	Beschreibung
permanent	1	CodeYesNoType	An indication that the area is permanent if Yes. Permanent 'Yes' means: always active, no start nor end date / time. Permanent 'No' means: a start and end date / time must be defined.
startDateTime	0..1	DateTimeType	The date and time when the area starts to exist.
endDateTime	0..1	DateTimeType	The date and time when the area ceases to exist.

3.5.4 Klasse «DailyPeriod»

Specifies a daily applicability schedule of the zone and its eventual permissions/restrictions, within the time when the area exists according to the TimePeriod information.

Attribut	Multiplizität	Datentyp (Wertebereich)	Beschreibung
day	1..6	CodeWeekDayType	The day of the week.
startTime	1	TimeType	The daily start time.
endTime	1	TimeType	The daily end time.

3.5.5 Klasse «Authority»

A relevant authority that is in charge for authorising or providing information for UAS operations in the UAS zone.

Attribut	Multi-plizität	Datentyp (Wertebereich)	Beschreibung
name	1	Localisa-tionCH_V1.Mul-tilingualText	The official multilingual name of a public or private authority. Important: Languages DE, FR, IT and EN have to be provided. Use the main language value as default for the other languages if no specific URL exists. The permissible length of the URL values is limited to 200 characters.
service	0..1	Localisa-tionCH_V1.Mul-tilingualText	The multilingual name of a specific department / service within the organisation. Important: Languages DE, FR, IT and EN have to be provided. Use the main language value as default for the other languages if no specific URL exists. The permissible length of the URL values is limited to 200 characters.
contactName	0..1	TextShortType	The name or role of a specific person that needs to be contacted within the organisation.
siteURL	1	MultilingualUri	The multilingual URL of the public internet site through which the organisation may be contacted. Important: Languages DE, FR, IT and EN have to be provided. Use the main language value as default for the other languages if no specific URL exists. The permissible length of the URL values is limited to 200 characters.
email	0..1	TextShortType	The e-mail address by which the organisation may be contacted.
phone	0..1	TextShortType	A phone number at which the organisation may be contacted. The country code (0041) has to be included.

3.5.6 Klasse «AuthorityRequirements» (Assoziationsklasse)

Indicates role of an authority in relation with an UAS zone and related requirements, such as the lead time before the actual use of the zone.

| Attribut	Multi-plizität	Datentyp (Wertebereich)	Beschreibung
purpose	1	CodeAuthority-Role	The role of the authority in relation with the zone.
intervalBefore	0..1	TimeInterval	The minimal time interval required between authorisation request and starting to operate in the zone.

3.5.7 Klasse «Metadata»

Information that qualifies and provides traceability for the zone operational data. It is mandatory, although it is only used in ground databases and not transmitted to the UAS or user,

Attribut	Multi-plizität	Datentyp (Wertebereich)	Beschreibung
creationDateTime	1	DateTimeType	Indicates when the zone was initially created.
updateDateTime	1	DateTimeType	Indicates when the characteristics of the zone have been last time updated.
author	1	TextShortType	Indicates who has last updated the information about the zone.

4 Konzeptionelles Datenmodell - UML-Klassendiagramme

Das Geodatenmodell "UASGeographicalZone_V1" ermöglicht es, dass allfällige Erweiterungen bei den Objekttypen unabhängig vom Datenmodell vorgenommen werden können.
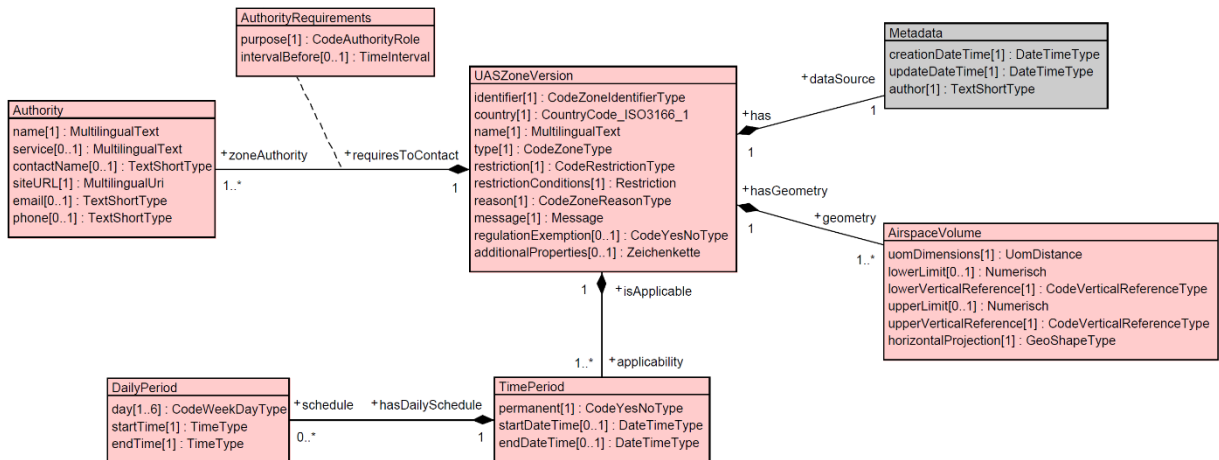
Übersicht der Themen
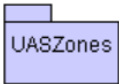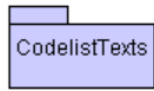
Thema «CodelistTexts»

Thema «UASZones»

5 Darstellungsmodell

Die Darstellung der geographischen UAS-Gebiete ergibt sich aus den Attributen «reason» und «restriction» der Klasse «UASZoneVersion» (vgl. Kap. 3.5.1).

Attributwert «UASZone-Version. reason» [1]	Attributwert «UASZoneVersion. restriction» [2]	Farbe (R/G/B)	Signatur	Symbol / Ausprägung
AIR_TRAFFIC	REQ_AUTHORISA-TION.MTOM_ALL	177 / 19 / 19	deckend; 40% transparent	Flugplatzperimeter
AIR_TRAFFIC	REQ_AUTHORISA-TION.MTOM_FROM	144 / 0 / 80	deckend; 40% transparent	5km-Flugplatzzone (bzw. angepasste Zone)
AIR_TRAFFIC	REQ_AUTHORISA-TION.CTR	144 / 0 / 80	diagonal gestrichelt (45° nach rechts, Linienabstand 10 Punkte, Liniendicke 0.5 Punkte), Dicke Umrandung 1.5 Punkte	
NATURE	-	255 / 170 / 0	deckend; 40% transparent	Schutzgebiet
SENSITIVE	-	0 / 65 / 190	deckend; 40% transparent	Kernkraftwerk, Strafvollzugsanstalt, militärische Infrastruktur, sonstige Flugverbote

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[1] Gemäss Wertebereich der Codeliste «*CodeZoneReasonType*» (vgl. Kap. 3.2)

[2] Gemäss Wertebereich der Codeliste «*CodeRestrictionType*» (vgl. Kap. 3.2) / Der Wert «NO_RESTRICTION» wird in der Darstellung momentan nicht berücksichtigt, obwohl er in den Daten vorkommen kann.

6 Filterfunktion

Für die Konvertierung der INTERLIS-Daten ins Format GeoJSON zu Publikationszwecken bedarf es folgender Filterung bzw. Festlegungen:

- Die Koordinaten des Attributs «horizontalProjection» der Klasse «AirspaceVolume» sind in WGS84 zu befüllen.

- Anstelle der mehrsprachigen Codelisten-Texte (vgl. Anhänge 7.1 und 7.2) werden nur die englischsprachigen Codelisten-Texte integriert.

- Die englische Beschreibung des Attributs «message» von «UASZoneVersion» (Kap. 3.5.1) sowie die englischsprachigen Werte der Attribute «name», «service» und «siteURL» der Klasse «Authority» (Kap. 3.5.5) sind aus Kompatibilitätsgründen auf max. 200 Zeichen zu beschränken.

- Die Klasse «metadata» ist wegzulassen.

- Die Codierung der Daten hat in UTF-8 zu erfolgen.

7 Anhang

7.1 Codeliste «RestrictionText»

Code	Description (de)	Description (fr)	Description (it)	Description (en)
RST01	Der Betrieb von unbemannten Luftfahrzeugen ist verboten.	L'exploitation d'aéronefs sans occupants est interdite.	L'esercizio di aeromobili senza occupanti è vietato.	The operation of unmanned aircraft is prohibited.
RST02	Der Betrieb von unbemannten Luftfahrzeugen mit einem Gewicht von mehr als 250 g ist verboten.	L'exploitation d'aéronefs sans occupants d'un poids supérieur à 250 g est interdite.	L'esercizio di aeromobili senza occupanti di peso superiore a 250 g è vietato.	The operation of unmanned aircraft weighing more than 250 g is prohibited.
RST03	Der Betrieb von unbemannten Luftfahrzeugen mit einem Gewicht von mehr als 250 g ist ab einer Höhe von 120 m über Grund verboten.	L'exploitation d'aéronefs sans occupants d'un poids supérieur à 250 g est interdite à partir d'une hauteur de 120 m au-dessus du sol.	L'esercizio di aeromobili senza occupanti di peso superiore a 250 g è vietato a partire da un'altezza di 120 m sopra il suolo.	The operation of unmanned aircraft weighing more than 250 g is prohibited from an altitude of 120 m above ground.

7.2 Codetexte «MessageText»

Code	Description (de)	Description (fr)	Description (it)	Description (en)
MSG01	Ausnahmebewilligungen können bei der zuständigen Stelle beantragt werden.	Des autorisations exceptionnelles peuvent être demandées à l'autorité compétente.	I permessi d'esenzione possono essere richieste all'autorità competente.	Exemption permits may be applied for at the competent authority.
MSG02	Ausnahmebewilligungen können bei der zuständigen kantonalen Fachstelle beantragt werden.	Des autorisations exceptionnelles peuvent être demandées auprès du service cantonal spécialisé compétent.	I permessi d'esenzione possono essere richieste al servizio cantonale specializzato competente.	Exemption permits may be applied for at the competent cantonal specialist office.

7.3 INTERLIS-Modelldatei

Sollte sich die hier abgedruckte Version der INTERLIS-Modelldefinition von der im Model
Repository publizierten unterscheiden, gilt die im Model Repository aufgeschaltete Version.

«UASGeographicalZoneDataModel_V1.ili»

```
INTERLIS 2.3;
/** EN: UAS Geographical Zone Data Model
 */
!!@ technicalContact=mailto:gis@bazl.admin.ch
!!@ furtherInformation=https://www.bazl.admin.ch/geoinformation
MODEL UASGeographicalZone_V1 (en)
AT "https://models.geo.admin.ch/BAZL/"
VERSION "2022-04-08"  =
  IMPORTS GeometryCHLV95_V1,InternationalCodes_V1,CatalogueObjects_V1,Localisa-
tionCH_V1;

  DOMAIN

    /** EN: Enumeration of predefined and generic message text elements
     */
    Message = (
      /** EN: Code as placeholder for predefined message text 1
       */
      MSG01,
      /** EN: Code as placeholder for predefined message text 2
       */
      MSG02,
      /** EN: Code as placeholder for predefined message text 3
       */
      MSG03,
      /** EN: Code as placeholder for predefined message text 4
       */
      MSG04,
      /** EN: Code as placeholder for predefined message text 5
       */
      MSG05,
      /** EN: Code as placeholder for predefined message text 6
       */
      MSG06,
      /** EN: Code as placeholder for predefined message text 7
       */
      MSG07,
      /** EN: Code as placeholder for predefined message text 8
       */
      MSG08,
      /** EN: Code as placeholder for predefined message text 9
       */
      MSG09,
      /** EN: Code as placeholder for predefined message text 10
       */
      MSG10
    );

    /** EN: Enumeration of predefined and generic restriction text elements
     */
    Restriction = (
      /** EN: Code as placeholder for predefined restriction text 1
       */
      RST01,
      /** EN: Code as placeholder for predefined restriction text 2
       */
      RST02,
      /** EN: Code as placeholder for predefined restriction text 3
       */
      RST03,
      /** EN: Code as placeholder for predefined restriction text 4
```

```
       */
      RST04,
      /** EN: Code as placeholder for predefined restriction text 5
       */
      RST05,
      /** EN: Code as placeholder for predefined restriction text 6
       */
      RST06,
      /** EN: Code as placeholder for predefined restriction text 7
       */
      RST07,
      /** EN: Code as placeholder for predefined restriction text 8
       */
      RST08,
      /** EN: Code as placeholder for predefined restriction text 9
       */
      RST09,
      /** EN: Code as placeholder for predefined restriction text 10
       */
      RST10
    );

  /** EN: Structure containing a localised Uniform Resource Identifier (URI)
   */
  STRUCTURE LocalisedUri =
    /** EN: Standard language code (ISO639_1) based on the CHBase model convention
     */
    Language : MANDATORY InternationalCodes_V1.LanguageCode_ISO639_1;
    /** EN: Uniform Resource Identifier (URI)
     */
    Text : MANDATORY URI;
  END LocalisedUri;

  /** EN: Structure containing multilingual elements of localised Uniform Resource
Identifier (URI)
   */
  STRUCTURE MultilingualUri =
    /** EN: Text as localised Uniform Resource Identifier (URI)
     */
    LocalisedText : BAG {1..*} OF UASGeographicalZone_V1.LocalisedUri;
    /** EN: Uniqueness constraint of multilingual element language
     */
    UNIQUE (LOCAL) LocalisedText:Language;
  END MultilingualUri;

  /** EN: Topic for code list texts
   */
  TOPIC CodelistTexts =
    OID AS INTERLIS.UUIDOID;

    /** EN: Multilingual code list for messages, whose entries may be used as dis-
play texts
     */
    CLASS MessageText
    EXTENDS CatalogueObjects_V1.Catalogues.Item =
      /** EN: Message code as predefined enumeration
       */
      Code : MANDATORY UASGeographicalZone_V1.Message;
      /** EN: Multilingual description of a message code
       */
      Description : MANDATORY LocalisationCH_V1.MultilingualText;
      /** EN: Uniqueness constraint of the code
       */
      UNIQUE Code;
    END MessageText;

    /** EN: Multilingual code list for restrictions, whose entries may be used as
display texts
     */
    CLASS RestrictionText
    EXTENDS CatalogueObjects_V1.Catalogues.Item =
      /** EN: Restriction code as predefined enumeration
```

```
       */
      Code : MANDATORY UASGeographicalZone_V1.Restriction;
      /** EN: Multilingual description of a restriction code
       */
      Description : MANDATORY LocalisationCH_V1.MultilingualText;
      /** EN: Uniqueness constraint of the code
       */
      UNIQUE Code;
    END RestrictionText;

  END CodelistTexts;

  /** EN: Topic for UAS Geographical Zone
   */
  TOPIC UASZones =
    OID AS INTERLIS.UUIDOID;

    DOMAIN

      /** EN: A coded list of values indicating the role that an authority has in
relation with the UAS zone
       */
      CodeAuthorityRole = (
        /** EN: The designated authority shall be contacted to get an authorisation
before accessing the UAS zone
         */
        AUTHORIZATION,
        /** EN: The designated authority is a general purpose point of contact for
the UAS in the zone (out of authorisation and notification)
         */
        INFORMATION
      );

      /** EN: A coded indicator of the restriction level for the zone
       */
      CodeRestrictionType = (
        /** EN: Indicates that the flight of UAS is subject to explicit authorisa-
tion requirements during the time of applicability
         */
        REQ_AUTHORISATION(
          /** EN: Indicates that the flight of UAS (independent of their weight) is
subject to explicit authorisation requirements during the time of applicability
           */
          MTOM_ALL,
          /** EN: Indicates that the flight of UAS (from a specific weight) is sub-
ject to explicit authorisation requirements during the time of applicability
           */
          MTOM_FROM,
          /** EN: Indicates that the flight of UAS within CTR (above 120m AGL) is
subject to explicit authorisation requirements during the time of applicability
           */
          CTR
        ),
        /** EN: Indicates that the zone may be used during the applicability time
without any special permissions or restrictions
         */
        NO_RESTRICTION
      );

      /** EN: A coded value that indicates a vertical reference system
       */
      CodeVerticalReferenceType = (
        /** EN: Height above ground/surface level
         */
        AGL,
        /** EN: Altitude above mean sea level
         */
        AMSL
      );

      /** EN: A coded value indicating a day of the week
       */
```

```
    CodeWeekDayType = (
      /** EN: Monday
       */
      MON,
      /** EN: Tuesday
       */
      TUE,
      /** EN: Wednesday
       */
      WED,
      /** EN: Thursday
       */
      THU,
      /** EN: Friday
       */
      FRI,
      /** EN: Saturday
       */
      SAT,
      /** EN: Sunday
       */
      SUN,
      /** EN: Any day of the week
       */
      Any
    );

    /** EN: A coded value that indicates a choice between a positive (yes) or a
negative (no) applicability
     */
    CodeYesNoType = (
      /** EN: The situation is true, according to the property default definition
       */
      Yes,
      /** EN: The situation is not true
       */
      No
    );

    /** EN: A coded identifier of a UAS zone
     */
    CodeZoneIdentifierType = TEXT*7;

    /** EN: A coded indication of a reason that justifies the existence of an UAS
zone
     */
    CodeZoneReasonType = (
      /** EN: Due to the presence of air traffic
       */
      AIR_TRAFFIC,
      /** EN: Due to the presence of a wildelife/nature sanctuary or another area
with sensitive nature/fauna
       */
      NATURE,
      /** EN: Due to the presence of a sensitive site, in the vicinity of which
the presence of drones could be considered a potential risk
       */
      SENSITIVE
    );

    /** EN: A code that indicates that a zone is provided with its common defini-
tion
     */
    CodeZoneType = (
      /** EN: The zone is provided with its common definition, valid for any UAS
and operator
       */
      COMMON
    );

    /** EN: A date and time instant according to ISO 8601
     */
```

```
     DateTimeType = FORMAT INTERLIS.XMLDateTime "1900-1-1T0:0:0.0" .. "2099-12-
31T23:59:59.0";

     /** EN: A geometrical shape by means of single polygons using the Swiss pro-
jection (EPSG:2056)
      */
     !!@ CRS=2056
     GeoShapeType = SURFACE WITH (STRAIGHTS) VERTEX GeometryCHLV95_V1.Coord2 WITH-
OUT OVERLAPS>0.05;

     /** EN: A string of maximum 200 characters
      */
     TextShortType = TEXT*200;

     /** EN: A period of time expressed according to the ISO 8601 rules for time
intervals
      */
     TimeInterval = TEXT*11;

     /** EN: A time instant type according to ISO 8601
      */
     TimeType = FORMAT INTERLIS.XMLTime "0:0:0.0" .. "23:59:59.999";

     /** EN: A list of units of measurement used for distances
      */
     UomDistance = (
       /** EN: Meter
        */
       M
     );
   STRUCTURE CodeWeekDayType_ = value : MANDATORY CodeWeekDayType; END CodeWeek-
DayType_;

   /** EN: The definition of the airspace volume comprised by the zone, in the form
of a cylinder with a horizontal projection and vertical limits
    */
   CLASS AirspaceVolume =
     /** EN: The unit of measurement used for the vertical dimensions and also for
the horizontal projection
      */
     uomDimensions : MANDATORY UomDistance;
     /** EN: The lowest level included in the zone; if not specified, it means that
the zone starts from surface (ground)
      */
     lowerLimit : 0 .. 99999 [INTERLIS.m];
     /** EN: The vertical reference system used for expressing the lower limit
      */
     lowerVerticalReference : MANDATORY CodeVerticalReferenceType;
     /** EN: The highest level included in the zone; if not specified, it means
that the zone extends to any possible level (unlimited)
      */
     upperLimit : 0 .. 99999 [INTERLIS.m];
     /** EN: The vertical reference system used for expressing the upper limit
      */
     upperVerticalReference : MANDATORY CodeVerticalReferenceType;
     /** EN: The shape of the area in the Swiss projection
      */
     horizontalProjection : MANDATORY GeoShapeType;
     /** EN: If lowerLimit is not defined, then lowerVerticalReference has to be
set to "AGL"
      */
     MANDATORY CONSTRAINT NOT (NOT (DEFINED (lowerLimit))) OR (lowerVerticalRefer-
ence == #AGL);
   END AirspaceVolume;

   /** EN: A relevant authority that is in charge for authorising or providing in-
formation for UAS operations in the UAS zone
    */
   CLASS Authority =
     /** EN: The official multilingual name of a public or private authority
      */
     name : MANDATORY LocalisationCH_V1.MultilingualText;
```

```
      /** EN: The multilingual name of a specific department or service within the
organisation
       */
      service : LocalisationCH_V1.MultilingualText;
      /** EN: The name or role of a specific person that needs to be contacted
within the organisation
       */
      contactName : TextShortType;
      /** EN: The multilingual URL of the public internet site through which the or-
ganisation may be contacted
       */
      siteURL : MANDATORY UASGeographicalZone_V1.MultilingualUri;
      /** EN: The e-mail address by which the organisation may be contacted
       */
      email : TextShortType;
      /** EN: A phone number at which the organisation may be contacted
       */
      phone : TextShortType;
    END Authority;

    /** EN: Specifies a daily applicability schedule of the zone and its eventual
permissions/restrictions, within the time when the area exists according to the
TimePeriod information
     */
    CLASS DailyPeriod =
      /** EN: The day of the week
       */
      day : BAG {1..6} OF CodeWeekDayType_;
      /** EN: The daily start time
       */
      startTime : MANDATORY TimeType;
      /** EN: The daily end time
       */
      endTime : MANDATORY TimeType;
    END DailyPeriod;

    /** EN: Defines the applicability dates and times of the zone, including its
eventual usage permissions/restrictions
     */
    CLASS TimePeriod =
      /** EN: An indication that the area is permanent; 'Yes' means: always active,
no start nor end date; 'No' means: consider the start and end date provided just af-
ter
       */
      permanent : MANDATORY CodeYesNoType;
      /** EN: The date and time when the area starts to exist
       */
      startDateTime : DateTimeType;
      /** EN: The date and time when the area ceases to exist
       */
      endDateTime : DateTimeType;
      /** EN: If permanent is "No", the start and end date must be definied. If per-
manent is "Yes", no start nor end date must be definied.
       */
      MANDATORY CONSTRAINT ((permanent == #No) AND (DEFINED (startDateTime) AND DE-
FINED (endDateTime))) OR ((permanent == #Yes) AND NOT (DEFINED (startDateTime) OR
DEFINED (endDateTime)));
    END TimePeriod;

    /** EN: An airspace of defined dimensions, above the land areas or territorial
waters of a state, within which a particular restriction or condition for UAS
flights applies
     */
    CLASS UASZoneVersion =
      /** EN: A string of characters that uniquely identifies the UAS zone within
the state/territory identified by the country attribute
       */
      identifier : MANDATORY CodeZoneIdentifierType;
      /** EN: The state that has the authority to declare the zone
       */
      country : MANDATORY InternationalCodes_V1.CountryCode_ISO3166_1;
```

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```
     /** EN: A multilingual text name by which the zone may be known by the public
or by the UAS community
      */
     name : MANDATORY LocalisationCH_V1.MultilingualText;
     /** EN: An indication that the zone is provided with its common definition
      */
     type : MANDATORY CodeZoneType;
     /** EN: An indication if flying in the zone is restricted or unrestricted
      */
     restriction : MANDATORY CodeRestrictionType;
     /** EN: An indication of the conditions under which the zone can be used
      */
     restrictionConditions : MANDATORY UASGeographicalZone_V1.Restriction;
     /** EN: A coded indication for the reason that led to the establishment of the
zone
      */
     reason : MANDATORY CodeZoneReasonType;
     /** EN: A message to be displayed to the user of the zone
      */
     message : MANDATORY UASGeographicalZone_V1.Message;
     /** EN: This is an extension point, that allows adding additional attributes
of national interest through this element
      */
     regulationExemption : CodeYesNoType;
     /** EN: Indicates that exemptions from the national or European regulations
are allowed in the UAS zone, that will be detailed via the "message" property
      */
     additionalProperties : TEXT;
   END UASZoneVersion;

   /** EN: Information that qualifies and provides traceability for the zone opera-
tional data
    */
   CLASS Metadata =
     /** EN: Indicates when the zone was initially created
      */
     creationDateTime : MANDATORY DateTimeType;
     /** EN: Indicates when the characteristics of the zone have been last time up-
dated
      */
     updateDateTime : MANDATORY DateTimeType;
     /** EN: Indicates who has last updated the information about the zone
      */
     author : MANDATORY TextShortType;
   END Metadata;

   /** EN: Indicates the role of an authority in relation with an UAS zone and re-
lated requirements, such as the lead time before the actual use of the zone
    */
   ASSOCIATION AuthorityRequirements =
     zoneAuthority -- {1..*} Authority;
     requiresToContact -<#> {1} UASZoneVersion;
     /** EN: The role of the authority in relation with the zone
      */
     purpose : MANDATORY CodeAuthorityRole;
     /** EN: The minimal time interval required between notification or authorisa-
tion request and starting to operate in the zone
      */
     intervalBefore : TimeInterval;
   END AuthorityRequirements;

   /** EN: Aggregation from DailyPeriod to TimePeriod
    */
   ASSOCIATION hasDailySchedule =
     schedule -- {0..*} DailyPeriod;
     hasDailySchedule -<#> {1} TimePeriod;
   END hasDailySchedule;

   /** EN: Aggregation from AirspaceVolume to UASZoneVersion
    */
   ASSOCIATION hasGeometry =
     geometry -- {1..*} AirspaceVolume;
```

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```
      hasGeometry -<#> {1} UASZoneVersion;
    END hasGeometry;

    /** EN: Aggregation from TimePeriod to UASZoneVersion
     */
    ASSOCIATION isApplicable =
      applicability -- {1..*} TimePeriod;
      isApplicable -<#> {1} UASZoneVersion;
    END isApplicable;

    /** EN: Aggregation from Metadata to UASZoneVersion
     */
    ASSOCIATION has =
      dataSource -- {1} Metadata;
      has -<#> {1} UASZoneVersion;
    END has;

  END UASZones;

END UASGeographicalZone_V1.
```

7.4 Nicht verwendete Modellelemente

Nicht verwendete Datentypen / Wertebereiche aus «UAS Geographical Zone Data Model» [1]

ConditionExpressionType	
An expression / indication that provides information about what is forbidden in a zone.	
Typ	**Beschreibung**
TEXT*10000	A string of maximum 10'000 characters.

CodeUSpaceClassType	
A coded identifier for a category or class of the zone applying a "USpace concept".	
Typ	**Beschreibung**
TEXT*100	A string of maximum 100 characters.

CodeAuthorityRole	
A coded list of values indicating the role that an authority has in relation with the UAS zone.	
Werte	**Beschreibung**
NOTIFICATION	The designated Authority shall be notified of the UAS flight prior to accessing the UAS Zone.

UomDistance	
A list of units of measurement used for distances.	
Werte	**Beschreibung**
FT	Feet

CodeCountryISOType	
A 3 letter identifier of a country or territory using the ISO 3166-1 alpha-3 standard.	
Werte	**Beschreibung**
CHE	A 3 letter identifier

CodeZoneType	
A coded list of values which allows indicating that the definition of a UAS zone is specifically customised for a particular UAS or operator.	
Werte	**Beschreibung**
CUSTOMIZED	The zone is provided with a customised definition, for a particular UAS or operator.

CodeRestrictionType	
A coded indicator of the restriction level for the zone.	
Werte	**Beschreibung**
PROHIBITED	Indicates that the flight of UAS is prohibited during the applicability time.
CONDITIONAL	Indicates that access in the UAS zone is allowed only to operators fulfilling a special condition, which is defined as a logical expression.

CodeZoneReasonType	
A coded indication of a reason that justifies the existence of an UAS zone.	
Werte	**Beschreibung**
PRIVACY	Due to the presence of a site for which the presence of drones could rise privacy concerns.
POPULATION	Due to the presence of a significantly populated area.
NOISE	Due to noise abatement regulations.
FOREIGN_TERRITORY	Indicates a "fake" zone that is created automatically and which corresponds to the territory of a neighboring country.
EMERGENCY	Due to activity related to a situation that requires urgent intervention (such as an accident).
OTHER	Due to another reason, which may be specified in the otherReasonInfo property.

Nicht verwendete Klassenattribute des «UAS Geographical Zone Data Model» [1]

UASZoneVersion

Attribut	Multi-plizität	Datentyp (Wertebereich)	Beschreibung
region	0..1	Number (0..65535)	Where applicable, identifies a region inside a State where the UAS Zone is located. This attribute is intended to facilitate extracting sub-sets of data, for specific regions.
otherReasonInfo	0..1	TextShortType	A free text description of the reason that led to the establishment of the zone, when not covered by a pre-defined coded value.
uSpaceClass	0..*	CodeUSpace-ClassType	A code that identifies the category or class of the zone applying a "USpace concept".