INSPIRE
Infrastructure for Spatial Information in Europe

D2.8.III.6 Data Specification on *Utility and governmental services* – Draft Guidelines

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Foreword
How to read the document?

This document describes the *"INSPIRE data specification on Utility and governmental services – Guidelines"* version 2.0 as developed by the Thematic Working Group (TWG) US using both natural and a conceptual schema language. This version is now available for the public consultation. Based on the results of the consultation (received comments and the testing reports), the final version 3.0 will be prepared by the TWGs.

The data specification is based on a common template used for all data specifications and has been harmonised using the experience from the development of the Annex I data specifications.

This document provides guidelines for the implementation of the provisions laid down in the draft Implementing Rule for spatial data sets and services of the INSPIRE Directive.

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

The UML diagrams (in Chapter 5) offer a rapid way to see the main elements of the specifications and their relationships. The definition of the spatial object types, attributes, and relationships are included in the Feature Catalogue (also in Chapter 5). People having thematic expertise but not familiar with UML can fully understand the content of the data model focusing on the Feature Catalogue. Users might also find the Feature Catalogue especially useful to check if it contains the data necessary for the applications that they run. The technical details are expected to be of prime interest to those organisations that are/will be responsible for implementing INSPIRE within the field of *Utility and governmental services.*

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

In order to distinguish the INSPIRE spatial data themes from the spatial object types, the INSPIRE spatial data themes are written in *italics.*

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

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Interoperability of Spatial Data Sets and Services – General Executive Summary

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

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

INSPIRE does not require collection of new data. However, after the period specified in the Directive[1] Member States have to make their data available according to the Implementing Rules.

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

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

To facilitate the implementation of INSPIRE, it is important that all stakeholders have the opportunity to participate in specification and development. For this reason, the Commission has put in place a consensus building process involving data users, and providers together with representatives of industry, research and government. These stakeholders, organised through Spatial Data Interest Communities (SDIC) and Legally Mandated Organisations (LMO)[2], have provided reference materials, participated in the user requirement and technical[3] surveys, proposed experts for the Data Specification Drafting Team[4] and Thematic Working Groups[5].

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[1] For all 34 Annex I,II and III data themes: within two years of the adoption of the corresponding Implementing Rules for newly collected and extensively restructured data and within 5 years for other data in electronic format still in use

[2] Number of SDICs and LMOs on 8/6/2011 was 461 and 249 respectively

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

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

[5] The Thematic Working Groups of Annex II and III themes have been composed of experts from Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Netherlands, Norway, Poland, Romania, Slovakia, Spain, Sweden, Switzerland, Turkey, UK, the European Commission, and the European Environmental Agency

This open and participatory approach was successfully used during the development of the data specification on Annex I data themes as well as during the preparation of the Implementing Rule on Interoperability of Spatial Data Sets and Services[6] for Annex I spatial data themes.,

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

- The Definition of Annex Themes and Scope[7] describes in greater detail the spatial data themes defined in the Directive, and thus provides a sound starting point for the thematic aspects of the data specification development.

- The Generic Conceptual Model[8] defines the elements necessary for interoperability and data harmonisation including cross-theme issues. It specifies requirements and recommendations with regard to data specification elements of common use, like the spatial and temporal schema, unique identifier management, object referencing, a generic network model, some common code lists, etc. Those requirements of the Generic Conceptual Model that are directly implementable will be included in the Implementing Rule on Interoperability of Spatial Data Sets and Services.

- The Methodology for the Development of Data Specifications[9] defines a repeatable methodology. It describes how to arrive from user requirements to a data specification through a number of steps including use-case development, initial specification development and analysis of analogies and gaps for further specification refinement.

- The "Guidelines for the Encoding of Spatial Data"[10] defines how geographic information can be encoded to enable transfer processes between the systems of the data providers in the Member States. Even though it does not specify a mandatory encoding rule it sets GML (ISO 19136) as the default encoding for INSPIRE.

Based on these framework documents and following the successful development of the Annex I Data specifications (Technical Guidelines) and the Implementing Rules, the new Thematic Working Groups have created the INSPIRE data specification for each Annex II and III theme. These documents – at the version 2.0 – are now publicly available for INSPIRE stakeholders for consultation. The consultation phase covers expert review as well as feasibility and fitness-for-purpose testing of the data specifications.

The structure of the data specifications is based on the "ISO 19131 Geographic information - Data product specifications" standard. They include the technical documentation of the application schema, the spatial object types with their properties, and other specifics of the spatial data themes using natural language as well as a formal conceptual schema language[11].

A consolidated model repository, feature concept dictionary, and glossary are being maintained to support the consistent specification development and potential further reuse of specification elements. The consolidated model consists of the harmonised models of the relevant standards from the ISO 19100 series, the INSPIRE Generic Conceptual Model, and the application schemas[12] developed for

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[6] Commission Regulation (EU) No 1089/2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services, published in the Official Journal of the European Union on 8th of December 2010.

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

[8] *http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/DataSpecifications/D2.5_v3.3.pdf*

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

[10] *http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/DataSpecifications/D2.7_v3.2.pdf*

[11] UML – Unified Modelling Language

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

each spatial data theme. The multilingual INSPIRE Feature Concept Dictionary contains the definition and description of the INSPIRE themes together with the definition of the spatial object types present in the specification. The INSPIRE Glossary defines all the terms (beyond the spatial object types) necessary for understanding the INSPIRE documentation including the terminology of other components (metadata, network services, data sharing, and monitoring).

By listing a number of requirements and making the necessary recommendations, the data specifications enable full system interoperability across the Member States, within the scope of the application areas targeted by the Directive. They will be published (version 3.0) as technical guidelines and will provide the basis for the content of the Amendment of the Implementing Rule on Interoperability of Spatial Data Sets and Services for data themes included in Annex II and III of the Directive. The Implementing Rule Amendment will be extracted from the data specifications keeping in mind short and medium term feasibility as well as cost-benefit considerations. The Implementing Rule will be legally binding for the Member States.

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

Utility and governmental services – **Executive Summary**

The theme *"Utility and Governmental Services"* may be considered as one of INSPIRE's widest and richest, according to the huge number of features included in its scope (i.e. miscellaneous energy networks, plentiful public services of different types and several environmental facilities).
In order to develop these current data specifications, the list of geographical entities has been first limited to the features linked with environment (as INSPIRE basic thematics) and moreover dispatched in three main subthemes described below.
Nevertheless, the *"Utility and Governmental Services"* thematic approach is quite simple and consists in providing some information describing such services, among which:

- Feature location;
- Owner of the service (Administration or organization on behalf of an administrative mandate);
- Technical characteristics, such as capacity or details on the type of service provided.

The use cases studied and taken into account in the data specifications development process are based on few European regulation processes (such as *Directive on Waste* – cf. Annexes B & C of the current document), but it has been decided that basic uses - as locating features and simply describing information - are the main ones to be considered.
This observation is principally due to (i) various national and local uses – impossible to be exhaustively considered – and also (ii) the aim of simplicity underlying the data specifications development process.

Due to the width of the scope, it has been decided to develop 3 different application schemas:
1. Utility networks;
2. Administrative and social governmental services;
3. Waste management facilities.
Each of them has its own modelization, independent from one to another.

The model of the *"Utility networks"* sub-theme is derived from the Generic Network model developed and used by Annex I *"Transport networks"* and *"Hydrography"* themes. It's based on a node-arc-node structure and network concept, detailed in 5 application schemas:

- Electricity network
- Oil & Gas network
- Sewer network
- Telecommunication network
- Water network

In addition to generic network information (utility link elements, connection with nodes and belonging to a network), each element (UtilityLinkSequence, UtilityNode and UtilityNetwork) is detailed within its specific application schema through various attributes, developed through several codelists values or Measure types for most of them.

The model of the *"Administrative and social governmental services"* sub-theme is based on one single central feature type, "GovernmentalService". Its geometric reference can be whether another existing object (such as INSPIRE Annex I "Address", Annex III "Building" or abstract type "Facility" described below) or a created object (GM_Object, mostly GM_Point to be consistent with the well-used notion of POI = Point of Interest). The GovernmentalService type value is selected from a codelist of more than 200 items, organized in a hierarchical structure, based on the "Classification of the functions of government", abbreviated as COFOG, currently used by EuroStat. The purpose of such an approach is to permit any data provider and user to exchange its own data with as much flexibility as possible.

The model of the *"Waste management"* sub-theme is based on one single central feature type called "Facility", with a generic geometric reference (GM_Object). The model takes into account requirements originating from various use cases and legal regulations, including the EU directive on waste (2008/98). The "Facility" feature type is suitable for the representation of sites and installations. The "parent"-association from "Facility" to "Facility" supports the representation of hierarchies among installations and sites. Several aspects of waste management facilities are represented in the model, most notably activities, permissions, capacities, related parties and status information. Several established codelists are used for the representation of such aspects, including Eurostat's NACE list of

economic activities, the Decision 2000/532 List of Wastes and the Directive 2008/98 List of disposal and recovery operations. The names and definitions in the model have deliberately chosen to be rather generic, in order to support a close alignment with other occurrences of facilities, especially in the Production and Industrial Facilities (PF) and the Agricultural and Aquaculture Facilities (AF) data specifications. The "Waste Management" model or parts of it can be added into the Generic Conceptual Model and reused within various data specifications.

Acknowledgements

Table of contents

1 Scope

This document specifies a harmonised data specification for the spatial data theme *Utility and governmental services* as defined in Annex III of the INSPIRE Directive.

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

2 Overview

2.1 Name

INSPIRE data specification for the theme *Utility and governmental services*.

2.2 Informal description

Definition:

The *Utility and governmental services* theme is defined within the INSPIRE Directive as:

"Includes utility facilities such as sewage, waste management, energy supply and water supply, administrative and social governmental services such as public administrations, civil protection sites, schools and hospitals."

[Directive 2007/2/EC]

Description:

In order to facilitate the drafting of the data specifications of this declared *"very broad INSPIRE theme including different kinds of objects"*[13], the Thematic Working Group (TWG) on *Utility and governmental services* developed the following specific approach:
The theme *Utility and governmental services* has been divided in three sub-themes, dealing respectively with:
- Utility services / networks
- Administrative and social governmental services
- Waste treatment facilities and waste storage

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[13] *D2.3 Definition of Annex Themes and scope*
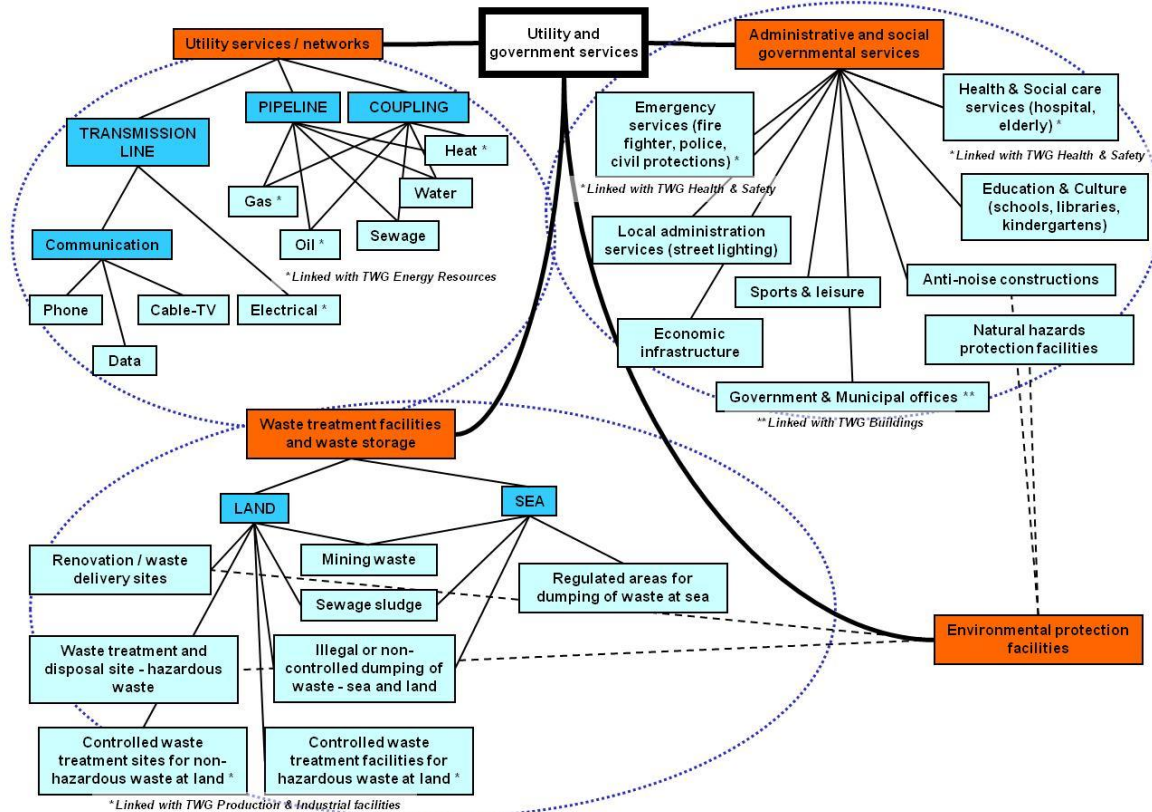
Figure 1 – Initial repartition of the US theme's scope within 3 sub-themes

Nota Bene: The above figure represents (in blue boxes) elements of the sub-scopes as they were initially proposed for the development of these data specifications. Sub-scopes' elements have evolved since.

The "Environmental protection facilities" initial part of the scope has been quickly split into the "Administrative and social governmental services" and the "Waste treatment facilities and waste storage" sub-themes.

Each sub-theme's specific sub-scope is detailed hereunder.

2.2.1   Utility services / networks

INSPIRE Feature Concept Dictionary

This sub-theme is described in the INSPIRE Feature Concept Dictionary as follows:

*"**Utility services/networks:** Physical construction for transport of defined products: These may include pipelines for transport of oil, gas, water, sewage or other pipelines. Transmission lines may include electrical, phone, cable-TV or other networks. Transmission lines for both land and at sea/water (bottom) are important. All kinds of transmission systems have nodes and are linked to facilities for production and treatment of different kinds of products. Despite being heavily interlinked, the themes in INSPIRE are treated separately – the production and treatment facilities are treated mainly in the theme production and industrial facilities. Transmission systems may be of different kinds;*

- ***Oil and gas pipelines:** Major lines from oil and gas fields/extraction areas and storage sites. Important production and treatment facilities of such resources is linked to a such a transport network, such as nuclear power stations, power stations, transformer stations and oil tanks. GISCO, Energy/ industry authorities, Companies*
- ***Water pipelines:** Location of water pipelines – large and local network. Large transmission lines are of interest here. Linked to production facilities for water for consumption/processes. Irrigation lines treated separately under agricultural facilities. Water supply institutions, Utilities/ health*
- ***Sewage pipelines:** Sewage network, linked to sewerage facilities. Major lines of interest here. Utilities*

- ***Transmission lines- electrical:*** *Data set showing larger transmission lines for electricity, both at land and sea. The location of lines is important knowledge for the energy sector itself, land use planners, construction, fisheries for sea cables. Parts of the information important in low flight hindrance databases. Large: national energy/industry institutions. Local authorities, Companies*
- ***Transmission lines-phone/ data/cable-TV:*** *Location of phone/ data: Rough data needed in land planning. Important transmission nodes, e.g. antennas, may be seen as part of the network. The cables placement can conflict other natural resource utilization activities, e.g. fisheries. Technical data accuracy for local level Companies*

Rough pipeline and utility service databases exist at European level, e.g. GISCO database with scale 1:1.000.000. Data within countries is non-homogenous. There are examples of national portals warning on construction, distributing maps/data on location of pipelines. At local and regional level the responsibility of government offices or different operators/ firms. In some countries there are national portals for information about cables etc. in construction work."

[INSPIRE Feature Concept Dictionary].

Comprehension of the scope

Utility services and networks include the physical constructions for transport of defined products, namely pipelines for transport of oil, gas, water, sewage or other pipelines. Transmission lines include electrical, phone, cable-TV and other networks. All kinds of transmission systems have nodes like e.g. pump stations, and they are linked to facilities for production and treatment of different kinds of products. These major production and treatment sites are treated in the theme production and industrial facilities.

Five important types of utility services and networks are distinguished, namely Oil & Gas Network, Electricity Network, Telecommunications Network, Water Network and Sewer Network.

> **Open issue 1:** Consideration of other networks
>
> So far, District heating networks are considered as a specific type of Water network; According to the different comments that may be received before version 2.9, it would be possible to add a separate type of network for such utility (based on technical specificity that are not used by other types of networks).

All these networks use the node-arc-node model, as defined in the generic network model developed by the transport networks thematic working group.

It is acknowledged that each organization has different responsibilities and this will influence the kind of data they collect, manage and use. Some organizations will use simple models while other will have more complex data models. This data specification is a basic framework that user can adopt and, if necessary, adapt and extend for themselves. The specification is focused on the core spatial objects required by networks, i.e. network centrelines etc. Not all the application-specific spatial objects (e.g. flow measurement sensors) are incorporated. Non-geographic data (e.g. information on flow in m³/s) is also out of scope of this specification.

In the utility services and networks there are "ducts", which are utility link sets used to convey fluids (liquids or gases) from one location to another. A duct belongs to the structural network, and is the outermost casing. A duct may contain other duct(s) and inner-duct(s). "Duct" contains information about the position and characteristics of ducts as seen from a manhole, vault, or a cross section of a trench and duct. Attributes that are considered valuable are coating, columns and rows, diameter, height and width, material and shape. In a duct there are "pipes", which are tubes for the conveyance of solids, liquids or gases from one location to another. Important attributes are coating, diameter, material and shape.

The nodes of the networks include poles. Poles represent node objects that support utility devices and cables. "Pole" is a container to other utility objects. The attributes of poles are diameter, foundation, has anchor guy, has push brace, has riser, height, material and type. Other important nodes are manholes. These are the top openings to an underground public utility or service. The attributes that describe a manhole are cover length, cover opening, cover shape, cover width, height, shaft access, shaft length, shaft material and shaft width.

Both poles and manholes (including ducts, to certain extent) represent *containers* for other network features. They co-exist on common application schema, e.g. a manhole may contain features belonging to one or more networks. Containers can also be further specialized in terms of network type, e.g. a telecommunications manhole/pole, water manhole, etc.

Organization of information

The proposed model will include the following elements (see chapter "5 Data content and structure" for further details):

Pipeline – oil, gas
- category of content
- segment id
- capacity, max
- average volume
- diameter
- pressure regime
- construction system
- date of construction
- responsible organization

Sewage system network
- segment id
- capacity, max
- average volume
- construction system, including e.g. material used for building the network (cast iron, cement …)
- altitude
- date of construction
- responsible organization

Water supply system network
- segment id
- capacity, max
- average volume
- construction system, including e.g. material used for building the network (cast iron, cement …)
- date of construction
- responsible organization

Electricity transmission lines
- segment id
- capacity, max
- average volume
- construction system
- date of construction
- responsible organization

Transmission network for different kind of data/ signals
- segment id
- category of object (feature type) e.g. antennas, base-stations, relay-antennas, cables etc
- category of data/signal, e.g. radio, data, mobile, TV
- date of construction
- responsible organization

Overlaps / links with other themes

This sub-theme might overlap with themes:
- Hydrography (A-I.8)
- Buildings (A-III.2)
- Land use (A-III.4)
- Environmental monitoring facilities (like treatment plants/pumping stations) (A-III.7)
- Production and industrial facilities (A-III.8)
- Energy resources (A-III.20)

Current sub-theme holds potential dependencies with the following themes:
- Annex I
  - Coordinate reference systems (geo-referencing of the point)
  - Geographical grid systems (geo-referencing of the point)
  - Geographical names (Identification of the point and of the place where it is located)
  - Administrative units (that contain the point)
  - Addresses (referencing of the point)
  - Cadastral parcels (that contain the given service and from which the service is provided)
  - Transport networks (that provide access to/from the services)
  - Protected sites (that may contain services or being potential receptors of these)
- Annex II
  - Elevation (referencing of the point)
- Annex III
  - Statistical units (that contain the point)
  - Buildings (that contain the given service and from which the service is provided)
  - Population distribution – demography (potential service "clients")
  - Utilities (that the service make use/depend on)

2.2.2   Administrative and social governmental services

INSPIRE Feature Concept Dictionary

It is further described in the INSPIRE Feature Concept Dictionary as follows:

*"**Administrative and social governmental services** such as public administrations, civil protection, sites, schools, hospitals. The kinds of sites are commonly presented in governmental and municipal portals and map system as "point of interest"-data, and may be point-based location of a variety of categories of municipal and governmental services and social infrastructure.*
- *police stations,*
- *fire fighter stations*
- *hospitals*
- *health care centres*
- *care centres for the elderly*
- *schools and kindergartens*
- *renovation/ waste delivery sites*
- *government and municipal offices.*

Environmental. protection facilities
The theme does also include a specific kind of facilities: Environmental protection facilities include a series communal or private facilities of sewage/ wastewater treatment sites, waste treatment facilities (e.g. incineration , landfills), anti-noise constructions facilities, protection facilities against natural hazards (slide walls, flood walls etc). It is important to identify the environmental protection facilities with unique identifiers. The data component category coincides with economic/statistical categories (NACE/SERIEE). Location by geographical point, by address or in some cases as area.

Examples
Natural hazards protection facilities: Any kind of facilities or constructions protecting against natural hazards, e.g. land slide walls, flood walls etc). Hydrographic services, civil security, local authorities.

- ***Anti-noise constructions:*** *Constructions/walls or other facilities for limiting the spread of noise from road, rail and air traffic, industrial or other noise. For industrial includes modification at the source. Workplace protection excluded. 6EAP."*

[INSPIRE Feature Concept Dictionary].

Comprehension of the scope

According to the INSPIRE Directive, the scope of the sub-theme comprises "… administrative and social governmental services such as public administrations, civil protection sites, schools and hospitals. [Annex III]."

On another hand, INSPIRE document "Definition of Annex Themes and Scope v3.0 (D 2.3)" details governmental services as those fitting the following description:
"Administrative and social governmental services such as public administrations, civil protection sites, schools, hospitals. The kinds of sites that are commonly presented in governmental and municipal portals and map systems as "points of interest"-data (POI), and may be point-based location of a variety of categories of municipal and governmental services and social infrastructure".

Given this description and, very specially, the concrete mention to the use of this type of data as POI, a wide interpretation of what "administrative and social governmental services" should be done.

In this same sense, the following words from the manual of the Spanish EIEL (Spanish acronym for Enquiry on Local Infrastructures and Services) database, which does also contain information on public services, may be considered as highly relevant: "(...)The variety of ways how public services are provided and the correspondent variety in facilities management, as well as the concurrent activity of different Public Administration bodies, do recommend having in mind a broad scope on what are the utilities and services that are collectively facing the same needs".

Eligibility criteria
In opposite to other INSPIRE themes, the scope of this sub-theme is comparatively wide and fuzzy. To identify the relevant services, two criteria have been defined:

First criterion: The service shall be provided for the use by, or to the benefit of, the public. It can be used by other administrations or private companies as well.

Providing information about services to external service-users is an important high-level use case for the sub-theme "Administrative and social governmental services". On the other hand, data which is only held for internal use within the providing institution, is out of the scope of the sub-theme (i.e. there is no need for data exchange).

Second criterion: Following the INSPIRE principles, the service can be used for environmental issues.

Another important high-level use case for the sub-theme is disaster management. Here one is faced to the fact that the set of required services and their description can't be strictly defined in advance. To solve this problem, the present schema takes the term "Administrative and social governmental services" in a broad sense.

Both criteria have to be fulfilled (logical intersection).

In opposite to these criteria, the fact whether the service is provided by a Public Administration Body (PAB) or by private institutions is not a relevant criterion. This approach fits with the definition of "'public authority" in the INSPIRE directive (§ 9 of Article 3). Very often, administrative and social governmental services are not provided by the PAB itself but by a private institution on behalf of a PAB. In many cases, this varies from Member State to Member State, from region to region and from municipality to municipality.

Organization of information

As it is mentioned in the INSPIRE Feature Concept Dictionary, Governmental services will be mostly featured by Points of Interest that will be located whether directly as specific geometry, or recovered from an address location or from a building respectively a facility position.

The choice made by the thematic working sub-group on "Administrative and social governmental services" was to prefer having only one single generic element, rather than implementing object classes for each category of administrative and social governmental services.
The service taxonomy is thus based on a structured list of activities, modelled on the "Classification of the functions of government"[14], abbreviated as COFOG, that was developed in its current version in 1999 by the OECD, published by the United Nations Statistical Division as a standard classifying the purposes of government activities and that is currently used by EuroStat.

The first level of information of COFOG includes the following domains:
- General public services
- Defence
- Public order and safety
- Economic affairs
- Environmental protection
- Housing and community amenities
- Health
- Recreation, culture and religion
- Education
- Social protection

This structure has been adopted in this data specification but has been adapted (defense, for instance, is out of INSPIRE's scope).

Based on user requirements interviews, the proposed model will include further elements for the purpose to find, evaluate and use a service (see chapter 5 "Data content and structure" for details).

Overlaps / links with other themes

Overlaps: This sub-theme, considered as a general container of layers, overlaps the following ones:
- Transport networks (A-I.7), e.g. regarding winter services or use of network references
- Buildings (A-III.2), e.g. use of buildings
- Human health and safety (A-III.5), e.g. hospitals
- Natural risk zones (A-III.12), e.g. exposed elements

given that contains elements that are also, partially or completely, contained in the mentioned Annex I and III themes.

Namely, in the case of "Human health and safety", there is a clear overlap given that, despite its description estates: "Geographical distribution of dominance of pathologies (allergies, cancers, respiratory diseases, etc.), information indicating the effect on health (biomarkers, decline of fertility, epidemics) or well-being of humans (fatigue, stress, etc.) linked directly (air pollution, chemicals, depletion of the ozone layer, noise, etc.) or indirectly (food, genetically modified organisms, etc.) to the quality of the environment", further in the document it has been written that, between other, this theme should focus on the description of "health care services".

Dependencies: Current sub-theme holds potential dependencies with the following themes:
- Annex I
    Coordinate reference systems (geo-referencing of the service)
    Geographical names (Area of responsibility of the service)

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http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=COFOG_99&StrLanguageCode=EN&IntPcKey=&StrLayoutCode=HIERARCHIC

Administrative units (that contain the service)
Addresses (referencing of the service)
- Annex III
Buildings (that contain the given service and from which the service is provided)
Facilities (that are abstract type created with "Waste treatment facilities and waste storage" sub-theme of this theme, but also used by "Production and industrial facilities" and "Agricultural and aquaculture facilities")

2.2.3 Waste treatment facilities and waste storage

INSPIRE Feature Concept Dictionary

It is further described in the INSPIRE Feature Concept Dictionary as follows:

*"**Waste treatment facilities and waste storage:***
It is important to identify the environmental protection facilities with unique identifiers. The data component category coincides with economic/statistical categories (NACE/SERIEE). Location by geographical point, by address or in some cases as area.
- ***Controlled waste treatment sites for non-hazardous waste at land:*** *geographical location of official or regulated facilities for waste treatment and storage; Included in the spatial component category "environmental protection facilities"*
  - *storage sites at land - landfills*
  - *incinerators*
  - *other treatment facilities*
  Information on kind of treatment, kind of substances treated, capacity, percentage biodegradable waste, energy recovery from incinerators and landfills
- ***Controlled waste treatment facilities for hazardous waste at land:*** *geographical location of official or regulated facilities for treatment and storage of hazardous waste; Included in the spatial component category "environmental protection facilities". Reported according to SEVESO II Directive. Distinction between*
  - *thermal treatment,*
  - *landfills*
  - *nuclear waste treatment and storage*
  - *and other treatment for hazardous waste (e.g. chemical),*
  - *other treatment facilities*
  Information about kind of treatment, kind of substances treated, capacity (and potential risks).
- ***Regulated areas for dumping of waste at sea:*** *Areas at sea for dumping of waste, e.g. ships, oil drilling platforms, industrial waste, military waste. OSPAR Permits on marine dumping. Reporting per contracting party and site (?) waste category, number of permits issued, tonnes licensed and contracting party. Important in environmental management and management of biological resources at sea. . Submission of data for the Annual OSPAR Report on Dumping of wastes at Sea from OSPAR Convention for the protection of the marine environment of the north-east Atlantic. The anticipated delivery authorities could be sea management/ marine/ waste/ environmental authorities, OSPAR. Included in the spatial data component "area regulation".*
  Does also include nuclear waste. Example is Russian dumping sites: Official sources states a total of 0.45 PBq of liquid radioactive material has been dumped in the Barents Sea and 0.32 PBq in the Kara Sea. Most of the solid radioactive waste has been dumped along the east coast of Novaja Zemlya and the open Kara Sea. Some material on existing sites and amounts are available.
- ***Illegal or non-controlled dumping of waste - sea and land.*** *Illegal landfills/"wildfills" on land areas are common, but policies are directed to reduce the number of such storage of waste. It is important in local waste management and pollution control to locate such illegal land fills, in order to carry out targeted actions. Non-controlled areas at sea where waste is recorded is also important, this can be shipwrecks, industrial waste, military waste, cars. OSPAR Permits on marine dumping.*
- ***Mining waste:*** *Mining waste is a special kind of waste. The residues from mining can contain a low content of metals or minerals not being economically extractable, but leaching can cause contamination of soil and water. The tailings of mining activities are usually located near the site of*

extraction. In management and assessment of mining waste there are needs for spatial data such as location of mines and tailings, water catchments, river network, water and sea, soil.

- *Sewage sludge: generation, sewage pipelines network and sewage treatment facilities: Is treated as a group here:*
  - o *Sewerage/wastewater treatment facilities, Information on capacity, kind of treatment, category of recipient.*
  - o *Sewage networks treated under the data component: utilities.*
  - o *Sewage sludge spread to agricultural lands - regulated "permission zones"*
  - o *Sewage sludge spread - agricultural lands and soil deposits suitability mapping*

Environmental. protection facilities

The theme does also include a specific kind of facilities: Environmental protection facilities include a series communal or private facilities of sewage/ wastewater treatment sites, waste treatment facilities (e.g. incineration , landfills), anti-noise constructions facilities, protection facilities against natural hazards (slide walls, flood walls etc). It is important to identify the environmental protection facilities with unique identifiers. The data component category coincides with economic/statistical categories (NACE/SERIEE). Location by geographical point, by address or in some cases as area.

Examples

- **Waste treatment and disposal site - hazardous waste:** *Waste treatment plants location for hazardous waste. Major distinction between hazardous and non-hazardous waste. Distinction between thermal treatment, landfills and other treatment for hazardous waste (chemical/ radioactive), incineration, landfills and other treatment for non-hazardous waste. Information about kind of treatment, kind of substances treated, capacity (and potential risks). Waste Directive (Directive 75/442/EEC), Mining Waste Directive (Directive 2006/21/EC), SEVESO II, WFD, MS to DG ENV*
- **Sewage/ wastewater treatment site:** *Wastewater treatment facilities, Information on capacity, kind of treatment, category of recipient. Sewage networks treated under the data component: utilities. WFD, MS to DG ENV, local authorities. Facilities defined in Directive 91/271/ECC (urban waste water) / industrial waste may be part of this general category of Sewage/wastewater treatment site."*

[INSPIRE Feature Concept Dictionary].

Comprehension of the scope

The INSPIRE Directive; "Definition of Annex Themes and Scope v3.0 (D 2.3)" states that this sub-theme comprises several categories in order to identify the environmental protection facilities. Categories such as waste treatment sites, waste treatment facilities, regulated and illegal areas for dumping, mining waste and sewage sludge are mentioned as categories to be included. The use cases also indicate the need for providing information on waste treatment, storage and disposal.

The sub-theme scope therefore includes all the facilities involved or/and requested by law to be registered on the management of all kind of wastes of the "European Waste Catalogue and Hazardous Waste List". Locations of the facilities are given by point or polygon. The waste management facilities are referred to either as installations or sites, where an installation is understood as a stationary unit where one or more waste management activities are carried out, or any other directly associated activities. The site is understood as a single location, in which certain infrastructure and facilities are shared, and where waste management activities take place.

All of the following is considered relevant for the scope: Type of waste management activity at the facility, type of economic activity at the facility, legal status such as illegal or abandoned, permissions, and output product. In addition, information on service hours and capacities are also linked to facility, as well as operators, owners, contacts, and competent authorities.

Waste management activities are distinguished by categories such as storage, recovery, and/or disposal of waste. Information on economic activity refers to the NACE catalogue (Classification of Economic Activities in the European Community) under the 'E'-Group "Water supply; sewerage; waste management

and remediation activities". The Eurostat CPA list of products (Annex Regulation (EC) n. 451/2008) is used for the classification of output products.

Organization of information

The following types of data are within the scope of the TWG-US sub-theme. They are provided with links to reference documents that illustrate which user requirements the type of data originate from.
- Disposal [1] (of waste)
- Dumping [1] (of waste at sea)
- Facility [3] (of waste treatment, storage)
- Hazardous waste [1]
- Incineration [8] (of waste)
- Landfill [13] (of waste)
- Non-hazardous waste [1]
- Plant [8] (of waste treatment, storage)
- Radioactive waste [14]
- Recovery [1] (of waste)
- Site [3] (of waste treatment, storage)
- Storage [8] (of waste)
- Treatment [1] (of waste or waste water)
- Transfer [3],[4] (of waste)
- Waste [1]

Data out of scope
- Emissions [2]
- Flooding
- Exhaust gas [8]
- Pollutants [3]

Overlaps / links with other themes

Current sub-theme holds potential dependencies with the following themes:
- *Addresses* (addresses of almost anyone involved in waste processes are required at minimum for postal delivery)*: Dependency*
- *Buildings* (stationary installations may be regarded as buildings)*: Dependency*
- *Administrative units* (eg. required for relating to Competent Authorities)*: Dependency*
- *Agricultural and aquaculture facilities: Potential dependency (harmonisation of site, facility, installation concepts)*
- *Cadastral parcels (interrelation of certain types of waste disposal sites with cadastral parcels is of relevance): Dependency*
- *Coordinate reference systems, Geographical grid systems, Geographical names: Dependency*
- *Environmental monitoring facilities (eg to relate points of waste water discharge to monitoring locations at rivers): Potential dependency (harmonisation of site, facility, installation concepts)*
- *Orthoimagery (in relation to landfills): Dependency*
- *Production and industrial facilities*: *Dependency (harmonisation of site, facility, installation concepts)*
- *Statistical units: Dependency*

Reference documents
[1] Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste
[2] Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control

[3] Regulation (EC) No 166/2006 of the European Parliament and of the Council of 18 January 2006 concerning the establishment of a European Pollutant Release and Transfer Register

[4] Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste

[5] Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators

[6] Regulation (EC) No 2150/2002 of the European Parliament and of the Council of 25 November 2002 on waste statistics

[7] Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE)

[8] Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste

[9] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

[10] Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles

[11] Council Regulation (EEC) No 696/93 of 15 March 1993 on the statistical units for the observation and analysis of the production system in the Community

[12] European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste

[13] Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste

[14] Council Directive 92/3/Euratom of 3 February 1992 on the supervision and control of shipments of radioactive waste between Member States and into and out of the Community

[15] Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment

2.3   Normative References

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

[ISO 19107]   EN ISO 19107:2005, Geographic Information – Spatial Schema

[ISO 19108]   EN ISO 19108:2005, Geographic Information – Temporal Schema

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

[ISO 19111]   EN ISO 19111:2007 Geographic information - Spatial referencing by coordinates (ISO 19111:2007)

[ISO 19113]   EN ISO 19113:2005, Geographic Information – Quality principles

[ISO 19115]   EN ISO 19115:2005, Geographic information – Metadata (ISO 19115:2003)

[ISO 19118]   EN ISO 19118:2006, Geographic information – Encoding (ISO 19118:2005)

[ISO 19123]   EN ISO 19123:2007, Geographic Information – Schema for coverage geometry and functions

[ISO 19135]   EN ISO 19135:2007 Geographic information – Procedures for item registration (ISO 19135:2005)

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

[ISO 19139]   ISO/TS 19139:2007, Geographic informantion – Metadata – XML schema implementation

[OGC 06-103r3]   Implementation Specification for Geographic Information - Simple feature access – Part 1: Common Architecture v1.2.0

NOTE   This is an updated version of "EN ISO 19125-1:2006, Geographic information – Simple feature access – Part 1: Common architecture". A revision of the EN ISO standard has been proposed.

[Regulation 1205/2008/EC]   Regulation 1205/2008/EC implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata

2.4   Terms and definitions

General terms and definitions helpful for understanding the INSPIRE data specification documents are defined in the INSPIRE Glossary[15].

There are no new terms defined in this specification.

2.5   Symbols and abbreviations

Here is a list of abbreviations and acronyms used in the data specification:

ABS	Acrylonitrile butadiene styrene
AF	Agricultural and aquaculture facilities *(INSPIRE theme)*
AM	Area management/restriction/regulation zones and reporting units *(INSPIRE theme)*
BU	Buildings *(INSPIRE theme)*
COFOG	Classification of the Functions of Government
CPA	Statistical Classification of Products by Activity in the EEC
CPVC	Collapsed polyvinylchloride
CS	Collective services *(within COFOG)*
DLC	Digital loop carrier
DXC	Digital cross connect
EEC	European Economic Community
EIEL	Enquiry on Local Infrastructures and Services *(Spanish acronym for)*
ESSPROS	European System of integrated Social Protection Statistics
FIC	Fiber interconnect
FRP	Fibre reinforced plastic
GCM	Generic Conceptual Model
GISCO	Geographic Information System of the European Commission
GM	Gravity main
GNM	Generic Network Model
GPRS	General packet radio service
GSM	Global system for mobile communications
HDPE	High density polyethylene
IHO	International Hydrographic Organization
IMO	International Maritime Organization
IS	Individual services *(within COFOG)*
ISO	International Organization for Standardization
LAN	Local area network
LE	Local exchange
LEC	Local exchange carrier
LL	Lateral line
MAN	Metropolitan area network
MDF	Main distribution frame
ML	Main line

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[15] The INSPIRE Glossary is available from http://inspire-registry.jrc.ec.europa.eu/registers/GLOSSARY

MS	Member State
MUX	Multiplexer
NACE	Classification of Economic Activities in the European Community *(French acronym for)*
NaN	Node-Arc-Node
NEC or n.e.c.	Not elsewhere classified *(within COFOG)*
ODF	Optical distribution frame
OECD	Organization for Economic Co-operation and Development
OH	Overhead
OSPAR	Oslo/Paris convention *(for the Protection of the Marine Environment of the North-East Atlantic)*
PAB	Public Administrative Body
PB	Polybutylene
PE	Polyethylene
PEX	Cross-linked high-density polyethylene
PF	Production and industrial facilities *(INSPIRE theme)*
PM	Pressurized main
POI	Point of interest
POTS	Plain old telephone services
PP	Polypropylene
PSTN	Public switched telephone networks
PVC	Polyvinylchloride
RPMP	Reinforced polymer mortar
RR	Radio-relay
S-100	IHO Hydrographic Geospatial Standard for Marine Data and Information
S-32	IHO International Hydrographic Dictionary
SCADA	Supervisory control and data acquisition
SERIEE	European System for the Collection of Economic Information on the Environment *(French acronym for)*
SP	Single-phase
TP	Three-phase
UG	Underground
UMTS	Universal mobile telephone system
VPN	virtual private network
WAN	Wide area network
WFD	Water Framework Directive *(Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy)*
WLAN	Wireless local area network

2.6 Notation of requirements and recommendations

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

IR Requirement X	Requirements that are reflected in the Implementing Rule on interoperability of spatial data sets and services are shown using this style.

DS Requirement X	Requirements that are not reflected in the Implementing Rule on interoperability of spatial data sets and services are shown using this style.

Recommendation 1	Recommendations are shown using this style.

2.7 Conformance

DS Requirement 1   Any dataset claiming conformance with this INSPIRE data specification shall pass the requirements described in the abstract test suite presented in Annex A.

3 Specification scopes

This data specification does not distinguish different specification scopes, but just considers one general scope.

NOTE   For more information on specification scopes, see [ISO 19131:2007], clause 8 and Annex D.

4 Identification information

NOTE   Since the content of this chapter was redundant with the overview description (section 2) and executive summary, it has been decided that this chapter will be removed in v2.0. and further

5 Data content and structure

IR Requirement 1   Spatial data sets related to the theme *Utility and governmental services* shall be provided using the spatial object types and data types specified in the application schema(s) in this section.

IR Requirement 2   Each spatial object shall comply with all constraints specified for its spatial object type or data types used in values of its properties, respectively.

Recommendation 1 The reason for a void value should be provided where possible using a listed value from the VoidValueReason code list to indicate the reason for the missing value.

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

5.1 Basic notions

This section explains some of the basic notions used in the INSPIRE application schemas. These explanations are based on the GCM [DS-D2.5].

5.1.1 Stereotypes

In the application schemas in this sections several stereotypes are used that have been defined as part of a UML profile for use in INSPIRE [INSPIRE DS-D2.5]. These are explained in Table 1 below.

Table 1 – Stereotypes (adapted from [INSPIRE DS-D2.5])

Stereotype	Model element	Description
applicationSchema	Package	An INSPIRE application schema according to ISO 19109 and the Generic Conceptual Model.
featureType	Class	A spatial object type.
type	Class	A conceptual, abstract type that is not a spatial object type.
dataType	Class	A structured data type without identity.
union	Class	A structured data type without identity where exactly one of the properties of the type is present in any instance.
enumeration	Class	A fixed list of valid identifiers of named literal values. Attributes of an enumerated type may only take values from this list.
codeList	Class	A flexible enumeration that uses string values for expressing a list of potential values.
placeholder	Class	A placeholder class (see definition in section 5.1.2).
voidable	Attribute, association role	A voidable attribute or association role (see definition in section 5.1.3).
lifeCycleInfo	Attribute, association role	If in an application schema a property is considered to be part of the life-cycle information of a spatial object type, the property shall receive this stereotype.
version	Association role	If in an application schema an association role ends at a spatial object type, this stereotype denotes that the value of the property is meant to be a specific version of the spatial object, not the spatial object in general.

5.1.2 Placeholder and candidate types

Some of the INSPIRE Annex I data specifications (which were developed previously to the current Annex II+III data specifications) refer to types that thematically belong and were expected to be fully specified in Annex II or III spatial data themes. Two kinds of such types were distinguished:

− *Placeholder types* were created as placeholders for types (typically spatial object types) that were to be specified as part of a future spatial data theme, but which was already used as a value type of an attribute or association role in this data specification.

Placeholder types received the stereotype «placeholder» and were placed in the application schema package of the future spatial data theme where they thematically belong. For each placeholder, a definition was specified based on the requirements of the Annex I theme. The Annex II+III TWGs were required to take into account these definitions in the specification work of the Annex II or III theme.

If necessary, the attributes or association roles in the Annex I data specification(s) that have a placeholder as a value type shall be updated if necessary.

− *Candidate types* were types (typically spatial object types) for which already a preliminary specification was given in the Annex I data specification. Candidate types did not receive a specific stereotype and were placed in the application schema package of the future spatial data theme where they thematically belong. For each candidate type, a definition and attributes and association roles were specified based on the requirements of the Annex I theme. The Annex II+III TWGs were required to take into account these specifications in the specification work of the Annex II or III theme.

If the type could not be incorporated in the Annex II or III data specification according to its preliminary specification, it should be moved into the application schema of the Annex I theme where it had first been specified. In this case, the attributes or association roles in the Annex I data specification(s) that have the type as a value type shall be updated if necessary.

Open issue 2: For all Annex II+III themes for which placeholders and candidate types were specified in an Annex I data specification, it should be clearly indicated in the data specification, how the placeholder and candidate types were taken into account. If the proposed solution would require any changes to an Annex I data specification (and the corresponding section in the IR for interoperability of spatial data sets and services), this should also be clearly indicated.

A thorough investigation of the implications of the proposed changes of candidate types (in particular related to requirements of Annex I maintenance) will have to be performed for v3.0 of the data specifications.

5.1.3 Voidable characteristics

If a characteristic of a spatial object is not present in the spatial data set, but may be present or applicable in the real world, the property shall receive this stereotype.

If and only if a property receives this stereotype, the value of *void* may be used as a value of the property. A *void* value shall imply that no corresponding value is contained in the spatial data set maintained by the data provider or no corresponding value can be derived from existing values at reasonable costs, even though the characteristic may be present or applicable in the real world.

It is possible to qualify a value of void in the data with a reason using the VoidValueReason type. The VoidValueReason type is a code list, which includes the following pre-defined values:
   − *Unpopulated*: The characteristic is not part of the dataset maintained by the data provider. However, the characteristic may exist in the real world. For example when the "elevation of the water body above the sea level" has not been included in a dataset containing lake spatial objects, then the reason for a void value of this property would be 'Unpopulated'. The characteristic receives this value for all objects in the spatial data set.
   − *Unknown*: The correct value for the specific spatial object is not known to, and not computable by the data provider. However, a correct value may exist. For example when the "elevation of the water body above the sea level" *of a certain lake* has not been measured, then the reason for a void value of this property would be 'Unknown'. This value is applied on an object-by-object basis in a spatial data set.

NOTE It is expected that additional reasons will be identified in the future, in particular to support reasons / special values in coverage ranges.

The «voidable» stereotype does not give any information on whether or not a characteristic exists in the real world. This is expressed using the multiplicity:
   − If a characteristic may or may not exist in the real world, its minimum cardinality shall be defined as 0. For example, an if an Address may or may not have a house number, the multiplicity of the corresponding property shall be 0..1.
   − If at least one value for a certain characteristic exists in the real world, the minimum cardinality shall be defined as 1. For example, if an Administrative Unit always has at least one name, the multiplicity of the corresponding property shall be 1..*.

In both cases, the «voidable» stereotype can be applied. A value (the real value or void) only needs to be made available for properties that have a minimum cardinality of 1.

5.1.4 Code lists and Enumerations

5.1.4.1.   Style

All code lists and enumerations use the following modelling style:
   − No initial value, but only the attribute name part, is used.
   − The attribute name conforms to the rules for attributes names, i.e. is a lowerCamelCase name. Exceptions are words that consist of all uppercase letters (acronyms).

5.1.4.2. Governance of code lists

Two types of code lists are defined in INSPIRE. These two types are distinguished using the tagged value "extendableByMS" in the UML data model:

– *Code lists that **may not** be extended by Member States.* For these code lists, the tagged value is set to "false". They shall be managed centrally in the INSPIRE code list register, and only values from that register may be used in instance data.
– *Code lists that **may** be extended by Member States.* For these code lists, the tagged value is set to "true".

5.1.5 Choices of standard types

For harmonization reasons, it has been decided to prefer the use of standardized types in all application schemas of the theme "*Utility and governmental services*", rather than creating customized types, even if these latter may have better fitted the constraints and requirements from each sub-theme.

This approach is mainly conceptual, since some of the standards are still in discussions and not consolidated (e.g. OM_Measurement). The standards concerned are:

Table 2 – Standard types used in US data specifications

Standard type	Standard reference	Comment
PT_FreeText	ISO TC211. ISO 19139 (Metadata - XML Implementation)	Instead of any CharacterString type or open text PT_FreeText type offers to allow translation in multiple languages of textual input, through a link (type: 1 to many) to LocalisedCharacterString
Measure	ISO TC211. ISO 19103:2005 (Schema Language)	Prefered to ISO 19156:2010 (Observations and Measurements) OM_Measurment type, the ISO 19103:2005 Measure type is systematically used for all data providing information on a pair of items (value + non-metric unit)
Length	ISO TC211. ISO 19103:2005 (Schema Language)	Prefered to ISO 19156:2010 (Observations and Measurements) OM_Measurment type, the ISO 19103:2005 Length type is systematically used for all data providing information on a pair of items (value + metric unit in 2D)
Volume	ISO TC211. ISO 19103:2005 (Schema Language)	Prefered to ISO 19156:2010 (Observations and Measurements) OM_Measurment type, the ISO 19103:2005 Length type is systematically used for all data providing information on a pair of items (value + metric unit in 3D)
CI_Citation	ISO TC211. ISO 19115:2006 (Metadata - Corrigendum)	CI_Citation is used to refer to any resource (digital document, image, table, video, etc. or hardcopy)
C_ResponsibleParty	ISO TC211. ISO 19115:2006 (Metadata - Corrigendum)	CI_ResponsibleParty provides information on identification of, and means of communication with, person(s) and organisations associated with the dataset

As soon as instructions will be given by the Drafting Team of INSPIRE Data Specification concerning a better choice of references, they will be implemented; otherwise, such use of standards will remain in the proposed model.

Open issue 3: Use of standards for legal reference or contact information

A specific feature "*LegislationReference*" has been recently developed for referring to any legal document in the AM theme. This could be integrated in the US model further versions for some elements, instead of the CI_Citation current proposal.

Same approach will be developed within US or externally with other themes for providing specific information to several actors of the "*Utility and governmental services* » theme (owner, maintainer, operator), since the CI_ResponsibleParty is more dedicated to data and metadata providers than services.

Open issue 4: Harmonization of the temporal information

Currently, the model proposes 2 expressions to describe opening hours of the services: PT_FreeText (cf. Administrative and social governmental services submodel) and ServiceHoursType (cf. Waste Management submodel). According to the comments received during the testing phase, it should be likely that these types will be harmonized one way or another.

5.2   Application schema "*Utility and governmental services*"

5.2.1   Description

5.2.1.1.   Narrative description and UML Overview
The INSPIRE theme *Utility and governmental services* has been split in 3 separate application schemas, that are developed hereafter.
Though main features of the 3 sub-themes have common concepts related to the theme (such as localization, technical description and responsible party), they were treated separately with different modelization approaches within 3 nearly independent application schemas. This is principally due to the observation that data providers and data users for each sub-theme are almost different.

It has been decided to not apply a coverage / grid modelization at this stage of the development of the data specification, due to the fact that such coverage, if existing, are more resulting of spatial analysis outputs (e.g. access to telecommunication networks – GSM, 3G, etc.) than real spatial information (e.g. position of antennas).

Next page is the UML diagram of these 3 application schemas.

class Utility and Governmental Services

«applicationSchema»
Utility Networks

- + Managing authority
- + Plan applicant
- + Duct
- + DuctCasingValue
- + MaintenanceAuthority
- + Manhole
- + ManholeCoverOpeningValue
- + ManholeCoverShapeValue
- + ManholeShaftAccessValue
- + ManholeShaftMaterialValue
- + ManholeTypeValue
- + OwnerAuthority
- + Pipe
- + PipeCoatingValue
- + PipeMaterialValue
- + PipeShapeValue
- + Pole
- + PoleFoundationValue
- + PoleMaterialValue
- + PoleTypeValue
- + *UtilityLink*
- + *UtilityLinkSequence*
- + *UtilityLinkSet*
- + UtilityName
- + *UtilityNetwork*
- + *UtilityNetworkElement*
- + UtilityNetworkSubTypeValue
- + UtilityNetworkTypeValue
- + *UtilityNode*
- + *UtilityNodeContainer*
- + *UtilityProperty*
- + Electricity Network
- + Oil & Gas Network
- + Sewer Network
- + Telecommunications Network
- + Water Network
- + Cables and Lines information portal

«applicationSchema»
Administrative and social governmental services

- + OccupancyType
- + ResourceType
- + AreaOfResponsibilityType
- + GovernmentalService
- + ServiceLevelValue
- + ServiceLocationType
- + ServiceTypeValue

«applicationSchema»
Waste Management

- + AbstractListType
- + ActivityListSelType
- + ActivityNACEListType
- + ActivityRecoveryDisposalListType
- + ActivityType
- + ActivityWasteStatisticsListType
- + ActivityWasteTreatmentListType
- + CapacityType
- + DayListType
- + DayTimeType
- + Facility
- + FacilityListType
- + FacilityStatusType
- + IdentifierType
- + InputOutputListSelType
- + InputOutputProductListType
- + InputOutputType
- + InputOutputWasteListType
- + PartyRoleType
- + PermissionType
- + RoleListType
- + ServiceHoursType
- + StatusListType

Figure 2 – UML class diagram: Overview of the "*Utility and governmental services*" application schema

5.2.1.2. Consistency between spatial data sets

The location of some *Utility and governmental services* features may be originally defined in the real world relative to administrative, cadastral or natural boundaries (roads, rivers, walls, etc.). These locations are initially similar to the position of a facility or a service (exact location of the networks elements, or of a zone where some public service is provided), which may be known to exist up to a natural or administrative feature. However, the INSPIRE *Utility and governmental services* data specification represents such facilities or services as absolute, not relative geometries. That is, they have their own, absolute geometries (as INSPIRE defined GM_Object or GM_MultiSurface) and their geographical location is not dependent on other features (other than during their original delineation). This is because many Member States do not update *Utility and governmental services* geometries if there are changes to administrative or natural boundaries, and in any case, the official definition of a *Utility and governmental services* remains fixed even if there are underlying changes to the administrative boundary or the location of natural features.
For example, one can see that some underground networks can remain at the same position, even after some road works.

On another hand, some other *Utility and governmental services* features do really share their existence with other datasets (buildings, facilities described in other themes, like *Production and industrial facilities*). For those elements, the location refers directly to the objects of those related themes, so that if a instantiation of these supportive objects are deleted from a database, the service object has to be deleted cascadingly. That reflects the dependence in real world: if a governmental service is provided in a building that is destroyed, then no more service is provided, or if a service is provided for a certain aggregation of administrative units (such as intercommunality, or region), the perimeter of responsibility will evolve with the new geometry of such administrative area, if modified.
In such case, the model refers directly to the objects (among the proposed location or area in the union type, for example).

5.2.1.3. Identifier management

The *Utility and governmental services* data specification uses the Identifier dataType from the INSPIRE General Conceptual Model [DS-D2.5]. These identifiers include version number, so can be used to track changes to an object. The use of identifiers in combination with dates is described in more detail in Section 5.2.1.7.

Additional identifiers may also be represented with the Id attribute for Facility features or can be mentioned in the note attribute for GorvenmentalServices. These attributes may be used to store some specified identification reference, such as in national registers, but may also contain international identifiers or other thematic identifiers, depending on the features.

5.2.1.4. Modelling of object references

According to the specific approach of the INSPIRE theme *Utility and governmental services*, some features described in the model are already existing as object in other thematic models.
EXAMPLE: Indeed, a school can be comprehended as a building, where several rooms are used as classrooms, or as a governmental service dedicated to a certain amount of children, or as a service provided by a PAB on a given regulated area (scholar districts) or also as an exposed element regarding the natural risk zones.
Another example concerns an environmental facility that can be a place where waste (type, quantity) is treated or stored, but also a specific activity allowed by an administrative permit, or also to a polluting activity subjected delivering frequent reports.
All this information is developed in INSPIRE, but some is described within the scope of the theme *Utility and governmental services*, some other in other scopes (e.g. 2. *Buildings*, 11. *Area management / restriction / regulation zones & reporting units*, or 12 *Natural risk zones*)

When such objects are already defined (e.g. in Annex I data specifications) or because most of the information required is produced and spread out, supported by a feature type from another model, the The-matic Working Group on *Utility and governmental services* has chosen to use these objects, rather

than doubling feature types that support such information. This position implies that our sub-models refer to external references, as described in the paragraph "5.2.1.1. Consistency between spatial data sets".

5.2.1.5. Geometry representation

IR Requirement 3   The value domain of spatial properties used in this specification shall be restricted to the Simple Feature spatial schema as defined by EN ISO 19125-1.

NOTEThe specification restricts the spatial schema to 0-, 1-, 2-, and 2.5-dimensional geometries where all curve interpolations are linear.

Open issue 5: Requirement to provide 3D information

The upper Note should be considered with the constraint to keep the possibility to host 3D information within the model (noticed by several use cases). So if the restriction to use only the Simple Feature spatial schema prevents to host such 3D data, another schema should be developed for the tri-dimensional information (at least for utility networks submodel).

NOTEThe topological relations of two spatial objects based on their specific geometry and topology properties can in principle be investigated by invoking the operations of the types defined in ISO 19107 (or the methods specified in EN ISO 19125-1).

Since the data concerned by the INSPIRE theme *Utility and governmental services* are produced and used at a local level (according to many decentralization processes), the level of detail should be important. In fact, description of a utility network or of services provided by or for a specific Public Administrative Body will be rich in their geometries and attributes (large scale data, accurate distinction between several services provided at local level).
This seems opposite to one goal of the INSPIRE directive, which is to gather similar data from different producers and users, at a greater level (regional, national or European). Then, the level of details described in the former paragraph is less important than collecting exhaustively the same type of data for the whole territory analysed.
This *data collection* work is somehow developed by aggregating agencies (regional, national or pan-European) and therefore may include some generalization processes, whether geometric or semantic. Thus data can be simplified, as soon as they're used at a greater level, and the use of large scale data at such greater levels can prove to be counterproductive. Then, if certain datasets are inappropriate to be used at certain scales, it should be specified within its restrictions metadata.
On another hand, the different use cases (localization, management of services, spatial and semantic analysis or reporting) implies different approaches and treatments of the data related to *Utility and governmental services*.

Thus, the models proposed for the theme *Utility and governmental services* tend to be as simple as possible and should fit to the use of such data at any scale (whether local or global). Nevertheless, the level of detail (according to the scale and accuracy of the dataset) should be provided within the metadata and data quality information.

Recommendation 2   *All spatial objects should be provided at the source accuracy where possible.*

Recommendation 3   *If spatial objects are provided at different accuracies, the accuracy should be specified for each spatial object using the attribute accuracy.*

5.2.1.6. Temporality representation

The application schemas use the derived attributes "beginLifespanObject" and "endLifespanObject" to record the lifespan of a spatial object.

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

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

NOTE 2 Changes to the attribute "endLifespanVersion" does not trigger a change in the attribute "beginLifespanVersion".

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

The beginLifespanVersion stores the date on which the data instance representing the features of the *Utility and Governmental Services* theme was first created, and the endLifespanVersion is populated when some attribute or geometry of that instance changes. At this point, an entirely new instance is created repeating all of the attributes of the instance that have not changed, and providing new values for the attributes or geometries that have changed. The new instance uses the same value for objectIdentifier.localId and objectIdentifier.nameSpace, but has a new value for objectIdentifier.version. Using this method for representing temporality, all of the versions of features of the *Utility and Governmental Services* theme can be established by looking for all the *Utility and Governmental Services* instances with the same value for objectIdentifier.localID and objectIdentifier.namespace.

The system dates can also be used for incremental updates. Instances that have been added since the last update can be determined by finding instances whose beginLifespanVersion is after the date of the last update. Instances that have been changed since the last update can be determined by finding instances whose endLifespanVersion is after the date of the last update.

The Simple application schema does not include system lifecycle information and does not store historical versions of features. The Full application schema includes full temporality and historical versions.

5.3 Application schema "Utility Networks"

5.3.1 Description

5.3.1.1. Narrative description and UML overview

Definition

Utility services and networks include the physical constructions for transport of defined products, namely pipelines for transport of oil, gas, water, sewage or other pipelines. Transmission lines include electrical, phone, cable-TV and other networks. All kinds of transmission systems have nodes like e.g. pump stations, and they are linked to facilities for production and treatment of different kinds of products. These major production and treatment sites are treated in the theme production and industrial facilities.

Description

It is acknowledged that each organization has different responsibilities and this will influence the kind of data they collect, manage and use. Some organizations will use simple models, other will have more complex data models. This data specification is a basic framework that user can adopt and, if necessary, adapt and extend for themselves. The specification is focused on the core spatial objects required by networks, i.e. network centerlines etc. Not all the application-specific spatial objects (e.g. flow measurement sensors) are incorporated. Non-geographic data (e.g. information on flow in m³/s) is also out of scope of this specification.

Abstract

To support a consistent approach to all themes the European Commission, through the Data Specifications Drafting Team, developed the "Generic Conceptual Model" [GCM] which was reviewed and published prior to the commencement of work on the Annex II and III themes. This is the foundation model for every utility network – with the intention that any additional network may be combined in future and used in a way that is predicable.

The scope of the INSPIRE Utility Networks Data Product Specification incorporates five distinct utility themes:

- Water network
- Sewer network
- Electricity network
- Telecommunications network
- Oil & gas network

This is summarised in the diagram below which shows how the Directive guides the Generic Conceptual Model [D2.5] which contains a basic framework for any kind of network model (the Generic Network Model [GNM]). From the GNM a Common Utility application schema is adapted and this then is used as the basis for all five application schemas. Collectively these are drawn together in this document as the Utility Networks Data Product Specification [Dx.x.x.x].
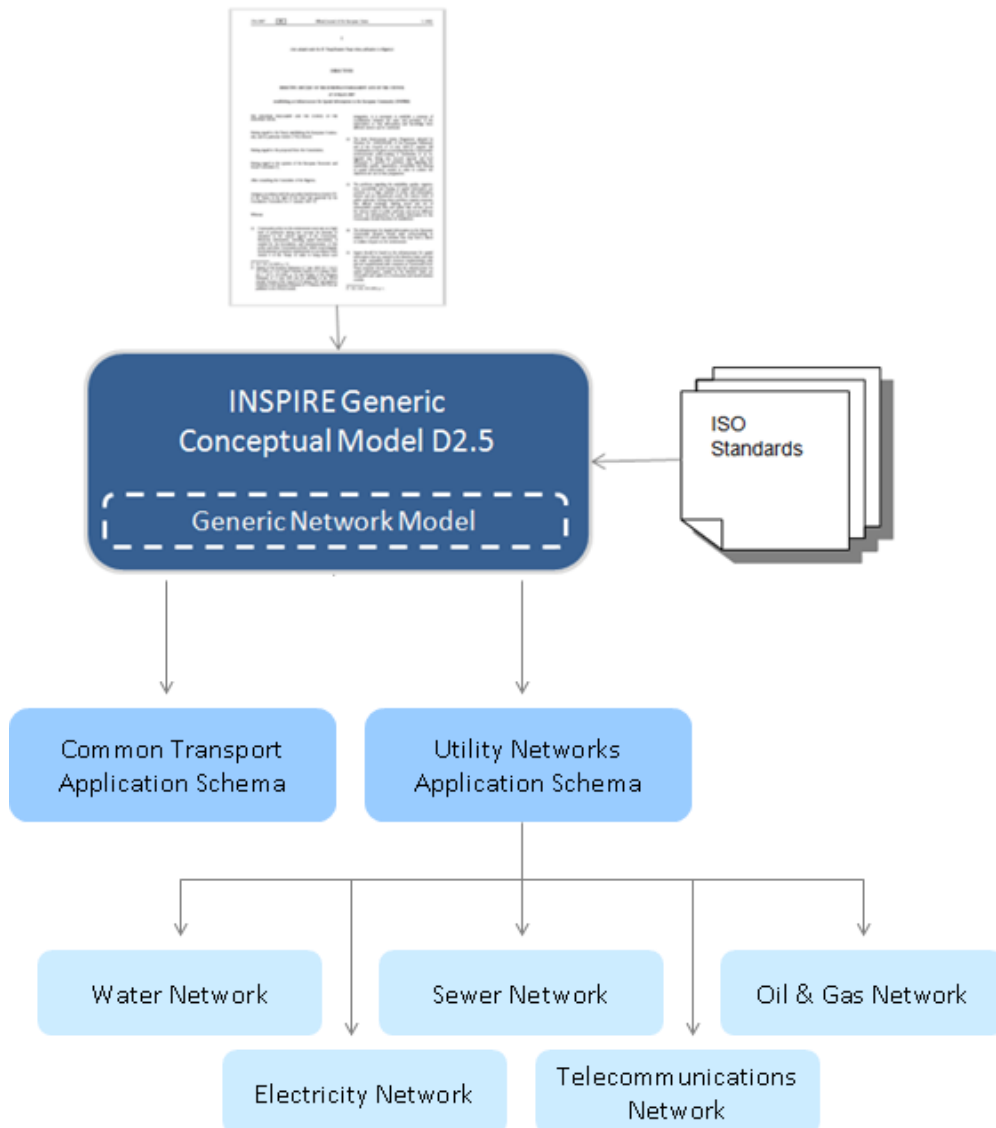
Figure 3 – Document framework for this data product specification [key documents only]

These themes can be used together to support an integrated approach to utility networks but as noted above - they may be used with other themes developed to the same standard (e.g. chemicals transport).

Understanding of the Generic Conceptual Model is essential and the GCM/GNM should be read in conjunction with this document. The GCM which describes the basic form of real world abstraction through to a comprehensive set of data interoperability. The GNM adapts this and describes the basic concepts that underpin and define the common Utility Networks Application Schema upon which all five themes are based. The GCM relies on ISO standards and the 19xxx series in particular.

Purpose

The purpose of this document is to specify a harmonised data specification for the spatial data theme Utility Networks, being a sub-scope of the *Utility and Governmental Services*, as defined in Annex III of the INSPIRE Directive.

This data specification is provided as basic framework which users can adopt and if required – extend for themselves. The model is structured to maximise reuse and the sharing of organisational data about a network. The specification is concerned only with the core spatial objects required by Utility Networks. This specification is mainly focussed on the "widely reused – widely referenced" segment of spatial objects (e.g. utility pipes' centerlines, or utility node objects).

Associated "non-Geographic" data

Any "non geographic data" (the majority of the data holdings in any organisation) – is also out of scope of this specification – such records maybe "an asset condition report", "flow report", "images of assets", "statistics" and so on. Therefore much of the data used in the utility industry is classified as application specific. While associated with the network all these examples are closer to the application end of the spectrum than generic use by a wide community whether they represent a geographic entity or non-geographic data.

To maximise reuse the linkage of such organisational data with the spatial objects should be "loose" in the sense that these are ideally defined as different data objects in a database. Configured correctly such data may then reused in several different applications and any associated information shared and exchanged as desired.

Extensibility

Users can extend the schema and add their own spatial objects to support an application. Data architects should use the GCM as the basis for any such extension. To illustrate this a small number of objects that are primarily of an application need are included in this specification. Examples of these are:

- Linear – information on flow in m³/s (for water networks)
- Point – new appurtenances, like pumps (for water networks)

Applications and use cases

The following use cases are highlighted to demonstrate the width and breadth of applications (the list is not exhaustive).

- **Asset Management**
- Capacity Planning
- Construction
- **Design & Planning**
- Disaster management
- Emergency response
- Environmental Impact Assessments
- Estate management
- Flow modelling
- Maintenance

The applications in bold above were used as use cases in the preparation of this specification. These represent applications at the European, national, local public sector levels and in the private sector. It is evident that the scope of the specific does not attempt to support all these applications. User extensibility is supported and encouraged. Future revisions may incorporate further object types if it is felt that further standardisation is necessary.

Characteristics of the specification

The key characteristics of the Utility Networks datasets are:

- They contain information of specific interest for the public sector in its role to support economic growth through efficient utility networks (electricity, telecommunications, water, sewer, etc.)
- The information is applicable from local to European levels of operation.
- The data represents a structure or methods of operation that is stable over time (even if parts of the data content frequently changes, e.g. telecommunications).
- Supports cross border (pan-European) applications.
- Being a part of the European Spatial Data Infrastructure the data may be more easily used with other kinds of data themes, such as geographical names, administrative units, and addresses etc.

- Private sector applications are extensive.

Spatial representation type

The spatial representation type for this theme is:

- 2D vector
- 3D vector

Implemented GNM specializations are:

- **Utility Node** - A point spatial object which is used for connectivity.

  The nodes of the networks include poles. Poles represent node objects that support utility devices and cables. "Pole" is a container to other utility objects. The attributes of poles are diameter, foundation, has anchor guy, has push brace, has riser, height, material and type. Other important nodes are manholes. These are the top openings to an underground public utility or service. The attributes that describe a manhole are cover length, cover opening, cover shape, cover width, height, shaft access, shaft length, shaft material and shaft width.

- **Utility Link** - A linear spatial object that describes the geometry and connectivity of an utility network between two points in the network. Utility links may represent pipes, ducts, cables, etc.

- **Utility Link Sequence** - A linear spatial object, composed of an ordered collection of utility links, which represents a continuous path in an utility network without any branches (monotone chain). The element has a defined beginning and end and every position on the utility link sequence is identifiable with one single parameter such as length. It describes an element of the utility network, characterized by one or more thematic identifiers and/or properties.

  "Pipe" objects are tubes for the conveyance of solids, liquids or gases from one location to another. Important attributes are coating, diameter, material and shape.

- **Utility Link Set** - A collection of utility link sequences and/or individual utility links that has a specific function or significance in an utility network.

  In the utility services and networks there are "ducts", which are utility link sets used to convey fluids (solids, liquids or gases) from one location to another. A duct belongs to the structural network, and is the outermost casing. A duct may contain other duct(s) and innerduct(s). "Duct" contains information about the position and characteristics of ducts as seen from a manhole, vault, or a cross section of a trench and duct. Attributes that are considered valuable are coating, columns and rows, diameter, height and width, material and shape. Ducts commonly contain "pipes" (see above).

Both poles and manholes (including ducts, to certain extent) represent *containers* for other network features. They co-exist on common application schema, e.g. a manhole may contain features belonging to one or more networks. It's also possible to further specialize containers in terms of network type, e.g. a telecommunications manhole/pole, water manhole, etc.

Spatial resolution and Topology

In the real world, objects are connected to each other: an optical cable is connected to a multiplexer that in turn is connected to copper cables connecting into our homes to provide cable TV, telephony and internet access. Using GIS to support network utility management typically involves many types of features that may have connectivity to each other. Topology in GIS is generally defined as the spatial relationship between connecting or adjacent features, and is an essential prerequisite for many spatial operations such as network analysis. Utility networks can be described as NaN (Node-Arc-Node) network

using two basic geometric types: points (aka nodes) and polylines (aka arcs). NaN topologies can be directed or un-directed, depending on specific type of network (i.e. water networks are directed, while telecommunications networks are not). Such topology structure provides an automated way to handle digitising and editing errors, and enable advanced spatial analyses such as adjacency, connectivity and containment. Infrastructure networks rely on Generic network model developed during Annex I.

That being said, Utility Networks support single spatial resolution. Containment (e.g. equipment being installed in manholes or on poles) is not taken in account as a different Level of Detail (LOD).

There is therefore a prerequisite for "implicit topology". This means that the data provided must be sufficiently clean and capable of automated topological construction within a user's application. There are therefore specific data capture requirements and these are described in Chapter 7 on Data Quality and in Chapter 10 on Data Capture.

class Utility Networks - Abstract Types
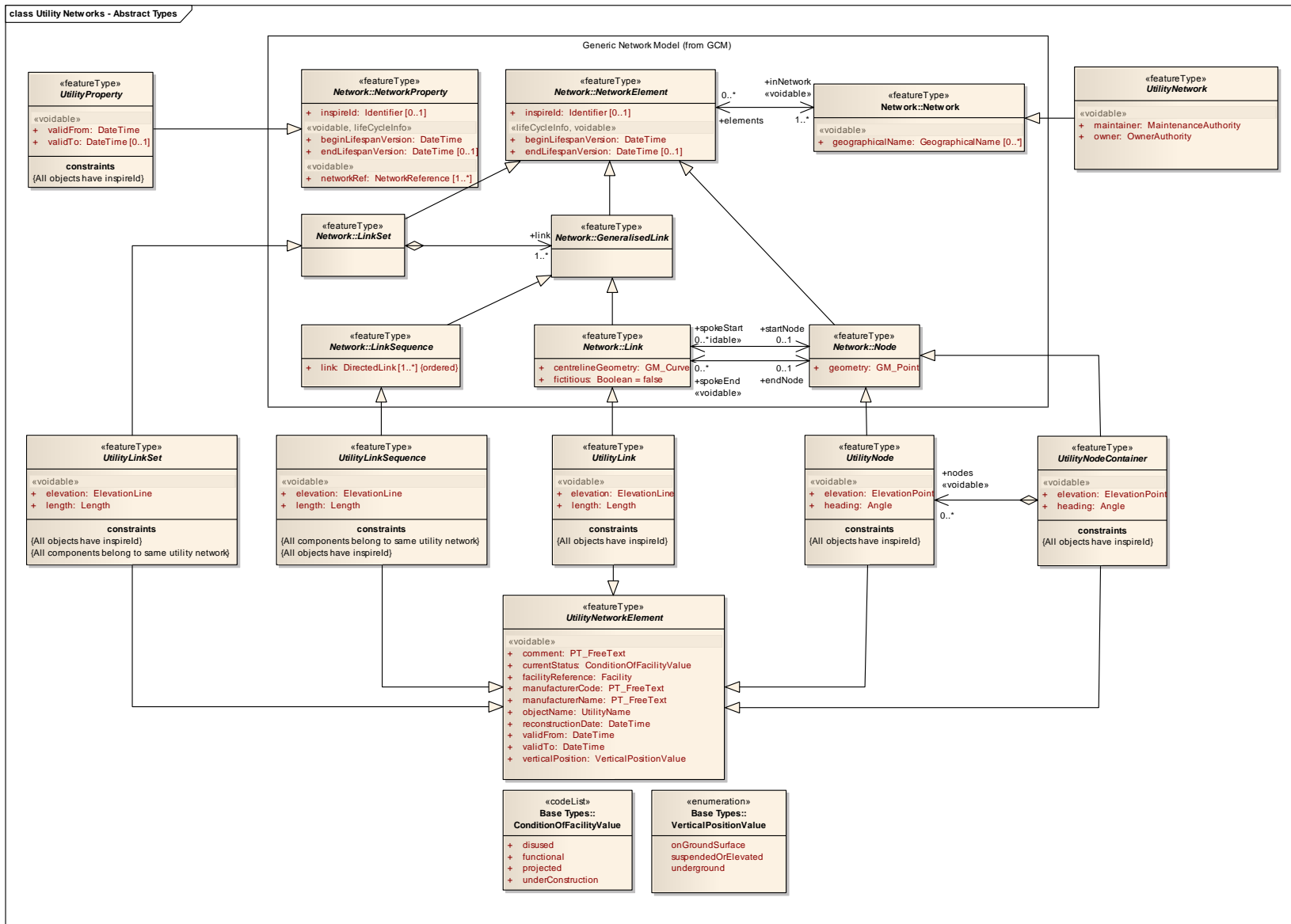
Figure 4 – UML class diagram: Overview of the US "Utility Networks – Abstract Types" application schema
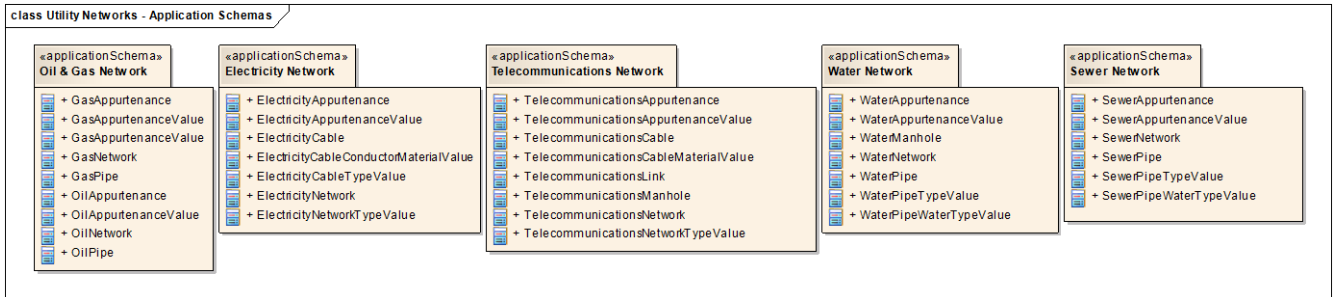
Figure 5 – UML class diagram: Overview of the US "Utility Networks – Application Schemas" application schema
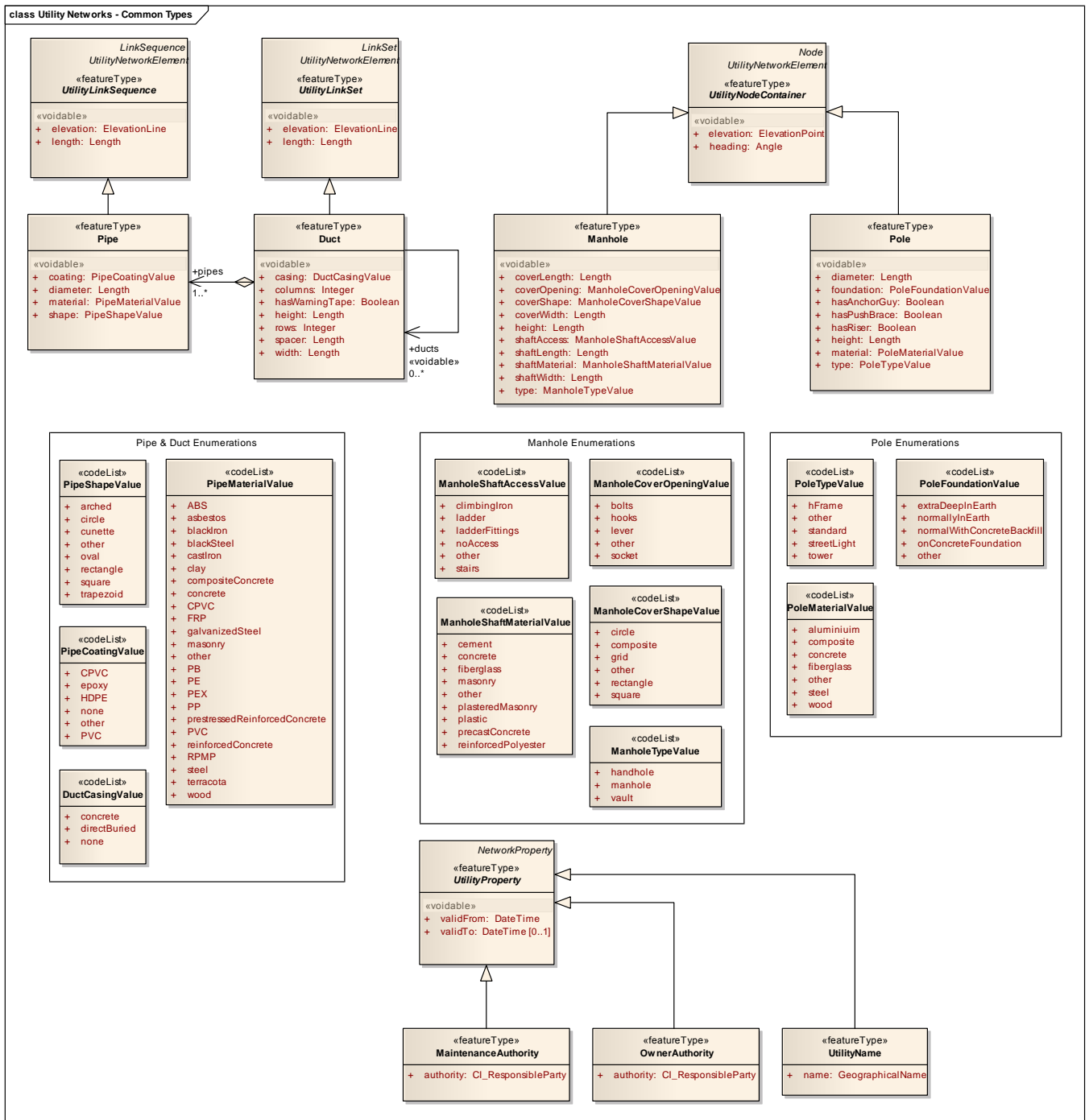
Figure 6 – UML class diagram: Overview of the US "Utility Networks – Common Types" application schema

Hereafter are the 5 UML class diagrams for the specific Utility Networks – Application Schemas, i.e.:
- "Electricity Network"
- "Oil & Gas Network"
- "Sewer Network"
- "Telecommunications Network"
- "Water Network"
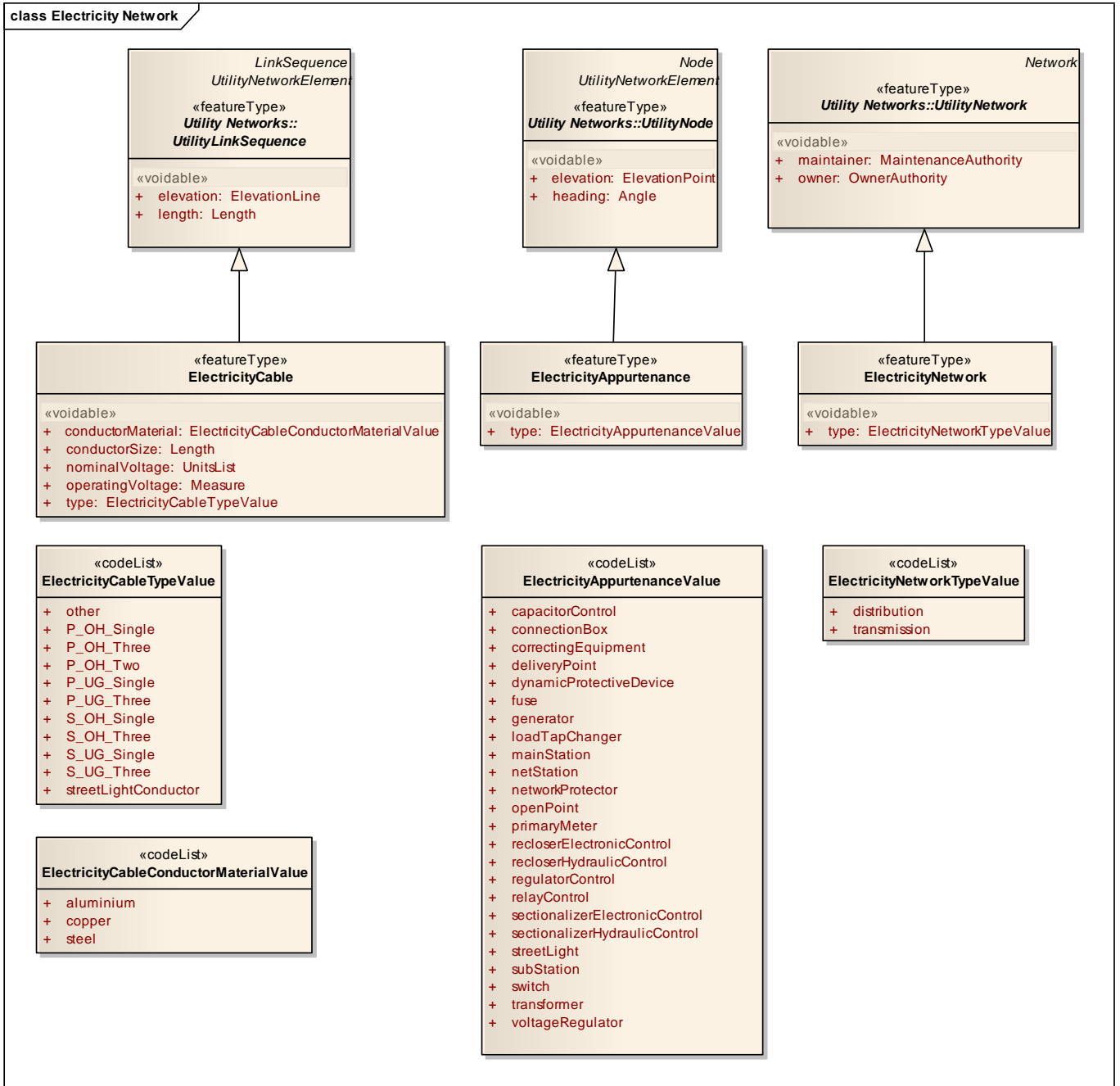
Figure 7 – UML class diagram: US "Electricity Network" application schema
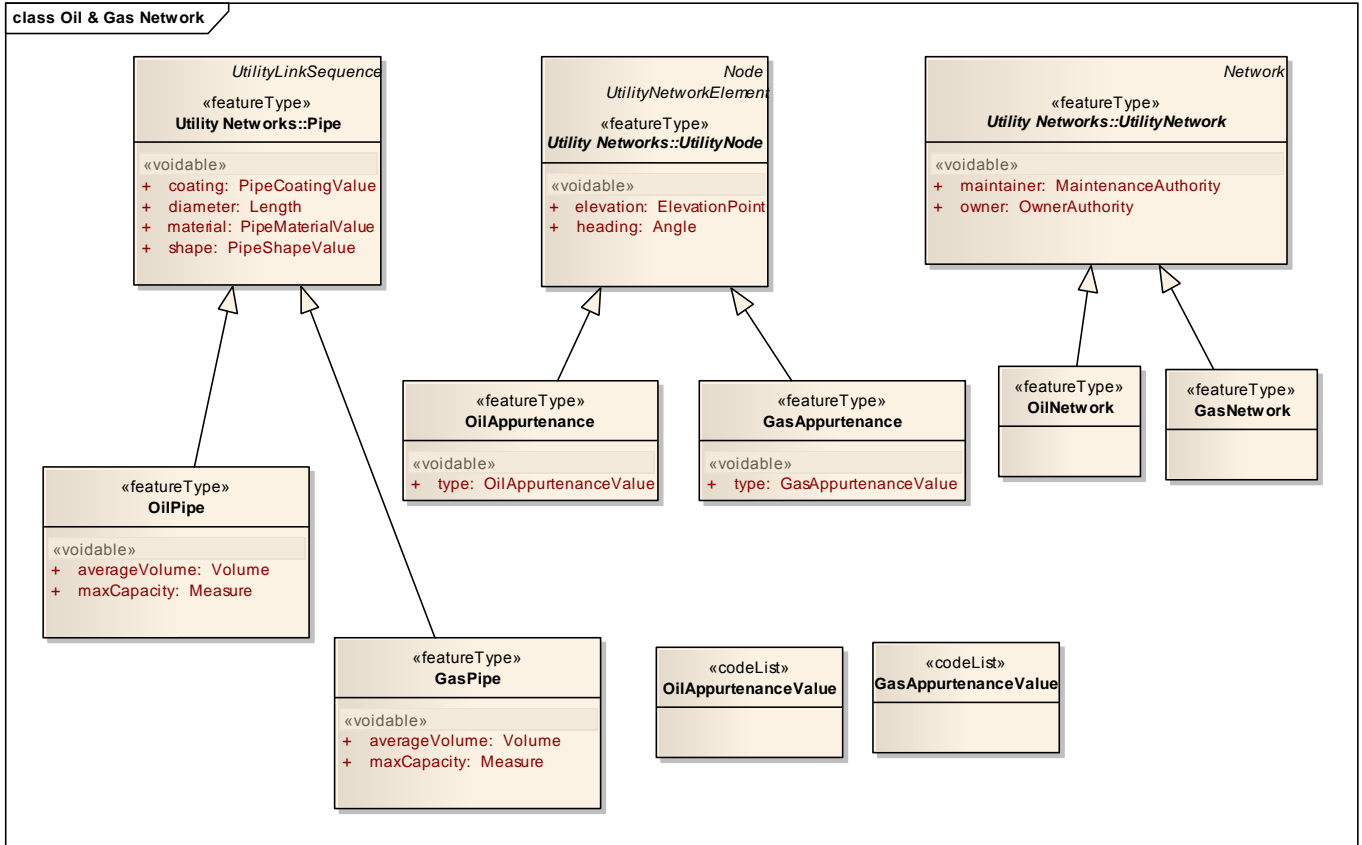
Figure 8 – UML class diagram: US "Oil & Gas Network" application schema

class Sewer Network

UtilityLinkSequence
«featureType»
Utility Networks::Pipe

«voidable»
+ coating: PipeCoatingValue
+ diameter: Length
+ material: PipeMaterialValue
+ shape: PipeShapeValue

Node
UtilityNetworkElement
«featureType»
Utility Networks::UtilityNode

«voidable»
+ elevation: ElevationPoint
+ heading: Angle

Network
«featureType»
Utility Networks::UtilityNetwork

«voidable»
+ maintainer: MaintenanceAuthority
+ owner: OwnerAuthority

«featureType»
SewerPipe

«voidable»
+ averageVolume: Volume
+ maxCapacity: Measure
+ type: SewerPipeTypeValue
+ waterType: SewerPipeWaterTypeValue

«featureType»
SewerAppurtenance

«voidable»
+ type: SewerAppurtenanceValue

«featureType»
SewerNetwork

«codeList»
SewerPipeTypeValue

+ LL
+ LL_Combination
+ LL_Commercial
+ LL_Domestic
+ LL_Irrigation
+ LL_Storm
+ ML
+ ML_GM
+ ML_GM_Collector
+ ML_GM_Culvert
+ ML_GM_InLineStorage
+ ML_GM_Interceptor
+ ML_GM_InvertedSiphon
+ ML_GM_OpenChannel
+ ML_GM_Outfall
+ ML_GM_Overflow
+ ML_GM_Tunnel
+ ML_PM
+ ML_PM_ForceMain
+ ML_PM_PipeBridge
+ ML_PM_Pressure
+ ML_PM_Vacuum

«codeList»
SewerPipeWaterTypeValue

+ combined
+ reclaimed
+ sanitary
+ storm

«codeList»
SewerAppurtenanceValue

+ anode
+ barrel
+ barScreen
+ catchBasin
+ cleanOut
+ dischargeStructure
+ meter
+ pump
+ regulator
+ scadaSensor
+ thrustProtection
+ tideGate

Figure 9 – UML class diagram: US "Sewer Network" application schema
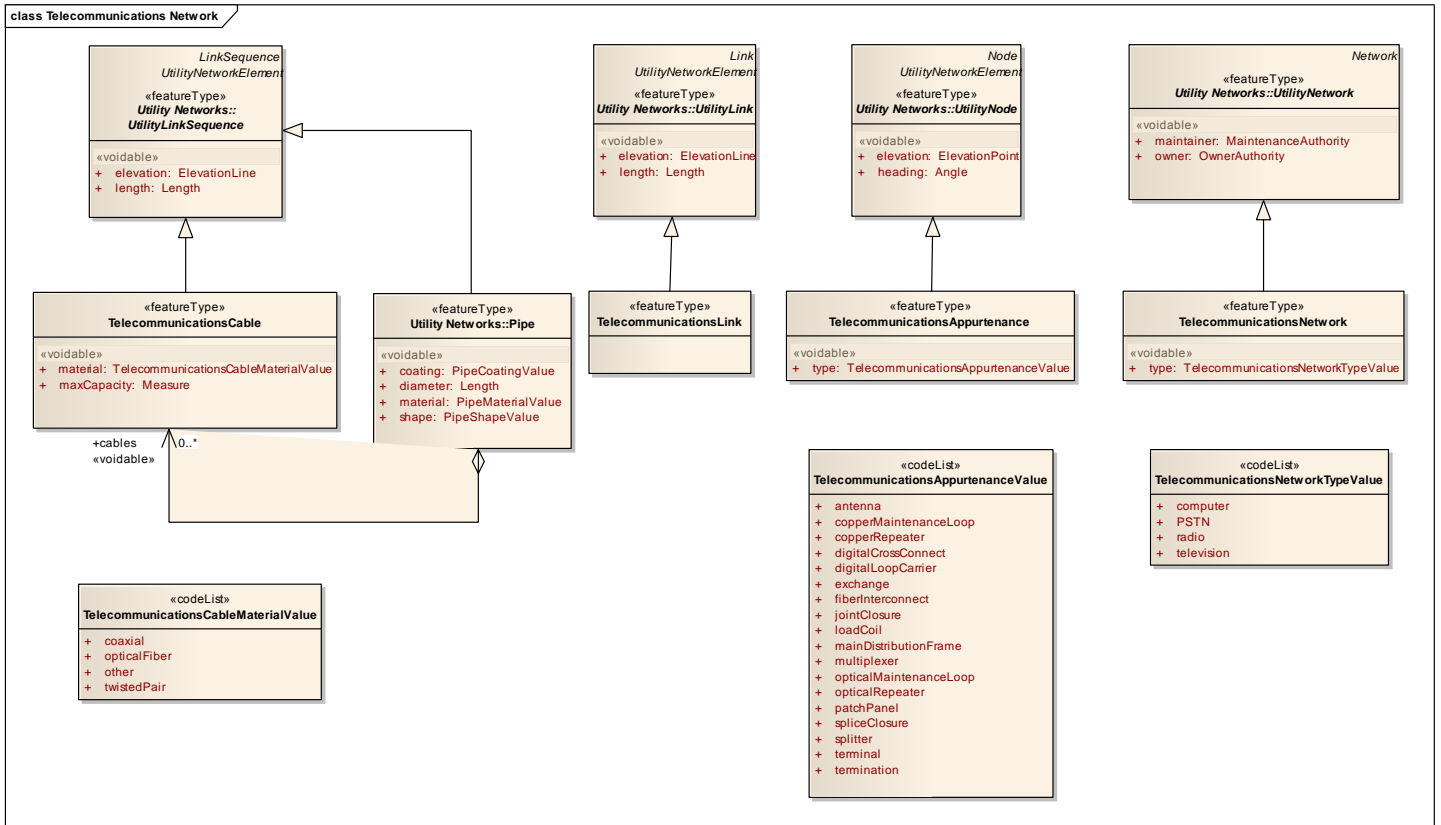
Figure 10 – UML class diagram: US "Telecommunications Network" application schema
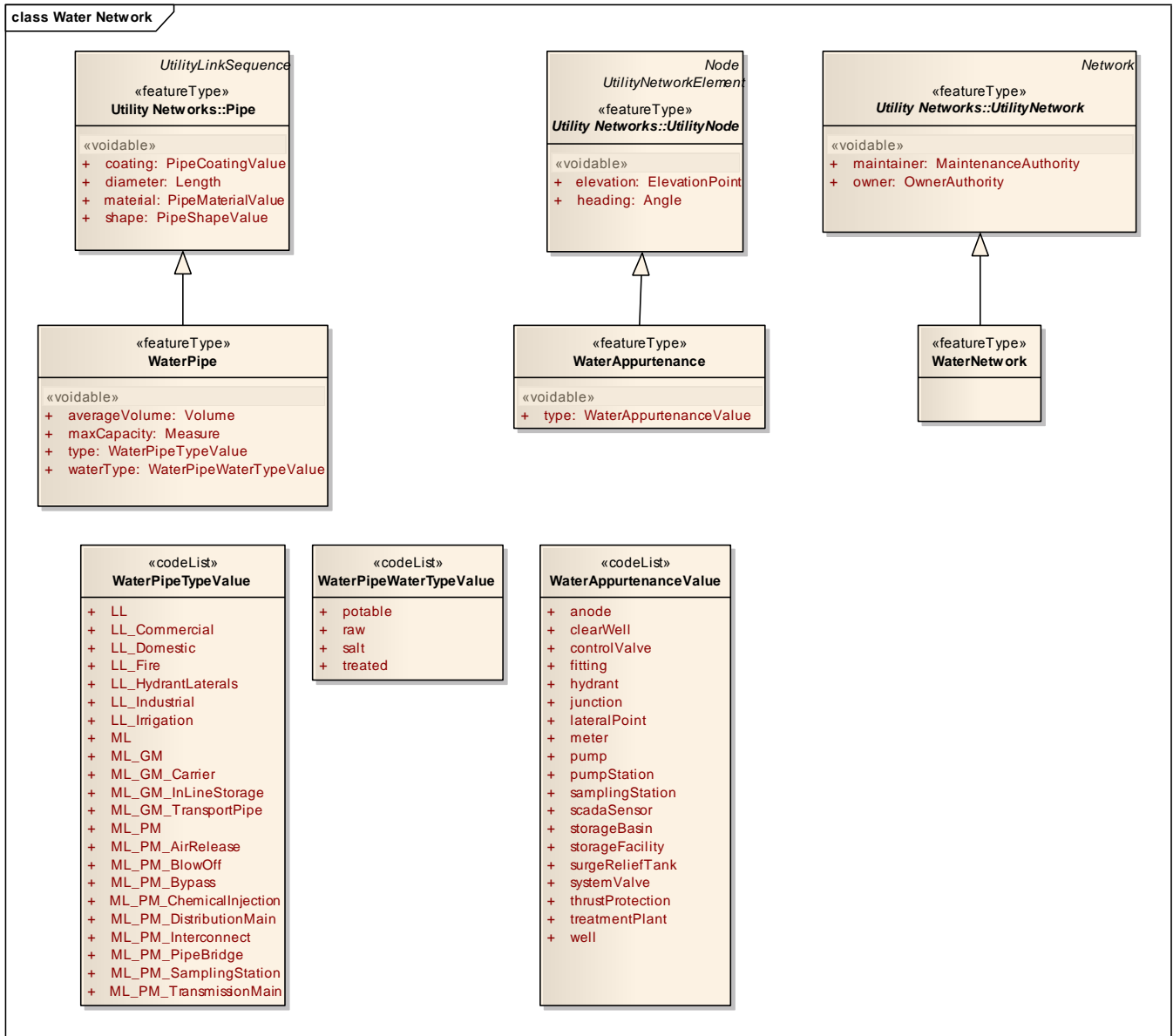
Figure 11 – UML class diagram: US "Water Network" application schema

5.3.1.2. Consistency between spatial data sets

Nothing more than what's written in the general paragraph 5.2.1.2.

5.3.1.3. Identifier management

Nothing more than what's written in the general paragraph 5.2.1.3.

5.3.1.4. Modelling of object references

Nothing more than what's written in the general paragraph 5.2.1.4.

5.3.1.5. Geometry representation

There are two types of geometry in this specification:

a) Centreline objects in Utility Networks

b)   Point objects in Utility Networks

Type (b) are network nodes, but can also be used to associate appurtenances with the network (e.g. antenna, pump, treatment plant etc).

Levels of detail: The specification addresses the highest resolution of data capture in Utility Networks and is also applicable to any derived lower resolution levels of detail where the number of coordinates is reduced and the geometry simplified to support viewing and reporting at regional, national and European levels.

This specification cannot advise on the form of representation at the highest resolution nor the accuracy since this will be driven by member state needs. Ideally, derived lower resolution datasets will use the approach outlined in D2.6 A.19 where all the objects are related from lowest to highest resolution and any user information collected about the network can be simply aggregated at the lower lever or disaggregated as the user increases the resolution.

Local, Regional, National and European relevance of the specification
The datasets in scope are used extensively at the "local level" and extend to regional, national and European levels. Usage can change with levels of operation or within an organisation. The specification is mainly focused on establishing a more coherent approach to those datasets that are universally used, probably held at regional and local level and at the highest resolution within this context.

Seamless resolution representations at the local and regional level
Lower resolution datasets would be derived from the local/high resolution data - outlined in the previous paragraph – and referenced (no geographic) data could then be aggregated and disaggregated as desired.

Multiple representations at regional, national and European levels.
Ideally the same data would be scalable dynamically from local to European level seamlessly. Since the current datasets and methods are insufficiently mature to support this - several "levels of detail" will usually be stored to represent the network at different operational levels.

Unfortunately today there is very little correspondence between each level. Ideally it would be easy to seamlessly move from the highest to the lowest resolution with corresponding scaling and aggregation and disaggregation of the associated organisational information (as we do on statistical datasets) e.g. for reporting purposes or trans-European analysis, real-time management (SCADA), planning and policy making.

In the meantime this specification applies to all levels of detail, although data providers are encouraged to introduce this specification at the local level as a priority.

> **Recommendation 5** All Utility Networks spatial objects should be provided at the source resolution and accuracy where possible.

> **Recommendation 6** Lower order resolutions should be derived from the highest order representation of the utility network, and any user information should be captured once and referenced to each geometrical representation.

> **IR Requirement 4**   The value domain of spatial properties used in this specification shall be restricted to the Simple Feature spatial schema as defined by EN ISO 19125-1.

NOTE The specification restricts the spatial schema to 0-, 1-, 2-, and 2.5-dimensional geometries where all curve interpolations are linear.

NOTE The topological relations of two spatial objects based on their specific geometry and topology properties can in principle be investigated by invoking the operations of the types defined in ISO 19107 (or the methods specified in EN ISO 19125-1).

5.3.1.6.   Temporality representation

Nothing more than what's written in the general paragraph 5.2.1.6.

5.3.2   Feature catalogue

Table 3 - Feature catalogue metadata

Feature catalogue name	INSPIRE feature catalogue Utility Networks
Scope	Utility Networks
Version number	2.0
Version date	2011-06-17
Definition source	INSPIRE data specification Utility Networks

Table 4 - Types defined in the feature catalogue

Type	Package	Stereotypes	Section
Duct	Utility Networks	«featureType»	5.3.2.1.1
DuctCasingValue	Utility Networks	«codeList»	5.3.2.2.1
ElectricityAppurtenance	Electricity Network	«featureType»	5.3.2.1.2
ElectricityAppurtenanceValue	Electricity Network	«codeList»	5.3.2.2.2
ElectricityCable	Electricity Network	«featureType»	5.3.2.1.3
ElectricityCableConductorMaterialValue	Electricity Network	«codeList»	5.3.2.2.3
ElectricityCableTypeValue	Electricity Network	«codeList»	5.3.2.2.4
ElectricityNetwork	Electricity Network	«featureType»	5.3.2.1.4
ElectricityNetworkTypeValue	Electricity Network	«codeList»	5.3.2.2.5
GasAppurtenance	Oil & Gas Network	«featureType»	5.3.2.1.5
GasAppurtenanceValue	Oil & Gas Network	«codeList»	5.3.2.2.6
GasAppurtenanceValue	Oil & Gas Network	«codeList»	5.3.2.2.7
GasNetwork	Oil & Gas Network	«featureType»	5.3.2.1.6
GasPipe	Oil & Gas Network	«featureType»	5.3.2.1.7
MaintenanceAuthority	Utility Networks	«featureType»	5.3.2.1.8
Manhole	Utility Networks	«featureType»	5.3.2.1.9
ManholeCoverOpeningValue	Utility Networks	«codeList»	5.3.2.2.8
ManholeCoverShapeValue	Utility Networks	«codeList»	5.3.2.2.9
ManholeShaftAccessValue	Utility Networks	«codeList»	5.3.2.2.10
ManholeShaftMaterialValue	Utility Networks	«codeList»	5.3.2.2.11
ManholeTypeValue	Utility Networks	«codeList»	5.3.2.2.12
OilAppurtenance	Oil & Gas Network	«featureType»	5.3.2.1.10
OilAppurtenanceValue	Oil & Gas Network	«codeList»	5.3.2.2.13
OilNetwork	Oil & Gas Network	«featureType»	5.3.2.1.11
OilPipe	Oil & Gas Network	«featureType»	5.3.2.1.12
OwnerAuthority	Utility Networks	«featureType»	5.3.2.1.13
Pipe	Utility Networks	«featureType»	5.3.2.1.14
PipeCoatingValue	Utility Networks	«codeList»	5.3.2.2.14
PipeMaterialValue	Utility Networks	«codeList»	5.3.2.2.15
PipeShapeValue	Utility Networks	«codeList»	5.3.2.2.16
Pole	Utility Networks	«featureType»	5.3.2.1.15
PoleFoundationValue	Utility Networks	«codeList»	5.3.2.2.17
PoleMaterialValue	Utility Networks	«codeList»	5.3.2.2.18

Type	Package	Stereotypes	Section
PoleTypeValue	Utility Networks	«codeList»	5.3.2.2.19
SewerAppurtenance	Sewer Network	«featureType»	5.3.2.1.16
SewerAppurtenanceValue	Sewer Network	«codeList»	5.3.2.2.20
SewerNetwork	Sewer Network	«featureType»	5.3.2.1.17
SewerPipe	Sewer Network	«featureType»	5.3.2.1.18
SewerPipeTypeValue	Sewer Network	«codeList»	5.3.2.2.21
SewerPipeWaterTypeValue	Sewer Network	«codeList»	5.3.2.2.22
TelecommunicationsAppurtenance	Telecommunications Network	«featureType»	5.3.2.1.19
TelecommunicationsAppurtenanceValue	Telecommunications Network	«codeList»	5.3.2.2.23
TelecommunicationsCable	Telecommunications Network	«featureType»	5.3.2.1.20
TelecommunicationsCableMaterialValue	Telecommunications Network	«codeList»	5.3.2.2.24
TelecommunicationsLink	Telecommunications Network	«featureType»	5.3.2.1.21
TelecommunicationsManhole	Telecommunications Network	«featureType»	5.3.2.1.22
TelecommunicationsNetwork	Telecommunications Network	«featureType»	5.3.2.1.23
TelecommunicationsNetworkTypeValue	Telecommunications Network	«codeList»	5.3.2.2.25
UtilityLink	Utility Networks	«featureType»	5.3.2.1.24
UtilityLinkSequence	Utility Networks	«featureType»	5.3.2.1.25
UtilityLinkSet	Utility Networks	«featureType»	5.3.2.1.26
UtilityName	Utility Networks	«featureType»	5.3.2.1.27
UtilityNetwork	Utility Networks	«featureType»	5.3.2.1.28
UtilityNetworkElement	Utility Networks	«featureType»	5.3.2.1.29
UtilityNetworkSubTypeValue	Utility Networks	«codeList»	5.3.2.2.26
UtilityNetworkTypeValue	Utility Networks	«codeList»	5.3.2.2.27
UtilityNode	Utility Networks	«featureType»	5.3.2.1.30
UtilityNodeContainer	Utility Networks	«featureType»	5.3.2.1.31
UtilityProperty	Utility Networks	«featureType»	5.3.2.1.32
WaterAppurtenance	Water Network	«featureType»	5.3.2.1.33
WaterAppurtenanceValue	Water Network	«codeList»	5.3.2.2.28
WaterManhole	Water Network	«featureType»	5.3.2.1.34
WaterNetwork	Water Network	«featureType»	5.3.2.1.35
WaterPipe	Water Network	«featureType»	5.3.2.1.36
WaterPipeTypeValue	Water Network	«codeList»	5.3.2.2.29
WaterPipeWaterTypeValue	Water Network	«codeList»	5.3.2.2.30

5.3.2.1.   Spatial object types

5.3.2.1.1.   Duct

Duct

Name:	Duct	
Subtype of:	UtilityLinkSet	
Definition:	A utility link set used to convey fluids (solids, liquids or gases) from one location to another.	
Description:	A Duct (or Conduit, or Duct-bank, or Wireway) is a linear object which belongs to the structural network. It is the outermost casing. A Duct may contain Pipe(s) or other Duct(s) and Innerduct(s). Duct is a concrete feature class that contains information about the position and characteristics of ducts as seen from a manhole, vault, or a cross section of a trench and duct.	
Status:	Proposed	
Stereotypes:	«featureType»	
URI:	null	

Duct

Attribute: casing

    Value type: DuctCasingValue
    Definition: Type of the Duct casing.
    Multiplicity: 1
    Stereotypes: «voidable»

Attribute: columns

    Value type: Integer
    Definition: Number of pipe columns.
    Multiplicity: 1
    Stereotypes: «voidable»

Attribute: hasWarningTape

    Value type: Boolean
    Definition: Indicates whether duct has attached warning tape.
    Description: Underground *warning tape* (UWT) is a coloured polyethylene underground marker tape with a printed warning message for marking underground buried services.
    Multiplicity: 1
    Stereotypes: «voidable»

Attribute: height

    Value type: Length
    Definition: Duct height.
    Multiplicity: 1
    Stereotypes: «voidable»

Attribute: rows

    Value type: Integer
    Definition: Number of pipe rows.
    Multiplicity: 1
    Stereotypes: «voidable»

Attribute: spacer

    Value type: Length
    Definition: Spacer size, in case there's built-in spacers.
    Multiplicity: 1
    Stereotypes: «voidable»

Attribute: width

    Value type: Length
    Definition: Duct width.
    Multiplicity: 1
    Stereotypes: «voidable»

Association role: ducts

    Value type: Duct
    Definition: A single duct or set of ducts that constitute the inner-duct.
    Multiplicity: 0..*
    Stereotypes: «voidable»

Association role: pipes

    Value type: Pipe
    Definition: The set of pipes that constitute the duct bank.

Duct

Multiplicity:	1..*	

5.3.2.1.2. *ElectricityAppurtenance*

ElectricityAppurtenance

Name:	Electricity Appurtenance
Subtype of:	UtilityNode
Definition:	A node (point) appurtenance in electricity networks.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: type

Value type:	ElectricityAppurtenanceValue
Definition:	Type of the electriciy network appurtenance.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.3. *ElectricityCable*

ElectricityCable

Name:	Electricity Cable
Subtype of:	UtilityLinkSequence
Definition:	A utility link sequence used to convey electricity from one location to another.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: conductorMaterial

Value type:	ElectricityCableConductorMaterialValue
Definition:	Cable conductor material type.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: conductorSize

Value type:	Length
Definition:	Size of the conductor.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: nominalVoltage

Value type:	UnitsList
Definition:	Nominal voltage of the electricity cable.
Description:	Value indicating system voltage; domain values include 7.2 kV Grounded Y, 24.9 kV Grounded Y, 2400 Delta, etc.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: operatingVoltage

Value type:	Measure
Definition:	Operating voltage of the electricity cable.
Description:	Code indicating standard level at which system is currently being operated that may vary above or below nominal voltage; domain values include 120 Volts, 480 Volts, etc.
Multiplicity:	1
Stereotypes:	«voidable»

ElectricityCable

Attribute: type

Value type:	ElectricityCableTypeValue
Definition:	Type of electricity cable.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.4.   ElectricityNetwork

ElectricityNetwork

Name:	Electricity Network
Subtype of:	UtilityNetwork
Definition:	Collection of electricity network elements.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: type

Value type:	ElectricityNetworkTypeValue
Definition:	Type of electricity network.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.5.   GasAppurtenance

GasAppurtenance

Name:	Gas Appurtenance
Subtype of:	UtilityNode
Definition:	A node (point) appurtenance in gas networks.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: type

Value type:	GasAppurtenanceValue
Definition:	Type of the gas network appurtenance.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.6.   GasNetwork

GasNetwork

Name:	Gas Network
Subtype of:	UtilityNetwork
Definition:	Collection of gas network elements.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

5.3.2.1.7.   GasPipe

GasPipe

Name:	Gas Pipe
Subtype of:	Pipe
Definition:	A gas pipe used to convey gas from one location to another.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

GasPipe

Attribute: averageVolume

Value type:	Volume
Definition:	Average volume of the pipe.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: maxCapacity

Value type:	Measure
Definition:	Maximum capacity of the pipe.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.8.   MaintenanceAuthority

MaintenanceAuthority

Name:	Maintenance Authority
Subtype of:	UtilityProperty
Definition:	The authority responsible for maintenance of the utility element.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: authority

Value type:	CI_ResponsibleParty
Definition:	Identification of the maintenance authority.
Multiplicity:	1

5.3.2.1.9.   Manhole

Manhole

Name:	Manhole
Subtype of:	UtilityNodeContainer
Definition:	Simple container object which may contain either single or multiple utility networks objects.
Description:	Manholes perform following functions:

- Provide drainage for the conduit system so that freezing water does not damage the conduit or wires.

- Provide a location for bending the conduit run without damaging the wires.

- Provide a junction for conduits coming from different directions.

- Provide access to the system for maintenance.

Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: coverLength

Value type:	Length
Definition:	Manhole cover length.

Manhole

Multiplicity:	1	
Stereotypes:	«voidable»	

Attribute: coverOpening

Value type:	ManholeCoverOpeningValue
Definition:	Manhole cover opening.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: coverShape

Value type:	ManholeCoverShapeValue
Definition:	Manhole cover shape.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: coverWidth

Value type:	Length
Definition:	Manhole cover width.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: height

Value type:	Length
Definition:	Manhole height.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: shaftAccess

Value type:	ManholeShaftAccessValue
Definition:	Manhole shaft access.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: shaftLength

Value type:	Length
Definition:	Manhole shaft length.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: shaftMaterial

Value type:	ManholeShaftMaterialValue
Definition:	Manhole shaft material.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: shaftWidth

Value type:	Length
Definition:	Manhole shaft width.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: type

Value type:	ManholeTypeValue
Definition:	Type of the manhole.

Manhole

Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.10.   OilAppurtenance

OilAppurtenance

Name:	Oil Appurtenance
Subtype of:	UtilityNode
Definition:	A node (point) appurtenance in oil networks.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: type

Value type:	OilAppurtenanceValue
Definition:	Type of the oil network appurtenance.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.11.   OilNetwork

OilNetwork

Name:	Oil Network
Subtype of:	UtilityNetwork
Definition:	Collection of oil network elements.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

5.3.2.1.12.   OilPipe

OilPipe

Name:	Oil Pipe
Subtype of:	Pipe
Definition:	An oil pipe used to convey oil from one location to another.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: averageVolume

Value type:	Volume
Definition:	Average volume of the pipe.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: maxCapacity

Value type:	Measure
Definition:	Maximum capacity of the pipe.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.13.   OwnerAuthority

OwnerAuthority

Name:	Owner Authority
Subtype of:	UtilityProperty
Definition:	The authority owning the utility element.

OwnerAuthority

Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: authority

Value type:	CI_ResponsibleParty
Definition:	Identification of the owner authority.
Multiplicity:	1

5.3.2.1.14.   Pipe

Pipe

Name:	Pipe
Subtype of:	UtilityLinkSequence
Definition:	A tube for the conveyance of solids, liquids or gases from one location to another.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: coating

Value type:	PipeCoatingValue
Definition:	Pipe coating.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: diameter

Value type:	Length
Definition:	Pipe diameter.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: material

Value type:	PipeMaterialValue
Definition:	Pipe material.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: shape

Value type:	PipeShapeValue
Definition:	Pipe shape.
Multiplicity:	1
Stereotypes:	«voidable»

Association role: cables

Value type:	TelecommunicationsCable
Definition:	Contained telecommunications cables.
Multiplicity:	0..*
Stereotypes:	«voidable»

5.3.2.1.15.   Pole

Pole

Name:	Pole
Subtype of:	UtilityNodeContainer
Definition:	Simple pole object which may carry utility objects belonging to either single or multiple utility networks.

Pole

Description:	Poles represent node objects that support utility devices and cables. the basic property is that it's container to other utlity objects.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: diameter

Value type:	Length
Definition:	Diameter of the pole.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: foundation

Value type:	PoleFoundationValue
Definition:	Pole foundation type.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: hasAnchorGuy

Value type:	Boolean
Definition:	Indicates whether a pole has anchor guy.
Description:	An *anchor guy* is a wire or set of wires running from the top of the pole to an anchor installed in the ground and consists of wires, appropriate fastenings and the anchor. The anchor guy is usually installed at a distance from the pole that is 0.25 to 1.5 of the height of the attachment such that the slope is about 1:1. Sidewalk guys have a horizontal strut that is attached about halfway down the pole to provide pedestrian clearance. The guy runs from the top of the pole to the top of the strut, then down to the anchor.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: hasPushBrace

Value type:	Boolean
Definition:	Indicates whether a pole has push braces.
Description:	*Pushbraces* support or brace a pole when it is not feasible to use an anchor guy. A pushbrace is a pole or other member that is placed at an angle to help support the unbalanced pole and is often used on the inside curve of mountain roads. The poles that pushbraces support are grouped into classes based on their circumference 6 feet from the butt of the structure.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: hasRiser

Value type:	Boolean
Definition:	Indicates whether a pole has risers.
Description:	A *riser* is a cylindrical or channel enclosure attached to a pole or structure to provide protection for underground conduit as it transitions from overhead to underground.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: height

Value type:	Length
Definition:	Pole height.
Multiplicity:	1
Stereotypes:	«voidable»

Pole

Attribute: material

Value type:	PoleMaterialValue
Definition:	Pole material.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: type

Value type:	PoleTypeValue
Definition:	Type of the pole.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.16.   SewerAppurtenance

SewerAppurtenance

Name:	Sewer Appurtenance
Subtype of:	UtilityNode
Definition:	A node (point) appurtenance in sewer networks.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: type

Value type:	SewerAppurtenanceValue
Definition:	Type of the sewer network appurtenance.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.17.   SewerNetwork

SewerNetwork

Name:	Sewer Network
Subtype of:	UtilityNetwork
Definition:	Collection of sewer (wastewater) network elements.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

5.3.2.1.18.   SewerPipe

SewerPipe

Name:	Sewer Pipe
Subtype of:	Pipe
Definition:	A sewer pipe used to convey wastewater (sewer) from one location to another
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: averageVolume

Value type:	Volume
Definition:	Average volume of the pipe.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: maxCapacity

Value type:	Measure

SewerPipe

Definition:	Maximum capacity of the pipe.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: type

Value type:	SewerPipeTypeValue
Definition:	Type of sewer pipe.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: waterType

Value type:	SewerPipeWaterTypeValue
Definition:	Type of sewer pipe based on water type.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.19.   TelecommunicationsAppurtenance

TelecommunicationsAppurtenance

Name:	Telecommunications Appurtenance
Subtype of:	UtilityNode
Definition:	A node (point) appurtenance in telecommunications networks.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: type

Value type:	TelecommunicationsAppurtenanceValue
Definition:	Type of the telecommunications network appurtenance.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.20.   TelecommunicationsCable

TelecommunicationsCable

Name:	Telecommunications Cable
Subtype of:	UtilityLinkSequence
Definition:	A utility link sequence used to convey data signals (PSTN, radio or TV) from one location to another.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: material

Value type:	TelecommunicationsCableMaterialValue
Definition:	Cable material.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: maxCapacity

Value type:	Measure
Definition:	Capacity of the cable.
Description:	"Capacity" actually depends on the cable type, but to keep things simple we didn't introduce derived telecommunicaions cables subtypes: copper cable, fiber-optic cable, etc. E.g. for copper cables the "capacity" is expressed in (twisted) pairs or quads. In fiber-optic cables "capacity" is expressed as total number of fibers.

TelecommunicationsCable

Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.21.   TelecommunicationsLink

TelecommunicationsLink

Name:	Telecommunications Link
Subtype of:	UtilityLink
Definition:	A radio-relay route for the telecommunications' signal transmission.
Description:	Wireless (microwave) radio-relay route is most commonly established by means of directed or undirected telecommunications antennas in line of sight.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

5.3.2.1.22.   TelecommunicationsManhole

TelecommunicationsManhole

Name:	Telecommunications Manhole
Subtype of:	Manhole
Definition:	Manhole used exclusively in telecommunications networks.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

5.3.2.1.23.   TelecommunicationsNetwork

TelecommunicationsNetwork

Name:	Telecommunications Network
Subtype of:	UtilityNetwork
Definition:	Collection of telecommunications network elements - a system of interconnected elements linked by facilities (i.e., physical connections) over which traffic will flow. The traffic may be conversations, information, or complex video or audio services. The telecommunications network must also be able to control the interconnected elements.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: type

Value type:	TelecommunicationsNetworkTypeValue
Definition:	Type of telecommunications network.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.24.   UtilityLink

UtilityLink (abstract)

Name:	Utility Link
Subtype of:	Link, UtilityNetworkElement
Definition:	A linear spatial object that describes the geometry and connectivity of an utility network between two points in the network. Utility links may represent pipes, ducts, cables, etc.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: elevation

UtilityLink (abstract)

Value type:	ElevationLine
Definition:	Relative height/depth with regards to the terrain surface.
Description:	Relative elevation of a utility node represents its relative height above a fixed reference point, most commonly terrain surface level. Relative elevation can be also negative, in case of underground feature. Used if vertical postion is either underground or suspendedOrElevated.
	NOTE Relative elevation is measured differently depending on the type of utility feature. For example, conduits are measured from the top of the conduit (cable, duct...) to the
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: length

Value type:	Length
Definition:	Length of utility network link.
Description:	This length is measured. Computed length is part of the geometry itself.
Multiplicity:	1
Stereotypes:	«voidable»

Constraint: All objects have inspireId

Natural language:	All utility links have an external object identifier.
OCL:	inv:inspireId->notEmpty()

5.3.2.1.25.   UtilityLinkSequence

UtilityLinkSequence (abstract)

Name:	Utility Link Sequence
Subtype of:	LinkSequence, UtilityNetworkElement
Definition:	A linear spatial object, composed of an ordered collection of utility links, which represents a continuous path in an utility network without any branches (monotone chain). The element has a defined beginning and end and every position on the utility link sequence is identifiable with one single parameter such as length. It describes an element of the utility network, characterized by one or more thematic identifiers and/or properties.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: elevation

Value type:	ElevationLine
Definition:	Relative height/depth with regards to the terrain surface.
Description:	Relative elevation of a utility node represents its relative height above a fixed reference point, most commonly terrain surface level. Relative elevation can be also negative, in case of underground feature. Used if vertical postion is either underground or suspendedOrElevated.
	NOTE Relative elevation is measured differently depending on the type of utility feature. For example, conduits are measured from the top of the conduit (cable, duct...) to the
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: length

Value type:	Length

UtilityLinkSequence (abstract)

Definition:	Length of utility network link sequence.	
Description:	This length is measured. Computed length is part of the geometry itself.	
Multiplicity:	1	
Stereotypes:	«voidable»	

Constraint: All components belong to same utility network

Natural language:	An utility link sequence must be composed of utility links that all belong to the same utility network.
OCL:	inv: link->forAll(l | l.link.inNetwork = self.inNetwork)

Constraint: All objects have inspireId

Natural language:	All utility link sets have an external object identifier.
OCL:	inv:inspireId->notEmpty()

5.3.2.1.26.   UtilityLinkSet

UtilityLinkSet (abstract)

Name:	Utility Link Set
Subtype of:	LinkSet, UtilityNetworkElement
Definition:	A collection of utility link sequences and/or individual utility links that has a specific function or significance in an utility network.
Description:	NOTE This spatial object type supports the aggregation of links to form objects with branches, loops, parallel sequences of links, gaps, etc. EXAMPLE A set of cables/ducts in telecommunications representing a single, traceable "route" of an utility network.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: elevation

Value type:	ElevationLine
Definition:	Relative height/depth with regards to the terrain surface.
Description:	Relative elevation of a utility node represents its relative height above a fixed reference point, most commonly terrain surface level. Relative elevation can be also negative, in case of underground feature. Used if vertical postion is either underground or suspendedOrElevated. NOTE Relative elevation is measured differently depending on the type of utility feature. For example, conduits are measured from the top of the conduit (cable, duct...) to the
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: length

Value type:	Length
Definition:	Length of utility network link set.
Description:	This length is measured. Computed length is part of the geometry itself.
Multiplicity:	1
Stereotypes:	«voidable»

Constraint: All components belong to same utility network

UtilityLinkSet (abstract)

Natural language:	An utility link set must be composed of utility links and/or utility link sequences that all belong to the same utility network.
OCL:	inv: link->forAll(l | l.inNetwork = self.inNetwork)

Constraint: All objects have inspireId

Natural language:	All utility link sets have an external object identifier.
OCL:	inv:inspireId->notEmpty()

5.3.2.1.27.   UtilityName

UtilityName

Name:	Utility Name
Subtype of:	UtilityProperty
Definition:	Name or identifier of the utility object, as assigned by the responsible authority.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: name

Value type:	GeographicalName
Definition:	Name or identifier of the utility object.
Multiplicity:	1

5.3.2.1.28.   UtilityNetwork

UtilityNetwork (abstract)

Name:	Utility Network
Subtype of:	Network
Definition:	Collection of network elements that belong to a single type of utility.
Description:	In the real world, objects are connected to each other: an optical cable is connected to a multiplexer that in turn is connected to copper cables connecting into our homes to provide cable TV, telephony and internet access. Using GIS to support network utility management typically involves many types of features that may have connectivity to each other. Topology in GIS is generally defined as the spatial relationship between connecting or adjacent features, and is an essential prerequisite for many spatial operations such as network analysis. Utility networks can be described as NaN (Node-Arc-Node) network using two basic geometric types: points (aka *nodes*) and polylines (aka *arcs*). NaN topologies can be directed or un-directed, depending on specific type of network (i.e. water networks are directed, while telecommunications networks are not). Such topology structure provides an automated way to handle digitising and editing errors, and enable advanced spatial analyses such as adjacency, connectivity and containment. Infrastructure networks rely on Generic network model developed during Annex I. NOTE Water, sewer, electricity, telecommunications and oil & gas networks are always considered separate utility network types.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: maintainer

Value type:	MaintenanceAuthority
Definition:	Organization(s) which maintans the utility network.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: owner

UtilityNetwork (abstract)

Value type:	OwnerAuthority
Definition:	Organization(s) which owns the utility network.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.29.   UtilityNetworkElement

UtilityNetworkElement (abstract)

Name:	Utility Network Element
Definition:	Abstract base type representing an utility network element in an utility network. Every element in an utility network provides some function that is of interest in the utility network.
Description:	NOTE Derived 'views' of real-world utility objects are represented through specialisations in other application schemas; all representations of the same real-world object share a common geographic name.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: comment

Value type:	PT_FreeText
Definition:	Arbitrary comment on utility object.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: currentStatus

Value type:	ConditionOfFacilityValue
Definition:	The status of an utility object with regards to its completion and use.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: facilityReference

Value type:	Facility
Definition:	Reference to a facility this utility network element belongs to (or is part of).
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: manufacturerCode

Value type:	PT_FreeText
Definition:	Code of the utility object as defined by the manufacturer.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: manufacturerName

Value type:	PT_FreeText
Definition:	Name of the utility object manufacturer.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: objectName

Value type:	UtilityName
Definition:	A name or identifier that is used to identify the utility network object in the real world. It provides a 'key' for implicitly associating different representations of the object.
Multiplicity:	1
Stereotypes:	«voidable»

UtilityNetworkElement (abstract)

Attribute: reconstructionDate

Value type:	DateTime
Definition:	The time when (if) the utility object was reconstructed or repaired.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: validFrom

Value type:	DateTime
Definition:	The time when the utility object started to exist in the real world.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: validTo

Value type:	DateTime
Definition:	The time from which the utility object no longer exists in the real world.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: verticalPosition

Value type:	VerticalPositionValue
Definition:	Vertical position of the utility object relative to ground.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.30.   UtilityNode

UtilityNode (abstract)

Name:	Utility Node
Subtype of:	Node, UtilityNetworkElement
Definition:	A point spatial object which is used for connectivity.
Description:	Nodes are found at both ends of the UtilityLink.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: elevation

Value type:	ElevationPoint
Definition:	Relative height/depth with regards to the terrain surface.
Description:	Relative elevation of a utility node represents its relative height above a fixed reference point, most commonly terrain surface level. Relative elevation can be also negative, in case of underground feature. Used if vertical postion is either underground or suspendedOrElevated.

NOTE Relative elevation is measured differently depending on the type of utility feature. For example, conduits are measured from the top of the conduit (cable, duct...) to the |
| Multiplicity: | 1 |
| Stereotypes: | «voidable» |

Attribute: heading

Value type:	Angle
Definition:	Heading (angle value) of an utility network node.
Description:	NOTE A directed angle together with a signed measure of the angle. Represents rotation with regards to True North. True North is the direction along the Earth's surface towards the geographic North Pole.

UtilityNode (abstract)

Multiplicity:	1
Stereotypes:	«voidable»

Constraint: All objects have inspireId

Natural language:	All utility nodes have an external object identifier.
OCL:	inv:inspireId->notEmpty()

5.3.2.1.31. *UtilityNodeContainer*

UtilityNodeContainer (abstract)

Name:	Utility Node Container
Subtype of:	UtilityNetworkElement, Node
Definition:	A point spatial object which is used for connectivity, and also may contain other spatial objects (not neccessarily belonging to the same utility network).
Description:	Nodes are found at either end of the UtilityLink.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: elevation

Value type:	ElevationPoint
Definition:	Relative height/depth with regards to the terrain surface.
Description:	Relative elevation of a utility node represents its relative height above a fixed reference point, most commonly terrain surface level. Relative elevation can be also negative, in case of underground feature. Used if vertical postion is either underground or suspendedOrElevated.

NOTE Relative elevation is measured differently depending on the type of utility feature. For example, conduits are measured from the top of the conduit (cable, duct...) to the |
| Multiplicity: | 1 |
| Stereotypes: | «voidable» |

Attribute: heading

Value type:	Angle
Definition:	Heading (angle value) of an utility network node.
Description:	NOTE A directed angle together with a signed measure of the angle. Represents rotation with regards to True North. True North is the direction along the Earth's surface towards the geographic North Pole.
Multiplicity:	1
Stereotypes:	«voidable»

Association role: nodes

Value type:	UtilityNode
Definition:	Contained utility nodes.
Multiplicity:	0..*
Stereotypes:	«voidable»

Constraint: All objects have inspireId

Natural language:	All utility nodes have an external object identifier.
OCL:	inv:inspireId->notEmpty()

5.3.2.1.32. *UtilityProperty*

UtilityProperty (abstract)

UtilityProperty (abstract)

Name:	Utility Property
Subtype of:	NetworkProperty
Definition:	A reference to a property that falls upon the utility network. This property can apply to the whole of the utility network element it is associated with or (for linear spatial objects) be described using linear referencing.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: validFrom

Value type:	DateTime
Definition:	The time when the utility property started to exist in the real world.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: validTo

Value type:	DateTime
Definition:	The time from which the utility property no longer exists in the real world.
Multiplicity:	0..1
Stereotypes:	«voidable»

Constraint: All objects have inspireId

Natural language:	All utility properties have an external object identifier.
OCL:	inv:inspireId->notEmpty()

5.3.2.1.33.   WaterAppurtenance

WaterAppurtenance

Name:	Water Appurtenance
Subtype of:	UtilityNode
Definition:	A node (point) appurtenance in water networks.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: type

Value type:	WaterAppurtenanceValue
Definition:	Type of the water network appurtenance.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.1.34.   WaterManhole

WaterManhole

Name:	Water Manhole
Subtype of:	Manhole
Definition:	Manhole used exclusively in water networks.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

5.3.2.1.35.   WaterNetwork

WaterNetwork

Name:	Water Network
Subtype of:	UtilityNetwork

WaterNetwork

Definition:	Collection of water network elements.	
Status:	Proposed	
Stereotypes:	«featureType»	
URI:	null	

5.3.2.1.36. WaterPipe

WaterPipe

Name:	Water Pipe
Subtype of:	Pipe
Definition:	A water pipe used to convey water from one location to another
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: averageVolume

Value type:	Volume
Definition:	Average volume of the pipe.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: maxCapacity

Value type:	Measure
Definition:	Maximum capacity of the pipe.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: type

Value type:	WaterPipeTypeValue
Definition:	Type of water pipe.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: waterType

Value type:	WaterPipeWaterTypeValue
Definition:	Type of water pipe based on water type.
Multiplicity:	1
Stereotypes:	«voidable»

5.3.2.2. Code lists

5.3.2.2.1. DuctCasingValue

DuctCasingValue

Name:	Duct Casing
Definition:	Available types Duct casings.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: concrete

Definition:	Concrete casing.

Value: directBuried

Definition:	Direct buried (a trench)

DuctCasingValue

Value: none

Definition:	No casing. Used in case when Duct represents simply a bundle of Pipes.

5.3.2.2.2.   ElectricityAppurtenanceValue

ElectricityAppurtenanceValue

Name:	Electricity Appurtenance
Definition:	Possible node (point) appurtenance values in electricity networks.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: capacitorControl

Definition:	Capacitor control.
Description:	*Capacior control* is usually done to achieve as many as possible of the following goals: reduce losses due to reactive load current, reduce kVA demand, decrease customer energy consumption, improve voltage profile, and increase revenue. Indirectly capacitor control also results in longer equipment lifetimes because of reduced equipment stresses.

Value: connectionBox

Definition:	Connection box.
Description:	*Connection box* protects and/or encloses electric circuits and equipment on the ground.

Value: correctingEquipment

Definition:	Power factor correcting equipment.
Description:	Power distribution is more efficient if operated when the *power factor* (PF) is unity. An alternating voltage and the current causing it to flow should rise and fall in value equally and reverse direction at the same instant. When this happens, the two waves are said to be in phase and the power factor is unity (1.0). However, various inductive effects, such as idle running induction motors or transformers, can lower the power factor.

Value: deliveryPoint

Definition:	Delivery point.
Description:	Point the electric power is being delivered to.

Value: dynamicProtectiveDevice

Definition:	Dynamic protective device.
Description:	In addition to opening when a fault is detected, *dynamic protective devices* also reclose to attempt to re-establish service. If the fault remains after a prescribed number of reclosings, the device may lock open the circuit. Reclosing is designed to reduce or eliminate the effects of temporary faults. NOTE It may include following subtypes: Circuit Breakers, Fault Interrupter, Reclosers (Single Phase Hydraulic, etc.), and Sectionalizers.

Value: fuse

Definition:	Fuse.

ElectricityAppurtenanceValue

Description:	*Fuses* are used to protect distribution devices from damaging currents. A fuse is an intentionally weakened spot in the electric circuit that opens the circuit at a predetermined current that is maintained for a predetermined amount of time. Fuses are not dynamic in that they remain open and do not reclose. By automatically interrupting the flow of electricity, a fuse prevents or limits damage caused by an overload or short circuit.

Value: generator

Definition:	Generator.
Description:	*Generator* is an alternative, third-party power source feeding into the electrical network.

Value: loadTapChanger

Definition:	Load tap changer.
Description:	*Load tap changer* represents power transformer controls that change the primary to-secondary turns ratio of a transformer winding while the transformer is under load to regulate the flow of current and minimize voltage drop. Automatic loadtap changers in the power transformer provides voltage control on the substation bus. Control systems of voltage regulators and tap changing equipment beyond the substation usually have a line-drop compensator to simulate voltage drop between the substation and points in the distribution system.

Value: mainStation

Definition:	Main station.
Description:	*Electric station* represents a building or fenced-in enclosure that houses the equipment that switches and modifies the characteristics of energy from a generation source. Distribution systems include primary feeders (circuits), transformer banks, and secondary circuits (overhead or underground) that serve a specified area.

Value: netStation

Definition:	Net station.

Value: networkProtector

Definition:	Network protector.
Description:	Network transformers connect to the secondary network through a *network protector*. Network protector components may be the circuit breaker, relays, backup fuses and controls required for automatically disconnecting a transformer from the secondary network in response to predetermined conditions on primary feeder or transformer.

Value: openPoint

Definition:	Open point.
Description:	*Open point* contains information about a variety of insulated and shielded devices that connect high-voltage cables to apparatus, including transformers. Separable, load-break insulated connectors are used with primary bushings of submersible distribution transformers for safety. This is known as a dead-front configuration.

Value: primaryMeter

Definition:	Primary meter.
Description:	*Primary meters* are installed if commercial customers elect to have power delivered at distribution voltages, such as 12.5 kV. Residential customers are generally billed for kilowatt hours (kWH) used. Commercial and industrial customers may additionally be billed for demand charges and power factor charges.

Value: recloserElectronicControl

Definition:	Recloser electronic control.

ElectricityAppurtenanceValue

Description:	*Reclosers* and sectionalizers isolate temporary and permanent faults in electric lines. Reclosers open circuits (trip) in case of a fault, and reclose after a predetermined time. The time-current characteristic, usually expressed in a curve, is based on temperature and fuse tolerances and is used to coordinate recloser operations. Reclosers allow (usually) four trip operations to clear temporary faults.

Value: recloserHydraulicControl

Definition:	Recloser hydraulic control.
Description:	*Recloser hydraulic control* is an intregral part of single-phase reclosers. A trip coil in series with the line is used to sense overcurrent and trip open the recloser contacts. The contacts close after a preset interval.

Value: regulatorControl

Definition:	Regulator control.
Description:	Voltage provided by *regulators* is changed using a tap-changing switch to adjust the number of secondary windings. Line load can be regulated from 10 percent above to 10 percent below normal line voltage. Voltage regulators that control distribution system voltage are rated from 2.5 kV to 34.5 grd Y kV. Most feeder regulators have the 32-step design.

Value: relayControl

Definition:	Relay control.
Description:	*Protective relay systems* detect and isolate faults. Time-delayed phase and ground relays are coordinated with fuses and reclosers further out on the circuit. They are instantaneous units with inverse TCCs to coordinate with fuses and reclosers further downstream. Relays are usually set to trip feeder breakers and protect the fuse in the event of temporary faults beyond the fuse.

Value: sectionalizerElectronicControl

Definition:	Sectionalizer electronic control.
Description:	*Sectionalizers* are automatic circuit opening devices that are installed on the load side of fault-interrupting devices and count its fault-trip operations. Sectionalizers can be set to open after one, two, or three counts have been detected with a predetermined time span. Sectionalizers are used in conjunction with fuses and reclosers and may have inrush current restraint features to prevent a false count when lines are re-energized.

Value: sectionalizerHydraulicControl

Definition:	Sectionalizer hydraulic control.
Description:	*Sectionalizer controls* store a pulse counter when the minimum actuating current drops to zero because a fault is interrupted by the recloser (or other protective device). Sectionalizers operate in conjunction with breakers and reclosers to lock out fault current after a predetermined number (usually three) of recloser operations (trips).

Value: streetLight

Definition:	Street light.
Description:	A *street light* (or lamppost, street lamp, light standard, or lamp standard) is a raised source of light on the edge of a road, which is turned on or lit at a certain time every night.

Value: subStation

Definition:	Sub station.

ElectricityAppurtenanceValue

Description:	An *electrical substation* is a subsidiary station of an electricity generation, transmission and distribution system where voltage is transformed from high to low or the reverse using transformers. Electric power may flow through several substations between generating plant and consumer, and may be changed in voltage in several steps. A substation that has a step-up transformer increases the voltage while decreasing the current, while a step-down transformer decreases the voltage while increasing the current for domestic and commercial distribution.

Value: switch

Definition:	Switch.
Description:	A *switch* disconnects circuits within the distribution network and can be manually or power operated. Switches are either open or closed. Switches are critical to the electric distribution system to allow current interruption to allow system maintenance, redirecting current in case of emergency, or to isolate system failures. Switches may be automated and controlled remotely through SCADA operation.

Value: transformer

Definition:	Transformer.
Description:	*Transformers* transfer electrical energy from one circuit to another circuit usually with changed values of voltage and current in the process. NOTE Subtypes include: Network, Single Phase Overhead, Single Phase Underground, Two Phase Overhead, Three Phase Overhead, Three Phase Underground, Step, and Power.

Value: voltageRegulator

Definition:	Voltage regulator.
Description:	*Voltage regulators* vary the ac supply or source voltage to the customer to maintain the voltage within desired limits. Voltage provided by regulators is changed using a tap-changing switch to adjust the number of secondary windings. Bypass switches allow a regulator to be removed for normal service without interrupting the downstream load. NOTE Subtypes include: Single Phase Overhead, Two Phase Overhead, Three Phase Overhead, Three Phase Pad-Mounted.

5.3.2.2.3. *ElectricityCableConductorMaterialValue*

ElectricityCableConductorMaterialValue

Name:	Electricity Cable Conductor Material
Definition:	Available types of electriciy cable conductor materials.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: aluminium

Definition:	Aluminium.

Value: copper

Definition:	Copper.

Value: steel

Definition:	Steel.

5.3.2.2.4. *ElectricityCableTypeValue*

ElectricityCableTypeValue

ElectricityCableTypeValue

Name:	Electricity Cable Type	
Definition:	Available electricity cable types.	
Status:	Proposed	
Stereotypes:	«codeList»	
Governance:	May not be extended by Member States.	
URI:	null	

Value: P_OH_Single

Definition:	Single phase primary overhead.

Value: P_OH_Three

Definition:	Three phase primary overhead.

Value: P_OH_Two

Definition:	Two phase primary overhead.

Value: P_UG_Single

Definition:	Single phase primary underground.

Value: P_UG_Three

Definition:	Three phase primary underground.

Value: S_OH_Single

Definition:	Single phase secondary overhead.

Value: S_OH_Three

Definition:	Three phase secondary overhead.

Value: S_UG_Single

Definition:	Single phase secondary underground.

Value: S_UG_Three

Definition:	Three phase secondary underground.

Value: other

Definition:	Other.

Value: streetLightConductor

Definition:	Street light conductor.

5.3.2.2.5.   ElectricityNetworkTypeValue

ElectricityNetworkTypeValue

Name:	Electricity Network Type	
Definition:	Available types of electricity networks.	
Status:	Proposed	
Stereotypes:	«codeList»	
Governance:	May not be extended by Member States.	
URI:	null	

Value: distribution

Definition:	Distribution network.

ElectricityNetworkTypeValue

Description:	*Electricity distribution* is the final stage in the delivery (before retail) of electricity to end users. A distribution system's network carries electricity from the transmission system and delivers it to consumers. Typically, the network would include medium-voltage (less than 50 kV) power lines, electrical substations and pole-mounted transformers, low-voltage (less than 1 kV) distribution wiring and sometimes electricity meters.

Value: transmission

Definition:	Transmission network.
Description:	*Electric power transmission* or "high voltage electric transmission" is the bulk transfer of electrical energy, from generating power plants to substations located near to population centers. This is distinct from the local wiring between high voltage substations and customers, which is typically referred to as electricity distribution. Transmission lines, when interconnected with each other, become high voltage transmission networks.

5.3.2.2.6.   GasAppurtenanceValue

GasAppurtenanceValue

Name:	Gas Appurtenance
Definition:	Possible node (point) appurtenance values in oil networks.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

5.3.2.2.7.   GasAppurtenanceValue

GasAppurtenanceValue

Name:	Gas Appurtenance
Definition:	Possible node (point) appurtenance values in gas networks.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

5.3.2.2.8.   ManholeCoverOpeningValue

ManholeCoverOpeningValue

Name:	Manhole Cover Opening
Definition:	Opening of the manhole cover.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: bolts

Definition:	Bolts.

Value: hooks

Definition:	Hooks.

Value: lever

Definition:	Lever.

Value: other

Definition:	Other.

ManholeCoverOpeningValue

Value: socket

    Definition: Socket.

5.3.2.2.9.   ManholeCoverShapeValue

ManholeCoverShapeValue

Name:	Manhole Cover Shape
Definition:	Shape of the manhole cover.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: circle

    Definition: Circle.

Value: composite

    Definition: Composite.

Value: grid

    Definition: Grid.

Value: other

    Definition: Other.

Value: rectangle

    Definition: Rectangle.

Value: square

    Definition: Square.

5.3.2.2.10.   ManholeShaftAccessValue

ManholeShaftAccessValue

Name:	Manhole Shaft Access
Definition:	Access to the manhole shaft.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: climbingIron

    Definition: Climbing iron.

Value: ladder

    Definition: Ladder.

Value: ladderFittings

    Definition: Ladder fittings.

Value: noAccess

    Definition: No access.

Value: other

    Definition: Other.

Value: stairs

ManholeShaftAccessValue

Definition:	Stairs.	

5.3.2.2.11.   ManholeShaftMaterialValue

ManholeShaftMaterialValue

Name:	Manhole Shaft Material
Definition:	Available manhole shaft material.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: cement

Definition:	Cement.

Value: concrete

Definition:	Concrete.

Value: fiberglass

Definition:	Fiberglass.

Value: masonry

Definition:	Masonry.

Value: other

Definition:	Other.

Value: plasteredMasonry

Definition:	Plastered masonry.

Value: plastic

Definition:	Plastic.

Value: precastConcrete

Definition:	Precast concrete.

Value: reinforcedPolyester

Definition:	Reinforced polyester.

5.3.2.2.12.   ManholeTypeValue

ManholeTypeValue

Name:	Manhole Type
Definition:	Type of the manhole.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: handhole

Definition:	Handhole.
Description:	A handhole represents a small hole for the insertion of the hand for cleaning purposes, etc.

Value: manhole

Definition:	Manhole.

ManholeTypeValue

Value: vault

    Definition: Vault.

5.3.2.2.13.   OilAppurtenanceValue

OilAppurtenanceValue

Name:	Oil Appurtenance
Definition:	Possible node (point) appurtenance values in oil networks.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

5.3.2.2.14.   PipeCoatingValue

PipeCoatingValue

Name:	Pipe Coating
Definition:	Type of (material used for) pipe coating.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: CPVC

    Definition: Collapsed polyvinylchloride (CPVC).

Value: HDPE

    Definition: High density polyethylene (HDPE).

Value: PVC

    Definition: Polyvinylchloride (PVC).

Value: epoxy

    Definition: Epoxy.

Value: none

    Definition: No coating.

Value: other

    Definition: Other.

5.3.2.2.15.   PipeMaterialValue

PipeMaterialValue

Name:	Pipe Material
Definition:	Material used to build a pipe.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: ABS

    Definition: Acrylonitrile butadiene styrene (ABS).

Value: CPVC

    Definition: Chlorinated polyvinyl chloride (CPVC).

Value: FRP

PipeMaterialValue

Definition:	Fibre reinforced plastic (FRP).

Value: PB

Definition:	Polybutylene (PB).

Value: PE

Definition:	Polyethylene (PE).

Value: PEX

Definition:	Cross-linked high-density polyethylene (PEX).

Value: PP

Definition:	Polypropylene (PP).

Value: PVC

Definition:	Polyvinyl chloride (PVC).

Value: RPMP

Definition:	Reinforced polymer mortar (RPMP).

Value: asbestos

Definition:	Asbestos.

Value: blackIron

Definition:	Iron without any finish on it, gray-black in color.

Value: blackSteel

Definition:	Steel with a surface layer of dark coloured iron oxides.

Value: castIron

Definition:	Iron with a high Carbon content (above 2%).

Value: clay

Definition:	Clay.

Value: compositeConcrete

Definition:	Composite concrete.

Value: concrete

Definition:	Concrete.

Value: galvanizedSteel

Definition:	Galvanized steel.

Value: masonry

Definition:	Masonry.

Value: other

Definition:	Other.

Value: prestressedReinforcedConcrete

Definition:	Prestressed reinforced concrete.

Value: reinforcedConcrete

Definition:	Reinforced concrete.

Value: steel

PipeMaterialValue

Definition:	Steel.

Value: terracota

Definition:	Terracota.

Value: wood

Definition:	Wood.

5.3.2.2.16.   PipeShapeValue

PipeShapeValue

Name:	Pipe Shape
Definition:	Geometric shape of the pipe.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: arched

Definition:	Arched.

Value: circle

Definition:	Circle.

Value: cunette

Definition:	Cunette.

Value: other

Definition:	Other.

Value: oval

Definition:	Oval.

Value: rectangle

Definition:	Rectangle.

Value: square

Definition:	Square.

Value: trapezoid

Definition:	Trapezoid.

5.3.2.2.17.   PoleFoundationValue

PoleFoundationValue

Name:	Pole Foundation
Definition:	Available pole foundation types.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: extraDeepInEarth

Definition:	Pole foundation set extra deep in the Earth.

Value: normalWithConcreteBackfill

Definition:	Pole foundation set normally, with concrete backfill.

PoleFoundationValue

Value: normallyInEarth

    Definition: Pole foundation set normally in the Earth.

Value: onConcreteFoundation

    Definition: Pole foundation set on concrete foundation.

Value: other

    Definition: Other.

5.3.2.2.18.   PoleMaterialValue

PoleMaterialValue

Name:	Pole Material
Definition:	Available materials or types of the pole.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: aluminiuim

    Definition: Aluminium.

Value: composite

    Definition: Composite.

Value: concrete

    Definition: Concrete.

Value: fiberglass

    Definition: Fiberglass.

Value: other

    Definition: Other material.

Value: steel

    Definition: Steel.

Value: wood

    Definition: Wood.

5.3.2.2.19.   PoleTypeValue

PoleTypeValue

Name:	Pole Type
Definition:	Available types of the pole.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: hFrame

    Definition: H-frame pole.

Value: other

    Definition: Other.

Value: standard

PoleTypeValue

Definition:	Standard pole.

Value: streetLight

Definition:	Street light pole.

Value: tower

Definition:	Tower (not a pole).

5.3.2.2.20.   SewerAppurtenanceValue

SewerAppurtenanceValue

Name:	Sewer Appurtenance
Definition:	Possible node (point) appurtenance values in sewer networks.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: anode

Definition:	Anode.
Description:	An *anode* is a feature (specifically, an electrical mechanism) that's applied to system components for the prevention of rust, pitting, and the corrosion of metal surfaces that are in contact with water or soil. A low-voltage current is applied to the water or soil in contact with the metal, such that the electromotive force renders the metal component cathodic. Corrosion is concentrated on the anodes instead of on the associated (and protected) water system components. This type of corrosion may occur in copper, steel, stainless steel, cast iron, and ductile iron pipes.

Value: barScreen

Definition:	Bar screen.
Description:	A *bar screen* is a set of parallel bars, either vertical or inclined, that is placed in a sewer or other waterway to catch debris. Bar screens are only found in wastewater and stormwater systems.

Value: barrel

Definition:	Barrel.
Description:	A *barrel* is the cylindrical part of a manhole between the cone and the shelf. Barrels are only found in wastewater and stormwater systems.

Value: catchBasin

Definition:	Catch basin.
Description:	A *catch basin* is a chamber or well used with storm or combined sewers to receive runoff into the collection system. Catch basins are used as a means of removing debris and solids that could enter thecollection system. Catch basins may also be modeled as curb inlets or stormwater inlets.

Value: cleanOut

Definition:	Clean out.
Description:	A *cleanout* is a sewer and stormwater-specific facility that is used as an opening in a collection system for inserting tools, rods, or snakes while cleaning a pipeline or clearing a stoppage. Cleanout types include two-way cleanouts, which are designed for working a snake into the pipe in either direction. Two-way cleanouts are commonly found in laterals or near a property line.

Value: dischargeStructure

Definition:	Discharge structure.

SewerAppurtenanceValue

Description:	A *discharge point* is a sewer and stormwater-specific facility where wastewater drainage is discharged from the system. A discharge point may be located at the terminus of an outfall.

Value: meter

Definition:	Meter.
Description:	A *meter* is a facility that is used to measure wastewater volume. Being a facility, a meter plays the role of a junction on the active network.

Value: pump

Definition:	Pump.
Description:	A *pump* is a piece of equipment that moves, compresses, or alters the pressure of a fluid, such as water or air, being conveyed through a natural or artificial channel. Pump types include AxialFlow, Centrifugal, Jet, Reciprocating, Rotary, Screw, and Turbine.

Value: regulator

Definition:	Regulator.
Description:	A *regulator* is a device that is used in combined sewer systems to control or regulate the diversion flow.

Value: scadaSensor

Definition:	SCADA sensor.
Description:	The *SCADA sensor* is a feature that's used to remotely measure the status of network components as part of a supervisory control and data acquisition (SCADA) system. SCADA systems provide alarms, responses, data acquisition, and control for collection and distribution systems. Operators use the SCADA system to monitor and adjust processes and facilities.

Value: thrustProtection

Definition:	Thrust protection.
Description:	The *thrust protection* represents a type of line protector that's used to prevent pipe movement. Thrust protection is commonly implemented as thrust blocks (masses of concrete material) that are placed at bends and around valve structures. The types of thrust protection include Anchor, Blocking, Deadman, and Kicker.

Value: tideGate

Definition:	Tide gate.
Description:	A *tide gate* is a device used in sewer and stormwater systems that is suspended from a free-swinging horizontal hinge and is usually placed at the end of a conduit, discharging into a body of water with a fluctuating surface elevation. This piece of equipment is also termed a backwater gate, flap gate, or check gate.

5.3.2.2.21.   SewerPipeTypeValue

SewerPipeTypeValue

Name:	Sewer Pipe Type
Definition:	Sewer lines classification.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: LL

Definition:	Lateral line.

SewerPipeTypeValue

Description:	A *lateral line* is a small-diameter pipe that runs from the main line to the customer premises.

Value: LL_Combination

Definition:	Lateral line that transports a combination of sanitary and storm water.
Description:	Lateral line that transports a combination of sanitary and storm water.

Value: LL_Commercial

Definition:	Lateral line that transport commercial-origin wastewater.
Description:	Lateral line that transport wastewater from commercial facilities.

Value: LL_Domestic

Definition:	Lateral line that transports domestic sanitary water.
Description:	Lateral line that transports domestic wastewater.

Value: LL_Irrigation

Definition:	Irrigation lateral line.
Description:	Lateral line that transports irrigation wastewater.

Value: LL_Storm

Definition:	Lateral line that transports storm water.
Description:	Lateral line that transports storm water.

Value: ML

Definition:	Main line.
Description:	A *main line* is a large-diameter pipe that carries sewer from the source through the network.

Value: ML_GM

Definition:	Main line's gravity main.
Description:	A *gravity main* is a type of main line that is unpressurized and relies on gravity to move the water through the main.

Value: ML_GM_Collector

Definition:	Main line's gravity main's collector.
Description:	A *collector* is a pipe that collects and transports wastewater to a treatment plant or disposal system. Service laterals connect to collectors.

Value: ML_GM_Culvert

Definition:	Main line's gravity main's culvert.
Description:	A *culvert* is a pipe used to channel water e.g. underneath a road, railway or embankment.

Value: ML_GM_InLineStorage

Definition:	Main line's gravity main's in-line storage.
Description:	*In-line storage* involves retaining wet-weather flow in the pipe for small rainstorms.

Value: ML_GM_Interceptor

Definition:	Main line's gravity main's interceptor.
Description:	Large sewer line that controls the flow of sewage to the treatment plant. In a storm it allows some of the sewage to flow directly into a receiving stream, thus keeping it from overflowing onto the streets.

Value: ML_GM_InvertedSiphon

Definition:	Main line's gravity main's inverted siphon.

SewerPipeTypeValue

Description:	An *inverted siphon* is a pipe that must dip below an obstruction to form a „U" shaped flow path. Inverted siphons are commonly used for preventing smelly sewer gases from coming back out of drains.

Value: ML_GM_OpenChannel

Definition:	Main line's gravity main's open channel.
Description:	An *open channel* is a channel open to the environment that transmits raw water and drainage.

Value: ML_GM_Outfall

Definition:	Main line's gravity main's outfall.
Description:	*Outfalls* are the conduit leading to the final disposal point or area for wastewater and drainage. Outfalls discharge into a receiving water body, such as a stream, river, lake, ocean, or other surface, or groundwater.

Value: ML_GM_Overflow

Definition:	Main line's gravity main's overflow.
Description:	An overflow connects a chamber or pipe to another part of the system or outfall during overload conditions or peak flows.

Value: ML_GM_Tunnel

Definition:	Main line's gravity main's tunnel.
Description:	Tunnels are used to transmit sewer through mountains or deep below the ground. Tunnels are generally created in bedrock and may contain features such as pipes and ducts (conduits) within the tunnel.

Value: ML_PM

Definition:	Main line's pressurized main.
Description:	A *pressurized main* is a type of main line that is pressurized. Pressure sewers are particularly adaptable for rural or semi-rural communities where public contact with effluent from failing drain fields presents a substantial health concern.
	NOTE There are numerous types of PressurizedMains in the sewer distribution model; they include AirRelease, BlowOff, Bypass, ChemicalInjection, DistributionMain, Interconnect, PipeBridge, SamplingStation, and TransmissionMain.

Value: ML_PM_ForceMain

Definition:	Main line's pressurized main's force main.

Value: ML_PM_PipeBridge

Definition:	Main line's pressurized main's pipe bridge.

Value: ML_PM_Pressure

Definition:	Main line's pressurized main's pressure.

Value: ML_PM_Vacuum

Definition:	Main line's pressurized main's vacuum.

5.3.2.2.22.   SewerPipeWaterTypeValue

SewerPipeWaterTypeValue

Name:	Sewer Pipe Water Type
Definition:	Sewer lines classification based on water type.
Status:	Proposed

SewerPipeWaterTypeValue

Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: combined

Definition:	Combined wastewater.
Description:	A *combined wastewater* sewer is a type of sewer system that collects sanitary sewage and stormwater runoff in a single pipe system.

Value: reclaimed

Definition:	Reclaimed water.
Description:	*Reclaimed water*, sometimes called recycled water, is former wastewater (sewage) that has been treated to remove solids and certain impurities, and then used in sustainable landscaping irrigation or to recharge groundwater aquifers.

Value: sanitary

Definition:	Sanitary wastewater.
Description:	*Sanitary sewers* remove waste products from peoples' home and send them underground to a treatment plant.

Value: storm

Definition:	Storm runoff wastewater.
Description:	*Storm wastewater* drains gather rain and storm runoff and direct them to wetlands and lakes. Ditches and curb line grates are storm drains.

5.3.2.2.23. *TelecommunicationsAppurtenanceValue*

TelecommunicationsAppurtenanceValue

Name:	Telecommunications Appurtenance
Definition:	Possible node (point) appurtenance values in telecommunications networks.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: antenna

Definition:	Antenna.
Description:	An *antenna* (or aerial) is a transducer that transmits or receives electromagnetic waves. In other words, antennas convert electromagnetic radiation into electric current, or vice versa.

Value: copperMaintenanceLoop

Definition:	Copper (twisted-pair) maintenance loop.
Description:	A *maintenance loop* is a coil of slack copper cable that is used to support future joining or other maintenance activities.

Value: copperRepeater

Definition:	Copper repeater.
Description:	A *copper repeater* is copper line conditioning equipment that amplifies the analog or digital input signal.

Value: digitalCrossConnect

Definition:	Digital cross connect (DXC).
Description:	A *digital cross connect* is a patch panel for copper cables that are used to provide digital service. Fibers in cables are connected to signal ports in this equipment.

Value: digitalLoopCarrier

TelecommunicationsAppurtenanceValue

Definition:	Digital loop carrier (DLC).
Description:	A *digital loop carrier* is a device that multiplexes an optical signal in to multiple lower level digital signals. Fibers in cables are connected to signal ports in this equipment.

Value: exchange

Definition:	Exchange (switch).
Description:	The *exchange* (central office) is the physical building used to house the inside plant equipment (distribution frames, lasers, switches etc).

Value: fiberInterconnect

Definition:	Fiber interconnect (FIC).
Description:	A *fiber interconnect* terminates individual fibers or establishes a connection between two or more fiber cables. Fibers in cables are connected to signal ports in the equipment.

Value: jointClosure

Definition:	Joint closure (copper of fiber).
Description:	A protective *joint closure* for either copper or fiber-optic cable joints. A cable joint consists of spliced conductors and a closure.

Value: loadCoil

Definition:	Load coil.
Description:	A *load coil* is a copper line conditioning equipment. Standard voice phone calls degrade noticeably when the copper portion of a phone line is greater than 18 kilofeet long. In order to restore call quality, load coils are inserted at specific intervals along the loop.

Value: mainDistributionFrame

Definition:	Main distribution frame (MDF).
Description:	A *main distribution frame* is often found at the local exchange (Central Office) and is used to terminate the copper cables running from the customer's site. The frame allows these cables to be cross connected using patch cords to other equipment such as a concentrator or switch.

Value: multiplexer

Definition:	Multiplexer (MUX).
Description:	A *multiplexer* is a device that combines multiple inputs into an aggregate signal to be transported via a single transmission channel. Fibers in cables are connected to signal ports in this equipment.

Value: opticalMaintenanceLoop

Definition:	Optical maintenance loop.
Description:	A *maintenance loop* is a coil of slack fiber cable that is used to support future splicing or other maintenance activities.

Value: opticalRepeater

Definition:	Optical repeater.
Description:	An *optical repeater* is a device that receives an optical signal, amplifies it (or, in the case of a digital signal, reshapes, retimes, or otherwise reconstructs it), and retransmits it as an optical signal. Fibers in cables are connected to signal ports in this equipment.

Value: patchPanel

Definition:	Patch panel.
Description:	A *patch panel* is device where connections are made between incoming and outgoing fibers. Fibers in cables are connected to signal ports in this equipment.

TelecommunicationsAppurtenanceValue

Value: spliceClosure

Definition:	Splice closure.
Description:	A *splice closure* is usually a weatherproof encasement, commonly made of tough plastic, that envelops the exposed area between spliced cables, i.e., where the jackets have been removed to expose the individual transmission media, optical or metallic, to be joined. The closure usually contains some device or means to maintain continuity of the tensile strength members of the cables involved, and also may maintain electrical continuity of metallic armor, and/or provide external connectivity to such armor for electrical grounding. In the case of fiber optic cables, it also contains a splice organizer to facilitate the splicing process and protect the exposed fibers from mechanical damage. In addition to the seals at its seams and points of cable entry, the splice closure may be filled with an encapsulate to further retard the entry of water.

Value: splitter

Definition:	Splitter.
Description:	A *splitter* is a transmission coupling device for separately sampling (through a known coupling loss) either the forward (incident) or the backward (reflected) wave in a transmission line. Fibers in cables are connected to signal ports in this equipment.

Value: terminal

Definition:	Terminal.
Description:	*Terminals* are in-loop plant hardware, specifically designed to facilitate connection and removal of distribution cable, drop or service wire to and from cable pairs at a particular location. Terminals are a class of equipment that establishes the end point of a section of the transmission network between the CO and the customer.

Value: termination

Definition:	Termination.
Description:	*Terminations* are a generic feature class for the end points of cables. These may be considered similar to service drops to buildings. They represent a point at which the telephone company network ends and connects with the wiring at the customer premises.

5.3.2.2.24. TelecommunicationsCableMaterialValue

TelecommunicationsCableMaterialValue

Name:	Telecommunications Cable Material
Definition:	Available materials of telecommunications cables.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: coaxial

Definition:	Coaxial cable.
Description:	A *coaxial cable*, or coax, is an electrical cable with an inner conductor surrounded by a flexible, tubular insulating layer, surrounded by a tubular conducting shield.

Value: opticalFiber

Definition:	Fibre-optic cable.
Description:	A *fiber optic cable* is composed of thin filaments of glass through which light beams are transmitted to carry large amounts of data. The optical fibers are surrounded by buffers, strength members, and jackets for protection, stiffness, and strength. A fiber-optic cable may be an all-fiber cable, or contain both optical fibers and metallic conductors.

TelecommunicationsCableMaterialValue

Value: other

    Definition: Other.

Value: twistedPair

    Definition: Twisted pair (copper) cable.

    Description: A *copper cable* is a group of metallic conductors (copper wires) bundled together that are capable of carrying voice and data transmissions. The copper wires are bound together, usually with a protective sheath, a strength member, and insulation between individual conductors and the entire group.

5.3.2.2.25.   TelecommunicationsNetworkTypeValue

TelecommunicationsNetworkTypeValue

Name:	Telecommunications Network Type
Definition:	Available types of telecommunications networks.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: PSTN

    Definition: Public switched telephone networks (PSTN).

Value: computer

    Definition: Computer network (e.g. LAN, WAN, MAN...)

Value: radio

    Definition: Radio network.

Value: television

    Definition: Television network.

5.3.2.2.26.   UtilityNetworkSubTypeValue

UtilityNetworkSubTypeValue

Name:	Utility Network Sub Type
Definition:	Type of utility network with regards to the volume being served.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: distribution

    Definition: Distribution networks serve a small scale volumes (of water, electricity, etc.). Service is most commonly served to the end-users by means of distribution (supply) networks.

Value: transmission

    Definition: Transmission networks serve a large scale volumes (of water, electricity, etc.). Service is most commonly served from the production facilities to the distribution networks.

5.3.2.2.27.   UtilityNetworkTypeValue

UtilityNetworkTypeValue

Name:	Utility Network Type
Definition:	Available types of utility networks.

UtilityNetworkTypeValue

Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: eletrical

Definition:	Electrical network.

Value: gas

Definition:	Gas network.

Value: oil

Definition:	Oil network.

Value: sewer

Definition:	Sewer network.

Value: telecom

Definition:	Telecommunications network.

Value: water

Definition:	Water network.

5.3.2.2.28.   WaterAppurtenanceValue

WaterAppurtenanceValue

Name:	Water Appurtenance
Definition:	Possible node (point) appurtenance values in water networks.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: anode

Definition:	Anode.
Description:	An *anode* is a feature (specifically, an electrical mechanism) that's applied to system components for the prevention of rust, pitting, and the corrosion of metal surfaces that are in contact with water or soil. A low-voltage current is applied to the water or soil in contact with the metal, such that the electromotive force renders the metal component cathodic. Corrosion is concentrated on the anodes instead of on the associated (and protected) water system components. This type of corrosion may occur in copper, steel, stainless steel, cast iron, and ductile iron pipes.

Value: clearWell

Definition:	Clear well.
Description:	A *clear well* is an enclosed tank that is associated with a treatment plant. Clear wells are used to store filtered water of sufficient capacity to prevent the need to vary the filtration rate with variations in demand. Clear wells are also used to provide chlorine contact time for disinfection. Pumps are used to move the water from the clear well to the treatment plant or to a distribution system.

Value: controlValve

Definition:	Control valve.
Description:	*Control valves* represent set of valves that operate in special ways. There are three fundamental types of control valves: backflow control, air control, and altitude.

WaterAppurtenanceValue

Value: fitting

Definition:	Fitting.
Description:	The *fitting* represents the facility found at the joint between two lines where a transition of some sort must occur. The basic connecting devices between pipes; fittings are rarely used to control the flow of water through the network.

Value: hydrant

Definition:	Hydrant.
Description:	A *hydrant* enables fire fighters to attach fire hoses to the distribution network. Hydrants also have secondary uses that include flushing main lines and laterals, filling tank trucks, and providing a temporary water source for construction jobs.

Value: junction

Definition:	Junction.
Description:	The *junction* is a water network node where two or more pipes combine, or a point where water consumption is allocated and defined as demand.

Value: lateralPoint

Definition:	Lateral point.
Description:	A *lateral point* represents the location of the connection between the customer and the distribution system.

Value: meter

Definition:	Meter.
Description:	A *meter* is a facility that is used to measure water consumption (volume). Being a facility, a meter plays the role of a junction on the active network.
	NOTE Meters are also much like hydrants as they also have an associated warehouse object, namely, a WarehouseMeter.

Value: pump

Definition:	Pump.
Description:	A *pump* is a piece of equipment that moves, compresses, or alters the pressure of a fluid, such as water or air, being conveyed through a natural or artificial channel.
	NOTE Pump types include AxialFlow, Centrifugal, Jet, Reciprocating, Rotary, Screw, and Turbine.

Value: pumpStation

Definition:	Pump station.
Description:	A *pump station* is a facility for pumping water on the network to transport to another part of the network (lift pump).

Value: samplingStation

Definition:	Sampling station.
Description:	A *sampling station* is a facility that is used for collecting water samples. Sampling stations may be dedicated sampling devices, or they may be other devices of the system where a sample may be obtained.

Value: scadaSensor

Definition:	SCADA sensor.

WaterAppurtenanceValue

Description:	The *SCADA sensor* is a feature that's used to remotely measure the status of network components as part of a supervisory control and data acquisition (SCADA) system. SCADA systems provide alarms, responses, data acquisition, and control for collection and distribution systems. Operators use the SCADA system to monitor and adjust processes and facilities.

Value: storageBasin

Definition:	Storage basin.
Description:	A *storage basin* represents artificially enclosed area of a river or harbor designed so that the water level remains unaffected by tidal changes.

Value: storageFacility

Definition:	Enclosed storage facility.

Value: surgeReliefTank

Definition:	Surge relief tank.
Description:	A *surge relief tank* is a piece of equipment used to absorb pressure increases in the water system. Surge relief tanks provide a buffer against throttling within the system by accepting water into a tank through a pressure valve.

Value: systemValve

Definition:	System valve.
Description:	A *system valve* is a facility that is fitted to a pipeline or orifice in which the closure member is either rotated or moved transversely or longitudinally in the waterway so as to control or stop the flow. System valves are used to regulate pressure, isolate, throttle flow, prevent backflow, and relieve pressure. NOTE System valve types include Gate, Plug, Ball, Cone, and Butterfly. These specific types may be classified as isolation valves.

Value: thrustProtection

Definition:	Thrust protection.
Description:	The *thrust protection* represents a type of line protector that's used to prevent pipe movement. Thrust protection is commonly implemented as thrust blocks (masses of concrete material) that are placed at bends and around valve structures. NOTE The types of thrust protection include Anchor, Blocking, Deadman, and Kicker.

Value: treatmentPlant

Definition:	Treatment plant.

Value: well

Definition:	Production well.

5.3.2.2.29.   WaterPipeTypeValue

WaterPipeTypeValue

Name:	Water Pipe Type
Definition:	Running water classification.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: LL

WaterPipeTypeValue

Definition:	Lateral line.	
Description:	A *lateral line* is a small-diameter pipe that runs from the main line to the customer premises. *LateralLine* is a concrete class. The types of lateral lines are Combination, Commercial, Domestic, Fire, HydrantLateral, Industrial, and Irrigation.	

Value: LL_Commercial

Definition:	Commercial lateral line.
Description:	Lateral line that transport water to commercial facilities.

Value: LL_Domestic

Definition:	Domestic lateral line.
Description:	Lateral line that transports water to domestic users.

Value: LL_Fire

Definition:	Fire lateral line.
Description:	Lateral line that transports water for the purposes of distinguishing fire.

Value: LL_HydrantLaterals

Definition:	Hydrant laterals.
Description:	Lateral line that transports water to the hydrants.

Value: LL_Industrial

Definition:	Industrial lateral line.
Description:	Lateral line that transports water to the industrial facilities.

Value: LL_Irrigation

Definition:	Irrigation lateral line.
Description:	Lateral line that transports water for the irrigation purposes.

Value: ML

Definition:	Main line.
Description:	A *main line* is a large-diameter pipe that carries water from the source through the network.

Value: ML_GM

Definition:	Main line's gravity main.
Description:	A *gravity main* is a type of main line that is unpressurized and relies on gravity to move the water through the main.
	NOTE For the water distribution model, the types of gravity mains are Carrier, InlineStorage, and TransportPipe.

Value: ML_GM_Carrier

Definition:	Main line's gravity main's carrier.
Description:	A *carrier pipe* is an inner pipe, or a hollow cylindrical tube contained inside an outer sheath. Responsible for carrying fluids, the carrier pipe runs through an outer, insulated casing that acts as a containment system that protects against spills.

Value: ML_GM_InLineStorage

Definition:	Main line's gravity main's in-line storage.

Value: ML_GM_TransportPipe

Definition:	Main line's gravity main's transport pipe.

Value: ML_PM

Definition:	Main line's pressurized main.

WaterPipeTypeValue

Description:	A *pressurized main* is a type of main line that is pressurized. There are numerous types of PressurizedMains in the water distribution model; they include AirRelease, BlowOff, Bypass, ChemicalInjection, DistributionMain, Interconnect, PipeBridge, SamplingStation, and TransmissionMain.

Value: ML_PM_AirRelease

Definition:	Main line's pressurized main's air release.

Value: ML_PM_BlowOff

Definition:	Main line's pressurized main's blow off.

Value: ML_PM_Bypass

Definition:	Main line's pressurized main's bypass.

Value: ML_PM_ChemicalInjection

Definition:	Main line's pressurized main's chemical injection.

Value: ML_PM_DistributionMain

Definition:	Main line's pressurized main's distribution main.

Value: ML_PM_Interconnect

Definition:	Main line's pressurized main's interconnect.

Value: ML_PM_PipeBridge

Definition:	Main line's pressurized main's pipe bridge.

Value: ML_PM_SamplingStation

Definition:	Main line's pressurized main's sampling station.

Value: ML_PM_TransmissionMain

Definition:	Main line's pressurized main's transmission main.

5.3.2.2.30.   WaterPipeWaterTypeValue

WaterPipeWaterTypeValue

Name:	Water Pipe Water Type
Definition:	Water lines classification based on water type.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: potable

Definition:	Potable water.
Description:	*Potable water* or drinking water is water of sufficiently high quality that can be consumed or used without risk of immediate or long term harm.

Value: raw

Definition:	Raw water.
Description:	*Raw water* is water taken from the environment, and is subsequently treated or purified to produce potable water in a water purification works. Raw water should not be considered safe for drinking or washing without further treatment.

Value: salt

Definition:	Salt water.
Description:	*Salt water* or saline water is a general term for water that contains a significant concentration of dissolved salts (NaCl).

WaterPipeWaterTypeValue

Value: treated

Definition:	Treated water.
Description:	*Treated water* is the water that throgh treatment proces.Treatment processes are the ones commonly used in water purification plants.

5.3.2.3. Imported types (informative)

This section lists definitions for feature types, data types and enumerations and code lists that are defined in other application schemas. The section is purely informative and should help the reader understand the feature catalogue presented in the previous sections. For the normative documentation of these types, see the given references.

5.3.2.3.1.   Angle

Angle

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Derived::Units of Measure [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.3.2.3.2.   Boolean

Boolean

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Primitive::Truth [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.3.2.3.3.   CI_ResponsibleParty

CI_ResponsibleParty

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19115:2006 Metadata (Corrigendum)::Citation and responsible party information [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.3.2.3.4.   ConditionOfFacilityValue

ConditionOfFacilityValue

Package:	INSPIRE Consolidated UML Model::Generic Conceptual Model::Base Types [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	The status of a facility with regards to its completion and use.

5.3.2.3.5.   DateTime

DateTime

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Primitive::Date and Time [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.3.2.3.6.   ElevationLine

ElevationLine (abstract)

Package:	INSPIRE Consolidated UML Model::Themes::Annex II::Elevation::Elevation - Vector Elements [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	A linear spatial object that provides a single value of an elevation property. It describes the elevation of a real world surface for a set of aligned adjoining locations characterized by having the same elevation.
Description:	NOTE A set of elevation lines, each of them having a different value of the elevation property, is often used in topographic datasets to represent the global morphology of the surface.

5.3.2.3.7. ElevationPoint

ElevationPoint (abstract)

Package:	INSPIRE Consolidated UML Model::Themes::Annex II::Elevation::Elevation - Vector Elements [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	A point spatial object that provides a single value of an elevation property. It describes the elevation of a real world surface at a specific location.
Description:	NOTE It includes the elevation property value of the surface at a specific location, which often represents a singular point in the morphology of the surface.

5.3.2.3.8. Facility

Facility

Package:	INSPIRE Consolidated UML Model::Themes::Annex III::*Utility and Governmental Services*::*Utility and Governmental Services*::Waste Management [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	A physical structure designed, built or installed to serve specific functions, or a delimitable area of land or water used to serve specific functions.
Description:	EXAMPLE In the context of waste management the "specific function" will be a waste management related one. Typically, waste management sites and waste management installations (such as incineration plants, landfills or storages) get distinguished. Multiple waste management installations may be found at the same site. Waste management installations can be a part of other waste management installations.

5.3.2.3.9. GeographicalName

GeographicalName

Package:	INSPIRE Consolidated UML Model::Themes::Annex I::Geographical Names::Geographical Names [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	Proper noun applied to a real world entity.

5.3.2.3.10. Integer

Integer

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Primitive::Numerics [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.3.2.3.11. Length

Length

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Derived::Units of Measure [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.3.2.3.12. Link

Link (abstract)

Package:	INSPIRE Consolidated UML Model::Generic Conceptual Model::Base Models::Network [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	Curvilinear network element that connects two positions and represents a homogeneous path in the network. The connected positions may be represented as nodes.

5.3.2.3.13. LinkSequence

LinkSequence (abstract)

LinkSequence (abstract)		
Package:	INSPIRE Consolidated UML Model::Generic Conceptual Model::Base Models::Network [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]	
Definition:	A network element which represents a continuous path in the network without any branches. The element has a defined beginning and end and every position on the link sequence is identifiable with one single parameter such as length.	
Description:	EXAMPLE A link sequence may represent a route.	

5.3.2.3.14. *LinkSet*

LinkSet (abstract)		
Package:	INSPIRE Consolidated UML Model::Generic Conceptual Model::Base Models::Network [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]	
Definition:	A collection of link sequences and/or individual links that has a specific function or significance in a network.	
Description:	NOTE This spatial object type supports the aggregation of links to form objects with branches, loops, parallel sequences of links, gaps, etc.

EXAMPLE A dual carriageway road, as a collection of the two link sequences that represent each carriageway. | |

5.3.2.3.15. *Manhole*

Manhole		
Package:	INSPIRE Consolidated UML Model::Themes::Annex III::*Utility and Governmental Services*::*Utility and Governmental Services*::Utility Networks [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]	
Definition:	Simple container object which may contain either single or multiple utility networks objects.	
Description:	Manholes perform following functions:

- Provide drainage for the conduit system so that freezing water does not damage the conduit or wires.

- Provide a location for bending the conduit run without damaging the wires.

- Provide a junction for conduits coming from different directions.

- Provide access to the system for maintenance. | |

5.3.2.3.16. *Measure*

Measure		
Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Derived::Units of Measure [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]	

5.3.2.3.17. *Network*

Network		
Package:	INSPIRE Consolidated UML Model::Generic Conceptual Model::Base Models::Network [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]	

Network

Definition:	A network is a collection of network elements.	
Description:	The reason for collecting certain elements in a certain network may vary (e.g. connected elements for the same mode of transport)	

5.3.2.3.18. *NetworkProperty*

NetworkProperty (abstract)

Package:	INSPIRE Consolidated UML Model::Generic Conceptual Model::Base Models::Network [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	Abstract base type representing phenomena located at or along a network element. This base type provides general properties to associate the network-related phenomena (network properties) with the network elements.
Description:	In the simplest case (NetworkReference), the network property applies to the whole network element. In the case of a Link, the spatial reference may be restricted to part of the Link by using a linear reference. ISO/TC 211 is currently in the early stages of developing a standard for Linear Referencing (ISO 19148). A simple mechanism to express linear references is provided in this version of the network model; it is expected that the model will be extended once ISO 19148 is stable. The current simple model requires for all linear references two expressions representing a distance from the start of the Link along its curve geometry. The network property applies to the part of the Link between fromPosition and toPosition.

5.3.2.3.19. *Node*

Node (abstract)

Package:	INSPIRE Consolidated UML Model::Generic Conceptual Model::Base Models::Network [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	Represents a significant position in the network that always occurs at the beginning or the end of a link.
Description:	NOTE if a topological representation of the network is used the road node is either a topological connection between two or more links or the termination of a ink. If a geometric representation of the network is used road nodes are represented by points or alternatively another geometric shape. [EuroRoadS]

5.3.2.3.20. *PT_FreeText*

PT_FreeText

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19139 Metadata - XML Implementation::Cultural and linguistic adapdability [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.3.2.3.21. *Pipe*

Pipe

Package:	INSPIRE Consolidated UML Model::Themes::Annex III::*Utility and Governmental Services*::*Utility and Governmental Services*::Utility Networks [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	A tube for the conveyance of solids, liquids or gases from one location to another.

5.3.2.3.22. *TelecommunicationsCable*

TelecommunicationsCable

Package:	INSPIRE Consolidated UML Model::Themes::Annex III::*Utility and Governmental Services*::*Utility and Governmental Services*::Utility Networks::Telecommunications Network [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

TelecommunicationsCable

Definition:	A utility link sequence used to convey data signals (PSTN, radio or TV) from one location to another.

5.3.2.3.23.   *UnitsList*

UnitsList

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Derived::Units of Measure [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.3.2.3.24.   *UtilityLink*

UtilityLink (abstract)

Package:	INSPIRE Consolidated UML Model::Themes::Annex III::*Utility and Governmental Services*::*Utility and Governmental Services*::Utility Networks [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	A linear spatial object that describes the geometry and connectivity of an utility network between two points in the network. Utility links may represent pipes, ducts, cables, etc.

5.3.2.3.25.   *UtilityLinkSequence*

UtilityLinkSequence (abstract)

Package:	INSPIRE Consolidated UML Model::Themes::Annex III::*Utility and Governmental Services*::*Utility and Governmental Services*::Utility Networks [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	A linear spatial object, composed of an ordered collection of utility links, which represents a continuous path in an utility network without any branches (monotone chain). The element has a defined beginning and end and every position on the utility link sequence is identifiable with one single parameter such as length. It describes an element of the utility network, characterized by one or more thematic identifiers and/or properties.

5.3.2.3.26.   *UtilityNetwork*

UtilityNetwork (abstract)

Package:	INSPIRE Consolidated UML Model::Themes::Annex III::*Utility and Governmental Services*::*Utility and Governmental Services*::Utility Networks [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	Collection of network elements that belong to a single type of utility.
Description:	In the real world, objects are connected to each other: an optical cable is connected to a multiplexer that in turn is connected to copper cables connecting into our homes to provide cable TV, telephony and internet access. Using GIS to support network utility management typically involves many types of features that may have connectivity to each other. Topology in GIS is generally defined as the spatial relationship between connecting or adjacent features, and is an essential prerequisite for many spatial operations such as network analysis. Utility networks can be described as NaN (Node-Arc-Node) network using two basic geometric types: points (aka *nodes*) and polylines (aka *arcs*). NaN topologies can be directed or un-directed, depending on specific type of network (i.e. water networks are directed, while telecommunications networks are not). Such topology structure provides an automated way to handle digitising and editing errors, and enable advanced spatial analyses such as adjacency, connectivity and containment. Infrastructure networks rely on Generic network model developed during Annex I.
	NOTE Water, sewer, electricity, telecommunications and oil & gas networks are always considered separate utility network types.

5.3.2.3.27.   UtilityNode

UtilityNode (abstract)	
Package:	INSPIRE Consolidated UML Model::Themes::Annex III::*Utility and Governmental Services*::*Utility and Governmental Services*::Utility Networks [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	A point spatial object which is used for connectivity.
Description:	Nodes are found at both ends of the UtilityLink.

5.3.2.3.28.   VerticalPositionValue

VerticalPositionValue	
Package:	INSPIRE Consolidated UML Model::Generic Conceptual Model::Base Types [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	The relative vertical position of a spatial object.

5.3.2.3.29.   Volume

Volume	
Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Derived::Units of Measure [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.4 Application schema "Administrative and social governmental services"

5.4.1 Description

5.4.1.1. Narrative description and UML overview

The *Administrative and social governmental services* application schema consists of the class *GovernmentalService*, the related data types, union classes plus a code list.

Non-voidable attributes of the class *GovernmentalService* are *InspireID*, the location where the service is provided (*serviceLocation*) and the type of the service (*serviceType*).

The location of the service (attribute serviceLocation) can be modelled variously, so data providers can choose the most appropriate alternative. Since the data type of these alternatives can vary, a union-class[16] is used for that attribute[17]. If services are located inside buildings or facilities, the service geometry should be provided as a reference to these features. Some service sites are located outside buildings or facilities, but they have an address (e.g. helicopter landing site). Then the spatial reference should be allocated by the address. The approach to use existing geometries avoids redundancy between the application schemas of different INSPIRE themes. Beyond that the service location can be provided by a geometry. Since this application schema is focussed on services (and not on the spatial objects where services are located), it is strongly recommended to provide the geometry as point in this cases. The intention to use the data type *GM_Object* in the application schema is to ease the effort for data provides if the geometry is originally stored with other data types. Anyway, the usage of other geometry types than point should be an exception.

The type of the service is specified by a code list (*ServiceTypeValue*). Foundation is the COFOG classification by EUROSTAT [COFOG 1999][18]. The acronym COFOG means "Classification of the Functions of Government". This classification covers a broad range of administrative and social governmental services but provides primarily a template for statistics regarding government expenditures. Therefore COFOG can't be used unmodified. The list has been tailored and refined by types, which are based on requirements derived from use cases and interviews. The code list is organized hierarchically[19]. In order to map their hierarchy inside the code list, *TaggedValues* are used to store parent service values. In this context it's important to note that the meaning of any item has to be taken not only from its name, definition or description, but also from its position within the hierarchy. The type "GovernmentalService" is the (fictive – because not part of the list) root element of the tree. Both nodes (e.g. fireFightingStation) and leafs (e.g. auxiliaryFireBrigade) are useable as service types. The tree is intentionally unbalanced.

> **Open issue 6:** The recommendation of providing an identifier / number as part of the codes to indicate the hierarchy has not been taken into account for the current specifications. Such transformation of the codelist values could be done for version 3.0, if required, but could become rather complex or long, e.g. "HEA_04_03_07_13_otorhinolaryngology". The clearance of the codelist should be the main priority; its format may evolve later.
> The hierarchical structure is provided in Annex D.

The further attributes of *GovernmentalService* are from stereotype <<voidable>>. Their definitions and descriptions can be taken from the application schema.

---

[16] See [ISO 19103]
[17] *Attention: The "union" type is not yet taken into account in the process "Extraction of feature catalogue". It is therefore not included in the § "5.4.2 Feature catalogue", but visible in the following figure "UML class diagram: Overview of the US "Administrative and social governmental services" application schema"*
[18] http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom= CL_COFOG99 &StrLanguageCode=EN&IntPcKey=&StrLayoutCode=HIERARCHIC)
[19] *For a better overview, the code list is provided within Annex D.*

Figure 12 – UML class diagram: Overview of the US "Administrative and social governmental services" application schema (*global view*)

class Administrative and Social Governmental Services

«featureType»
GovernmentalService

+ inspireId: Identifier
+ serviceLocation: ServiceLocationType
+ serviceType: ServiceTypeValue

«voidable»
+ additionalLocationDescription: PT_FreeText [0..1]
+ areaOfResponsibility: AreaOfResponsibilityType [0..1]
+ emergencyPlan: CI_Citation [0..*]
+ hoursOfService: PT_FreeText
+ name: GeographicalName [0..*]
+ note: PT_FreeText [0..1]
+ occupancy: OccupancyType [0..*]
+ resources: ResourceType [0..*]
+ responsiblePartyContact: CI_ResponsibleParty [1..*]
+ serviceLevel: ServiceLevelValue [0..*]
+ validFrom: DateTime
+ validTo: DateTime [0..1]
+ website: URL [0..1]

«lifeCycleInfo, voidable»
+ beginLifespanVersion: DateTime
+ endLifespanVersion: DateTime [0..1]

constraints
{endLifespanVersion}
{validTo}

endLifespanVersion
/* If set, the date endLifespanVersion shall be later than beginLifespanVersion. */
inv: self.endLifespanVersion .isAfter (self.beginLifespanVersion)

validTo
/* If set, the date validTo shall be equal or later than validFrom. */
inv: self.validTo .isEqual(self.validFrom) or self.validTo .isAfter(self.validFrom)

The attribute hoursOfService is consistent to the ISO data type CI_Citation's attribute hoursOfService

«dataT...
Resour...
+ typeOfTechnicalMeans:
«voidable»
+ amount: Measure

+ typeO
«voidable
+ numb

+ areaOfResponsibility
+ areaOfResponsibility
+ areaOfResponsibility
+ areaOfResponsibility

+ servic
+ servic
+ servic
+ servic

classes used from other Annex themes

«featureType»
Addresses::Address

+ inspireId: Identifier
+ locator: AddressLocator [1..*] {ordered}
+ position: GeographicPosition [1..*]

«voidable»
+ alternativeIdentifier: CharacterString [0..1]
+ status: StatusValue [0..1]
+ validFrom: DateTime
+ validTo: DateTime [0..1]

«voidable, lifeCycleInfo»
+ beginLifespanVersion: DateTime
+ endLifespanVersion: DateTime [0..1]

constraints
{AddressPosition}
{AddressCountry}
{EndLifeSpanVersion}

+parentAddress
«voidable» 0..1

«featureType»
AdministrativeUnits::AdministrativeUnit

+ country: CountryCode
+ geometry: GM_MultiSurface
+ inspireId: Identifier
+ name: GeographicalName [1..*]
+ nationalCode: CharacterString
+ nationalLevel: AdministrativeHierarchyLevel

«voidable, lifeCycleInfo»
+ beginLifespanVersion: DateTime
+ endLifespanVersion: DateTime [0..1]

«voidable»
+ nationalLevelName: LocalisedCharacterString [1..*]
+ residenceOfAuthority: ResidenceOfAuthority [1..*]

constraints
{CondominiumsAtCountryLevel}
{AdmininstrativeUnitHighestLevel}
{AdministrativeUnitLowestLevel}

+coAdminister
«voidable» 0..*

+administeredBy
«voidable» 0..*

+upperLevelUnit
«voidable» 0..1

+lowerLevelUnit
«voidable» 0..*

+building
«voidable»
0..*

«placeholder,feat...
Buildings::Abstract

«dataType»
Geographical Names::GeographicalName

+ spelling: SpellingOfName [1..*]

«voidable»
+ grammaticalGender: GrammaticalGenderValue [0..1]
+ grammaticalNumber: GrammaticalNumberValue [0..1]
+ language: CharacterString
+ nameStatus: NameStatusValue
+ nativeness: NativenessValue
+ pronunciation: PronunciationOfName
+ sourceOfName: CharacterString

«dataType»
Base Types::Identifier

+ localId: CharacterString
+ namespace: CharacterString

«lifeCycleInfo, voidable»
+ versionId: CharacterString [0..1]

constraints
{Allowed characters for localId and namespace}

Figure 13 – UML class diagram: Overview of the US "Administrative and social governmental services" application schema (*zoom on the left part*)

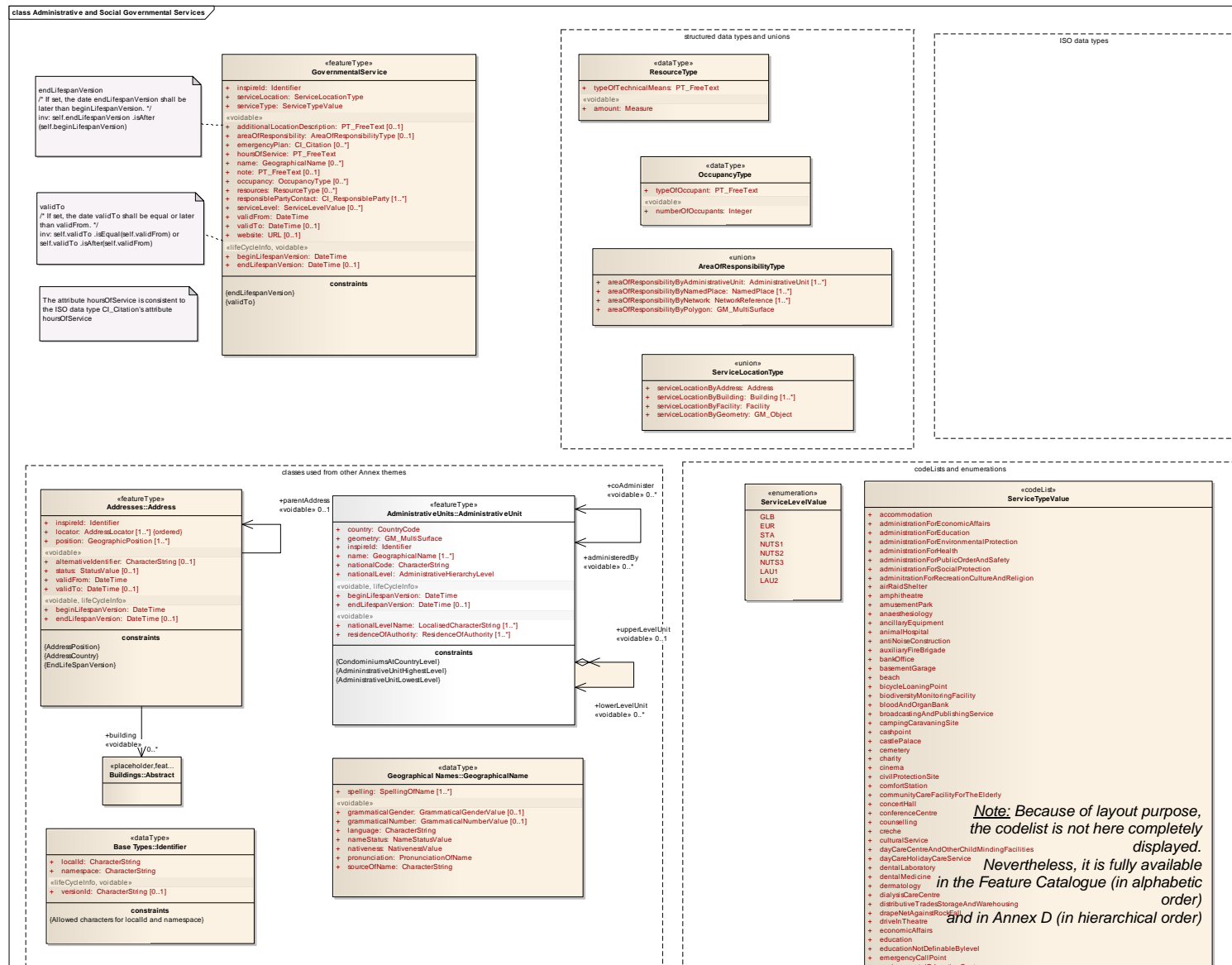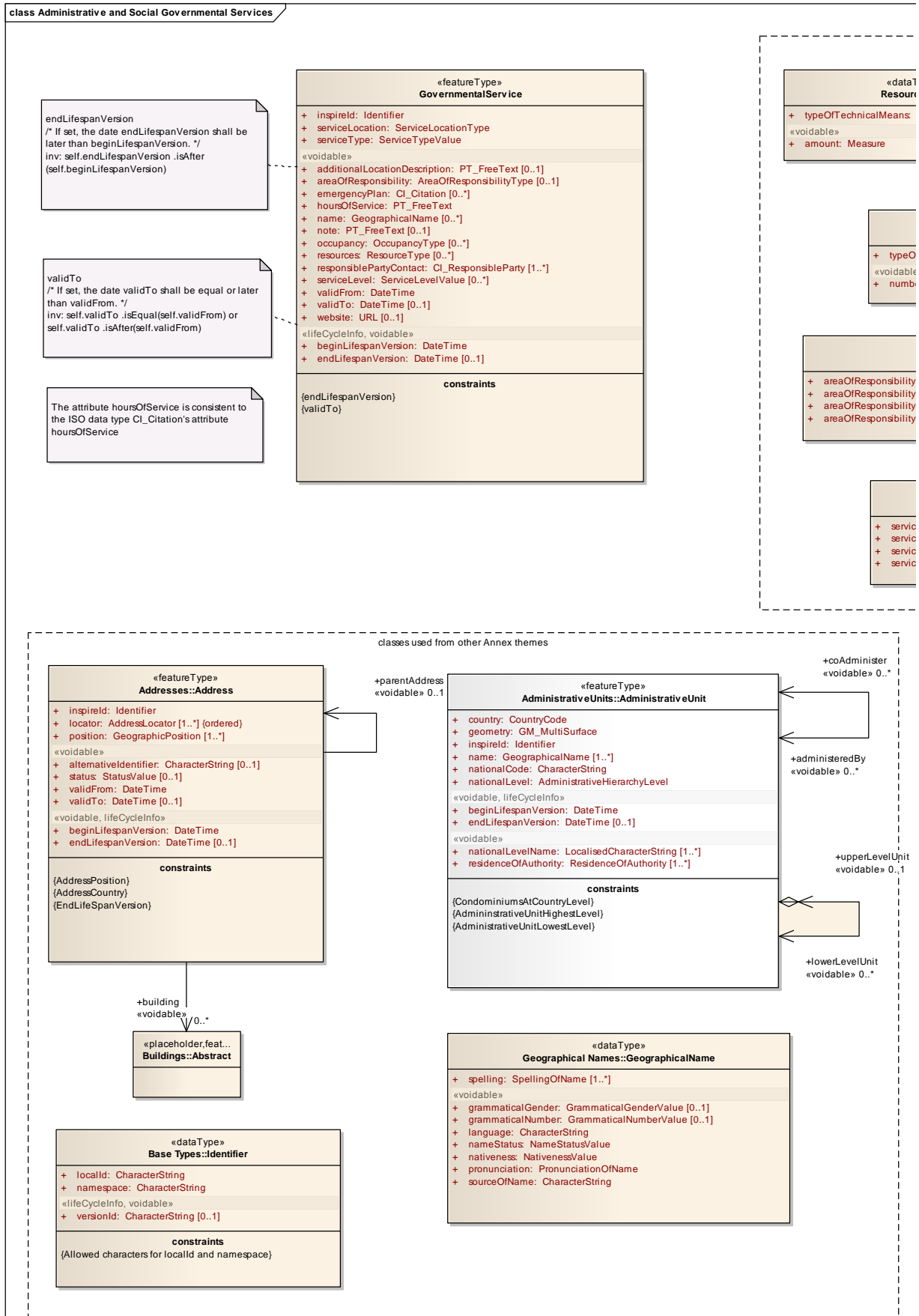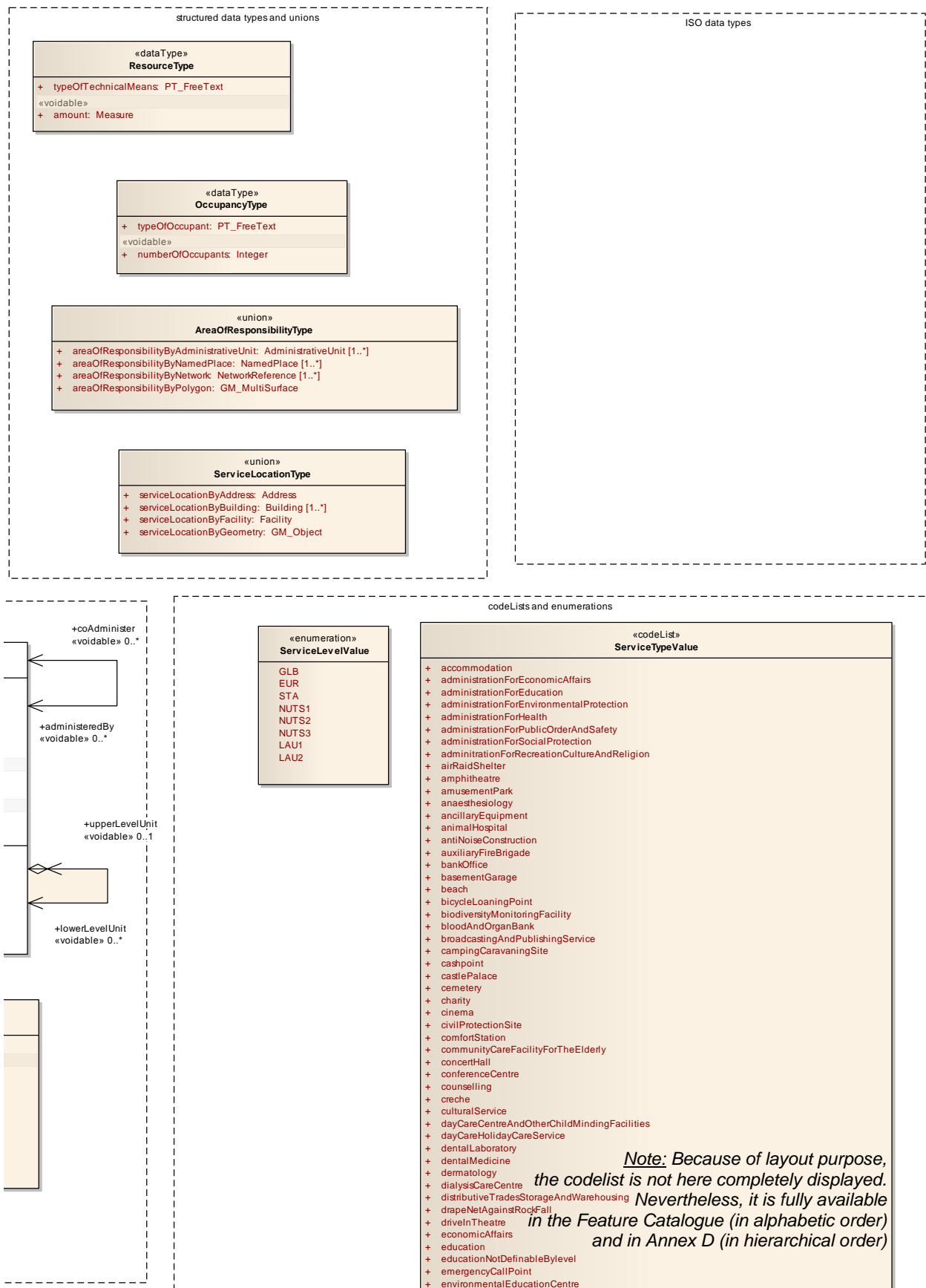**Figure 14 – UML class diagram: Overview of the US "Administrative and social governmental services" application schema (*zoom on the right part*)**

5.4.1.2. Consistency between spatial data sets

Nothing more than what's written in the general paragraph 5.2.1.2.

5.4.1.3. Identifier management

Nothing more than what's written in the general paragraph 5.2.1.3.

5.4.1.4. Modelling of object references

Internal references:
The application schema describes single services. Several services can be offered at the same location or by the same authority. Such internal references aren't explicitly modelled but can be analysed by spatial or logical intersections.

External references:
This application schema provides a special view at real world objects. Very often the same real world object, which is modelled as a service in the application schema, can be seen as a building, a facility or an exposed element as well. Such external references are partly explicitly modelled in the application schema by using references to buildings or to facilities as data types for the spatial attribute serviceLocation. Beyond that external references can be analysed by spatial intersections.

5.4.1.5. Geometry representation

Instances of feature class *GovernmentalService,* as depicted and explained in the following UML model and XML schema, may be modelled by using any kind of geometry (geometry type: *GM_Geometry*) in order to not forcing any MS or data producer to introduce changes in the way how they model their original data sets.

Moreover this, as previously explained, the present specification allows Governmental Services data to be located by using one between a set of different location references: point, address, polygon or facility. Which, once again, releases GS data of being modelled in a single compulsory way.

Nevertheless, due to their nature of "*types of information that are often published or mapped as "points-of-interest"-data* (POI)", as explained at document "D 2.3: *Definition of INSPIRE Annex Themes and Scope*" and reproduced at 2.2.2 in this specification, it is highly recommended that:

> **Recommendation 7** Whenever possible, administrative and social governmental services data should be modelled as point objects (geometry type: GM_Point)

Please, note that this recommendation stands only for autonomous geometry of the *GovernmentalService* feature. If the service can be displayed by a building, a facility or an address, there is no more issue, according to the fact that the *GovernmentalService* will be using the geometry of the linked object (cf. third clause of the 5.4.1.1 Narrative description and UML overview).

5.4.1.6. Temporality representation

Nothing more than what's written in the general paragraph 5.2.1.6.

5.4.2 Feature catalogue

Table 3 – Feature catalogue metadata

Feature catalogue name	INSPIRE feature catalogue Administrative and social governmental services
Scope	Administrative and social governmental services

Version number	2.0
Version date	2011-06-17
Definition source	INSPIRE data specification Administrative and social governmental services

Table 4 – Types defined in the feature catalogue

Type	Package	Stereotypes	Section
AreaOfResponsibilityType	Administrative and social governmental services	«union»	5.4.2.2.1
GovernmentalService	Administrative and social governmental services	«featureType»	5.4.2.1.1
OccupancyType	Administrative and social governmental services	«dataType»	5.4.2.2.2
ResourceType	Administrative and social governmental services	«dataType»	5.4.2.2.3
ServiceLevelValue	Administrative and social governmental services	«enumeration»	5.4.2.3.1
ServiceLocationType	Administrative and social governmental services	«union»	5.4.2.2.4
ServiceTypeValue	Administrative and social governmental services	«codeList»	5.4.2.4.1

5.4.2.1.   Spatial object types

5.4.2.1.1.   GovernmentalService

GovernmentalService

Name:	Governmental Service
Definition:	Administrative and social governmental services provided by, or on behalf of, a Public Administrative Body, in order to be used in the treatment of environmental issues (broad meaning) for public use or to the benefit of citizens
Description:	Administrative and social governmental services such as public administrations, civil protection, sites, schools, hospitals. The kinds of sites are commonly presented in governmental and municipal portals and map system as "point of interest"-data, and may be point-based location of a variety of categories of municipal and governmental services and social infrastructure
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: additionalLocationDescription

Value type:	PT_FreeText
Definition:	Additional information that helps to easily find the specific governmental service, more than provided by the service location (i.e. correct level in a building, prefered entrance, etc.)
Description:	EXAMPLE A heart defibrillator is located at the "information desk, ground floor"
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: areaOfResponsibility

Value type:	AreaOfResponsibilityType
Definition:	The spatial responsibility of a service instance
Description:	EXAMPLES: An administration is responsible for a municipality; A winter service is responsible for a number of roads
Multiplicity:	0..1
Stereotypes:	«voidable»

GovernmentalService

Attribute: beginLifespanVersion

Value type:	DateTime
Definition:	Date and time at which this version of the spatial object was inserted or changed in the spatial data set
Description:	related to the life-cycle of the spatial object in the data set
Multiplicity:	1
Stereotypes:	«lifeCycleInfo,voidable»

Attribute: emergencyPlan

Value type:	CI_Citation
Definition:	Document describing actions to be undertaken by the governmental service users and responsible parties, when a certain (or several) risk(s) occurs
Description:	EXAMPLE: Emergency Plan in case of volcano's eruption in Vesuvio's region, in Italy. The document can provide information to minimize such risks preventively or how to react in front of such risks. Such documents may be required by the legislations of several European countries
Multiplicity:	0..*
Stereotypes:	«voidable»

Attribute: endLifespanVersion

Value type:	DateTime
Definition:	Date and time at which this version of the spatial object was superseded or retired in the spatial data set
Description:	related to the life-cycle of the spatial object in the data set
Multiplicity:	0..1
Stereotypes:	«lifeCycleInfo,voidable»

Attribute: hoursOfService

Value type:	PT_FreeText
Definition:	Time, when the service can be used
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: inspireId

Value type:	Identifier
Definition:	External object identifier of the governmental service
Description:	NOTE An external object identifier is a unique object identifier published by the responsible body, which may be used by external applications to reference the spatial object. The identifier is an identifier of the spatial object, not an identifier of the real-world phenomenon
Multiplicity:	1

Attribute: name

Value type:	GeographicalName
Definition:	Usual name (designation of an object by a linguistic expression) of the service

GovernmentalService

Description:	EXAMPLE "Hotel de ville" The name can be refering: (a) to the description of the type of governmental service, if providing more detailed information than the ServiceTypeValue (e.g. "Children Library" when the value in the codelist is only "Library"); (b) to a proper noun, given to the service (e.g. "Reichstag" or "Buckhingam Palace"); or (c) to a mix of both solutions (a) and (b) (e.g. "Lycee Professionnel Jean Jaures" or "KinderGarten W.A. Mozart") Recommandation: It's useless to have a name only repeating the value of the codelist ServiceTypeValue The text is multi-linguistic (PT_FreeText), so several names can be provided (Tour Eiffel (FR), Eiffel Tower (EN), EiffelTurm (DE), etc.)	
Multiplicity:	0..*	
Stereotypes:	«voidable»	

Attribute: note

Value type:	PT_FreeText
Definition:	Any comment that help the user to better understand what is the governmental service (i.e. litteral description of the service)
Description:	This atribute is not used for internal matters, such as database management, but to provide more detailleed information that cannot be included in other attributes (e.g. "This home for the handicapped is speciallized for the blind people only")
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: occupancy

Value type:	OccupancyType
Definition:	Capacity of a governmental service with the purpose of accommodation (e.g. home for the elderly) or attendance of persons (e.g. stadium).
Description:	The capacity of the service shall be provided, not the current occupancy.
Multiplicity:	0..*
Stereotypes:	«voidable»

Attribute: resources

Value type:	ResourceType
Definition:	Description of technical resources of services
Multiplicity:	0..*
Stereotypes:	«voidable»

Attribute: responsiblePartyContact

Value type:	CI_ResponsibleParty
Definition:	Contact (i.e. person, telephone number, e-mail, etc.) of the responsible party, given a specific role (owner, maintainer, etc.) of the governmental service. This information can be used for emergency purposes or for gathering more detailed information about the governmental service
Description:	Prefer to use designation of the function and generic informations, rather than data unsing the names of the responsible persons, who may change within shorter period than data update (e.g. for e-mail addresses)
Multiplicity:	1..*
Stereotypes:	«voidable»

Attribute: serviceLevel

Value type:	ServiceLevelValue
Definition:	Allowed types for the adminstrative level where the service is provided from
Multiplicity:	0..*

GovernmentalService

Stereotypes:	«voidable»

Attribute: serviceLocation

Value type:	ServiceLocationType
Definition:	Location from where the service is offered
Multiplicity:	1

Attribute: serviceType

Value type:	ServiceTypeValue
Definition:	Type of a governmental service
Multiplicity:	1

Attribute: validFrom

Value type:	DateTime
Definition:	The time when the phenomenon started to exist in the real world
Description:	related to the existence of the phenomenon in the real world
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: validTo

Value type:	DateTime
Definition:	The time from which the phenomenon no longer exists in the real world
Description:	related to the existence of the phenomenon in the real world
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: website

Value type:	URL
Definition:	Official Internet site of the governmental service, where can be found more detailled information. The URL can also link to a document provinding such information (preferebly .pdf or universally readable format)
Description:	EXAMPLES: http://www.opapisa.it/fr/home.html for the Leaning Tower of Pisa or http://www.teatroallascala.org/en/index.html for the Opera of Milano
Multiplicity:	0..1
Stereotypes:	«voidable»

Constraint: endLifespanVersion

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

Constraint: validTo

Natural language:	If set, the date validTo shall be equal or later than validFrom.
OCL:	inv: self.validTo .isEqual(self.validFrom) or self.validTo .isAfter(self.validFrom)

5.4.2.2. Data types

5.4.2.2.1. AreaOfResponsibilityType

AreaOfResponsibilityType

Name:	Area Of Responsibility Type
Definition:	Allowed types for the description of spatial responsibility
Status:	Proposed
Stereotypes:	«union»
URI:	null

AreaOfResponsibilityType

Attribute: areaOfResponsibilityByAdministrativeUnit

Value type: AdministrativeUnit
Definition: Administrative unit describing the geographic extent of the responsibility of a service
Multiplicity: 1..*

Attribute: areaOfResponsibilityByNamedPlace

Value type: NamedPlace
Definition: Geographical name describing the geographic extent of the responsibility of a service
Multiplicity: 1..*

Attribute: areaOfResponsibilityByNetwork

Value type: NetworkReference
Definition: Part of a network describing the geographic extent of the competence of a service
Multiplicity: 1..*

Attribute: areaOfResponsibilityByPolygon

Value type: GM_MultiSurface
Definition: Polygon describing the geographic extent of the responsibility of a service
Multiplicity: 1

5.4.2.2.2.   OccupancyType

OccupancyType

Name: Occupancy Type
Definition: Description of a group of occupants
Status: Proposed
Stereotypes: «dataType»
URI: null

Attribute: numberOfOccupants

Value type: Integer
Definition: Number of occupants
Multiplicity: 1
Stereotypes: «voidable»

Attribute: typeOfOccupant

Value type: PT_FreeText
Definition: Qualitative description of a group of occupants
Description: EXAMPLE: Elderly people, partly immobile
Multiplicity: 1

5.4.2.2.3.   ResourceType

ResourceType

Name: Resource Type
Definition: Description of a single technical resource
Description: EXAMPLE: Capacity of a fire water reservoir
Status: Proposed
Stereotypes: «dataType»
URI: null

Attribute: amount

Value type: Measure
Definition: Quantitative description of a technical resource

ResourceType

Multiplicity:	1
Stereotypes:	«voidable»

Attribute: typeOfTechnicalMeans

Value type:	PT_FreeText
Definition:	Qualitative description of a technical resource
Multiplicity:	1

5.4.2.2.4.   ServiceLocationType

ServiceLocationType

Name:	Service Location Type
Definition:	Allowed types of references to locate the service
Status:	Proposed
Stereotypes:	«union»
URI:	null

Attribute: serviceLocationByAddress

Value type:	Address
Definition:	Location of the service by referencing to an address
Multiplicity:	1

Attribute: serviceLocationByBuilding

Value type:	Building
Definition:	Location of the service by referencing to a building
Multiplicity:	1..*

Attribute: serviceLocationByFacility

Value type:	Facility
Definition:	Location of the service by referencing to a facility
Multiplicity:	1

Attribute: serviceLocationByGeometry

Value type:	GM_Object
Definition:	Location of the service by referencing to a geometry
Multiplicity:	1

5.4.2.3.   Enumerations

5.4.2.3.1.   ServiceLevelValue

ServiceLevelValue

Name:	Service Level
Definition:	EUROSTAT classification of European territorial units
Status:	Proposed
Stereotypes:	«enumeration»
URI:	null

Value: EUR

Definition:	Pan-European level

Value: GLB

Definition:	Global, supra-European level

Value: LAU1

Definition:	Local administrative units at the supramunicipal level

Value: LAU2

ServiceLevelValue

	Definition:	Local administrative units at the municipal level

Value: NUTS1

	Definition:	Major socio-economic region level

Value: NUTS2

	Definition:	Basic region level (for the aplication of regional policies)

Value: NUTS3

	Definition:	Small region level (for specoific diagnoses)

Value: STA

	Definition:	Member State level

5.4.2.4. Code lists

5.4.2.4.1. ServiceTypeValue

ServiceTypeValue

	Name:	Service Type
	Definition:	Codelist containing a classification of governmental services
	Status:	Proposed
	Stereotypes:	«codeList»
	Governance:	May not be extended by Member States.
	URI:	null

Value: accommodation

	Definition:	General services concerned with the over night accommodation of travellers e.g. in hotels, on cruise ships or on campgrounds. [Based on Wikipedia]

Value: administrationForEconomicAffairs

	Definition:	Administration offices concerned with economic affairs.

Value: administrationForEducation

	Definition:	Administration offices concerned with educational matters.

Value: administrationForEnvironmentalProtection

	Definition:	Administration offices concerned with environmental protection.

Value: administrationForHealth

	Definition:	This item comprises establishments primarily engaged in the regulation of activities of agencies that provide health care and overall administration of health policy. [Based on ICHA-HP, OECD 2000]

Value: administrationForPublicOrderAndSafety

	Definition:	Administration offices concerned with public order and safety.

Value: administrationForSocialProtection

	Definition:	Administration offices concerned with matters of social protection.

Value: adminitrationForRecreationCultureAndReligion

	Definition:	Administration offices concerned with recreation, culture and religion.

Value: airRaidShelter

	Definition:	Structure originally built as a shelter during an air raid.

Value: amphitheatre

	Definition:	Services provided by or at amphitheatres.

ServiceTypeValue

Value: amusementPark

Definition: Permanent site providing entertainment for the public in the form of amusement arcades, water rides and other facilities. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: anaesthesiology

Definition: Practice of anaesthesiology. An anaesthesiologist is a physician trained in anaesthesia and peri-operative medicine. [Based on Wikipedia]

Value: ancillaryEquipment

Definition: Services concerned with supplementary equipment for the fire-protection services.

Value: animalHospital

Definition: Location where sick or injured animals are given medical or surgical care. [Based on Oxford English Dictionary]

Value: antiNoiseConstruction

Definition: Structures to mitigate noise from e.g. roadways or construction.

Value: auxiliaryFireBrigade

Definition: Organized body of volunteer firemen. [Based on Oxford English Dictionary]

Value: bankOffice

Definition: Services concerned with monetary transactions and financial advice. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: basementGarage

Definition: Underground location for parking.

Value: beach

Definition: Area of sand, shingles or rocks beside inland or tidal water. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: bicycleLoaningPoint

Definition: Location where bicycles can be rented.

Value: biodiversityMonitoringFacility

Definition: Services providing current information and trends on biodiversity.

Value: bloodAndOrganBank

Definition: This item comprises establishments primarily engaged in collecting, storing and distributing blood and blood products and storing and distributing body organs. Illustrative examples: • blood donor stations. [ICHA-HP, OECD 2000]

Value: broadcastingAndPublishingService

Definition: Services concerned with broadcasting and publishing affairs.

Value: campingCaravaningSite

Definition: Location where facilities or campsites for caravans and camping are provided.

Value: cashpoint

Definition: Machine on inside/outside of banks/building societies that dispense cash 24 hours a day. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: castlePalace

ServiceTypeValue

Definition:	Services provided by or at castles/palaces.

Value: cemetery

Definition:	Site and associated structures devoted to services concerned with the burial of the dead. [Based on DGIWG Feature Data Dictionary 2010]

Value: charity

Definition:	Institutions and services engaged in the relief of the poor and provision for the needy. [Based on Merriam-Webster Online Dictionary]

Value: cinema

Definition:	Services provided by or at cinemas.

Value: civilProtectionSite

Definition:	Site offering protection from disasters.

Value: comfortStation

Definition:	Location where public toilets and lavatories are provided.

Value: communityCareFacilityForTheElderly

Definition:	This item comprises establishments primarily engaged in providing residential and personal care services for elderly and other persons (1) unable to fully care for themselves and/or (2) unwilling to live independently. The care typically includes room, board, supervision, and assistance in daily living, such as housekeeping services. In some instances these establishments provide skilled nursing care for residents in separate on-site facilities. Assisted living facilities with on-site nursing care facilities are included in this item. Homes for the elderly without on-site nursing care facilities are also included. Illustrative examples: • assisted-living facilities; • continuing-care retirement communities; • homes for the elderly without nursing care. [ICHA-HP, OECD 2000]

Value: concertHall

Definition:	Services provided by or at concert halls.

Value: conferenceCentre

Definition:	Location where formal discussions/meetings take place. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: counselling

Definition:	Services concerned with the provision of counselling of persons who are disaster victims, victims of assault and abuse and potential suicides; services concerned with the long-term support of persons who are gamblers, alcohol abusers and substance abusers; services concerned with the improvement of conditions in prisons, including prison visitors and social rehabilitation. [Based on COPNI 2001]

Value: creche

Definition:	Public centre for the care and education of young children. [Based on Merriam-Webster Online Dictionary]

Value: culturalService

Definition:	Services concerned with facilities for cultural pursuits (libraries, museums, art galleries, theatres, exhibition halls, monuments, historic houses and sites, zoological and botanical gardens, aquaria, arboreta, etc.); production, operation or support of cultural events (concerts, stage and film productions, art shows, etc.). [Based on COFOG 1999]

Value: dayCareCentreAndOtherChildMindingFacilities

ServiceTypeValue

Definition:	Child-care institutions other than creche, kindergarten and play school.

Value: dayCareHolidayCareService

Definition:	Services concerned with non-residential facilities providing activities for elderly or disabled individuals. Most centres operate 10 – 12 hours per day and provide meals, social/recreational outings, and general supervision. Some centres offer additional short-term care during holidays. [Based on Wikipedia]

Value: dentalLaboratory

Definition:	Dental services concerned with manufacturing or customizing a variety of products to assist in the provision of oral health care by a licensed dentist. These products include crowns, bridges, dentures and other dental products. [Based on Wikipedia]

Value: dentalMedicine

Definition:	Practice of dental medicine. Dentistry is the branch of medicine that is involved in the study, diagnosis, prevention, and treatment of diseases, disorders and conditions of the oral cavity, maxillofacial area and the adjacent and associated structures. [Based on Wikipedia]

Value: dermatology

Definition:	Practice for dermatology. Dermatology is the branch of medicine dealing with the skin and its diseases. [Based on Wikipedia]

Value: dialysisCareCentre

Definition:	This item comprises establishments with medical staff primarily engaged in providing out-patient kidney or renal dialysis services. [ICHA-HP, OECD 2000]

Value: distributiveTradesStorageAndWarehousing

Definition:	Services concerned with the distributive trade and the storage and warehousing industry. [Based on COFOG 1999]

Value: drapeNetAgainstRockFall

Definition:	Metallic nets on rock slope surfaces providing protection for roads and infrastructure against the detachment of small rock elements.

Value: driveInTheatre

Definition:	Services provided by or at drive-in theatres.

Value: economicAffairs

Definition:	Services concerned with activities relating to general and sectoral economic affairs. [Based on COFOG 1999]

Value: education

Definition:	Services concerned with educational affairs. These services include military schools and colleges where curricula resemble those of civilian institutions, police colleges offering general education in addition to police training and the provision of education by radio or television broadcasting. [Based on COFOG 1999]

Value: educationNotDefinableBylevel

Definition:	Provision of education not definable by level (that is, educational programmes, generally for adults, which do not require any special prior instruction, in particular vocational training and cultural development). [Based on COFOG 1999]

Value: emergencyCallPoint

Definition:	Location of telephones in a box or on a post for the use of motorists in the event of a breakdown. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

ServiceTypeValue

Value: environmentalEducationCentre

Definition: Institution engaged in developing programs and material to increase awareness about the environment and sustainable development.

Value: environmentalProtection

Definition: Services concerned with the administration, supervision, inspection, operation or support of activities relating to the protection and conservation of the environment.

Value: equipmentForFireBrigade

Definition: Location for the storage of equipment for fire brigades.

Value: establishmentAsProviderOfOccupationalHealthCareService

Definition: This item comprises service locations providing occupational health care as ancillary production. Illustrative examples • occupational health care services not provided in separate health care establishments (all industries); • military health services not provided in separate health care establishments; • prison health services not provided in separate health care establishments; • school health services. [Based on ICHA-HP, OECD 2000]

Value: fairAndExhibitionCentre

Definition: Services concerned with building complexes used for displaying products, e.g. cars, computers, ect. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: familyAdvisoryService

Definition: Services concerned with guidance, arbitration, fostering and adoption services for families. [Based on COPNI 2001]

Value: familyPlanningCentre

Definition: This item comprises establishments with medical staff primarily engaged in providing a range of family planning services on an out-patient basis, such as contraceptive services, genetic and prenatal counselling, voluntary sterilisation, and therapeutic and medically indicated termination of pregnancy. Illustrative examples: • pregnancy counselling centres; • birth control clinics; • childbirth preparation classes; • fertility clinics. [ICHA-HP, OECD 2000]

Value: familyViolenceShelter

Definition: Place of temporary refuge and support for women and their children escaping violent or abusive situations, such as rape, and domestic violence. [Based on Wikipedia]

Value: financialAndPostalService

Definition: Services concerned with the financial and postal sector.

Value: fireDetectionCamera

Definition: Camera for the detection of fires.

Value: fireFightingStation

Definition: Services concerned with a station housing fire fighters, their equipment and vehicles. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: fireProtectionService

Definition: Services concerned with fire-prevention and fire-fighting affairs; operation of regular and auxiliary fire brigades and of other fire-prevention and fire fighting services maintained by public authorities; operation or support of fire prevention and fire-fighting training programmes. [Based on COFOG 1999]

ServiceTypeValue

Value: fireWater

Definition: Location where water for fire-fighting is provided.

Value: firstStageOfTertiaryEducation

Definition: Provision of tertiary education at ISCED-97 level 5 (International Standard Classification of Education). [Based on COFOG 1999]

Value: floodWall

Definition: Barrier constructed to hold back water and raise its level to form a reservoir or to prevent flooding. [Based on DGIWG Feature Data Dictionary 2010]

Value: fountain

Definition: Ornamental feature in a pool or lake from which water issues or a device that supplies drinking water, usually in a public place. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: freeStandingAmbulatorySurgeryCentre

Definition: This item comprises establishments with physicians and other medical staff primarily engaged in providing surgical services (e.g., orthoscopic and cataract surgery) on an out-patient basis. Out-patient surgical establishments have specialised facilities, such as operating and recovery rooms, and specialised equipment, such as anaesthetic or X-ray equipment. [ICHA-HP, OECD 2000]

Value: gallery

Definition: Services provided by or at galleries.

Value: gardenPlot

Definition: Plot of land let to an individual for cultivation. [Based on Merriam-Webster Online Dictionary]

Value: gastronomy

Definition: Public restaurants of different kinds.

Value: generalAdministrationOffice

Definition: General administration offices e.g. town halls.

Value: generalHospital

Definition: Hospital services that do not limit their services to a particular medical speciality. [Based on COFOG 1999]

Value: generalMedicalService

Definition: General medical services delivered by general medical clinics and general medical practitioners. [Based on COFOG 1999]

Description: General medical clinics are defined as institutions which chiefly provide outpatient services which are not limited to a particular medical speciality and which are chiefly delivered by qualified medical doctors. General medical practitioners do not specialize in a particular medical speciality. [Based on COFOG 1999]

Value: generalPractice

Definition: General medical practice. A general practitioner treats acute and chronic illnesses and provides preventive care and health education for all ages and both sexes. [Based on Wikipedia]

Value: greenAreaAndBeach

Definition: Services concerned with open green spaces and beach.

ServiceTypeValue

Value: greenSpace

Definition: Area of land covered with grass, especially in the middle of a village. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: gynaecology

Definition: Practice of gynaecology. Gynaecology is the medical practice dealing with the health of the female reproductive system (uterus, vagina, and ovaries). [Based on Wikipedia]

Value: health

Definition: Services concerned with health issues provided to individual persons and services provided on a collective basis. [Based on COFOG 1999]

Value: hearingAids

Definition: Location of a hearing aid specialist.

Value: heartDefibrillator

Definition: Location where heart defibrillators are provided.

Value: helicopterLandingSite

Definition: Improved area used for take-off and landing of helicopters. [Based on DGIWG Feature Data Dictionary 2010]

Value: homeForTheElderly

Definition: Services concerned with any home, residence, facility, or premises which provides temporary, interim, or permanent housing to elderly persons. [Pasadena Municipal Code, California, 2011]

Value: hospitalService

Definition: Services concerned with Hospitalization. Hospitalization is defined as occurring when a patient is accommodated in a hospital for the duration of the treatment. Hospital day-care and home-based hospital treatment are included, as are hospices for terminally ill persons. Hospitals are defined as institutions which offer in-patient care under direct supervision of qualified medical doctors. Hospital services include medicaments, prostheses, medical appliances and equipment and other health related products supplied to hospital patients. It also includes non-medical expenditure of hospitals on administration, non-medical staff, food and drink, accommodation (including staff accommodation), etc. [Based on COFOG 1999]

Value: hotel

Definition: Location providing over night accommodation for travellers in hotels. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: hotelAndRestaurant

Definition: Services provided by the hotel and catering industry.

Value: housing

Definition: Services concerned with any home, residence, facility, or premises which provides temporary, interim, or permanent housing to various groups of persons. [Pasadena Municipal Code, California, 2011]

Value: hydrant

Definition: Special water access point used by emergency services. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: indoorSport

Definition: Services concerned with indoor sport facilities and activities.

ServiceTypeValue

Value: internalMedicine

Definition: Practice of internal medicine. Internal medicine is the medical specialty dealing with the prevention, diagnosis, and treatment of adult diseases. Physicians specializing in internal medicine are called internists. [Based on Wikipedia]

Value: jobCentre

Definition: Services concerned with centres that deal with all aspects of employment and job vacancies. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: kindergarten

Definition: Services concerned with day-care establishments for young children of pre-school age. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: lawCourt

Definition: Services concerned with civil and criminal law courts and the judicial system, including enforcement of fines and legal settlements imposed by the courts and operation of parole and probation systems; legal representation and advice on behalf of government or on behalf of others provided by government in cash or in services. [Based on COFOG 1999]

Value: leisure

Definition: Services concerned with leisure time activities.

Value: levee

Definition: Natural or artificial slope or wall to regulate water levels. [Based on Wikipedia]

Value: library

Definition: Services provided by or at libraries.

Value: lookout

Definition: Elevated place or structure affording a wide view for observation [Based on Merriam-Webster Online Dictionary]

Value: lowerSecondaryEducation

Definition: Provision of lower-secondary education at ISCED-97 level 2 (International Standard Classification of Education). [Based on COFOG 1999]

Description: Includes: out-of-school lower-secondary education for adults and young people. [COFOG 1999]

Value: marineRescueStation

Definition: Services on the coast providing search-and-rescue ships and/or search-and-rescue control. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: maternityCentreService

Definition: Services concerned with maternity centres. Maternity centres offer prenatal, perinatal and postnatal care to women. [Based on Wikipedia]

Value: medicalAndDiagnosticLaboratory

Definition: This item comprises establishments primarily engaged in providing analytic or diagnostic services, including body fluid analysis and diagnostic imaging, generally to the medical profession or the patient on referral from a health practitioner. Illustrative examples: • diagnostic imaging centres; • dental or medical X-ray laboratories; • medical testing laboratories; • medical pathology laboratories; • medical forensic laboratories. [ICHA-HP, OECD 2000]

ServiceTypeValue

Value: medicalAppliances

Definition: This item comprises establishments primarily engaged in the sale of medical appliances other than optical goods and hearing aids to the general public with or without prescription for personal or household consumption or utilisation. Included are establishments primarily engaged in the manufacture of medical appliances but where the fitting and repair is usually done in combination with manufacture of medical appliances. [ICHA-HP, OECD 2000]

Value: medicalCentre

Definition: Locations with physicians and other medical staff primarily engaged in providing a range of out-patient health care services with a focus generally on primary health care. Included are integrated community care centres providing both in-patient and out-patient services primarily engaged in out-patient services. [Based on ICHA-HP, OECD 2000]

Value: medicalPractice

Definition: Location where medical services are provided.

Value: medicalProductsAppliancesAndEquipment

Definition: Service covering medicaments, prostheses, medical appliances and equipment and other health-related products obtained by individuals or households, either with or without a prescription, usually from dispensing chemists, pharmacists or medical equipment suppliers. They are intended for consumption or use outside a health facility or institution. Such products supplied directly to outpatients by medical, dental and paramedical practitioners or to in-patients by hospitals and the like are included in outpatientService or hospitalService groups. [Based on COFOG 1999]

Value: mentalHealthAndSubstanceAbuseHospital

Definition: This item comprises licensed establishments that are primarily engaged in providing diagnostic and medical treatment, and monitoring services to in-patients who suffer from mental illness or substance abuse disorders. The treatment often requires an extended stay in an in-patient setting including hostelling and nutritional facilities. Psychiatric, psychological, and social work services are available at the facility. These hospitals usually provide other services, such as out-patient care, clinical laboratory tests, diagnostic X-rays, and electroencephalography services. [ICHA-HP, OECD 2000]

Value: moneyExchangeOffice

Definition: Office where the exchanging of kinds or denominations of currency takes place. [Based on Merriam-Webster Online Dictionary]

Value: museum

Definition: Services provided by or at museums.

Value: neurology

Definition: Practice of neurology. A neurologist is a physician who specializes in neurology, and is trained to investigate, or diagnose and treat neurological disorders. Paediatric neurologists treat neurological disease in children. [Based on Wikipedia]

Value: noiseProtectionEmbankment

Definition: Embankment built to reduce noise. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: noiseProtectionWall

Definition: Wall erected to reduce noise. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

ServiceTypeValue

Value: nonMedicalHomeCareService

Definition: Domiciliary care services such as home-cleaning services or meal programmes. [Based on COPNI 2001]

Value: nursingAndConvalescentHomeService

Definition: In-patient services to persons recovering from surgery or a debilitating disease or condition that requires chiefly monitoring and administering of medicaments, physiotherapy and training to compensate for loss of function or rest. [Based on COFOG]

Description: Includes: Institutions serving old people in which medical monitoring is an essential component; rehabilitation centres providing in-patient health care and rehabilitative therapy where the objective is to treat the patient rather than to provide long-term support.
[COFOG 1999]

Value: nursingCareFacility

Definition: This item comprises establishments primarily engaged in providing in-patient nursing and rehabilitative services. The care is generally provided for an extended period of time to individuals requiring nursing care. These establishments have a permanent core staff of registered or licensed practical nurses who, along with other staff, provide nursing and continuous personal care services. Illustrative examples: • convalescent homes or convalescent hospitals (other than mental health and substance abuse facilities); • homes for the elderly with nursing care; • in-patient care hospices; • nursing homes; • rest homes with nursing care; • skilled nursing facilities (USA); • teaching nursing homes. [ICHA-HP, OECD 2000]

Value: ophthalmology

Definition: Practice of Ophthalmology. Ophthalmology is the branch of medicine which deals with the anatomy, physiology and diseases of the eye. [Based on Wikipedia]

Value: opticalGlassesAndOtherVisionProducts

Definition: Location of an Optician.

Value: orphanage

Definition: Institution for the care of orphans. [Based on Merriam-Webster Online Dictionary]

Value: orthopaedics

Definition: Practice of Orthopaedics. Orthopaedic surgeons use both surgical and nonsurgical means to treat musculoskeletal trauma, sports injuries, degenerative diseases, infections, tumours, and congenital disorders. [Based on Wikipedia]

Value: otherCommunityService

Definition: Services concerned with community affairs other than religion.

Value: otorhinolaryngology

Definition: Practice of otolaryngology. Otolaryngology or ENT (ear, nose, and throat) is the branch of medicine and surgery that specializes in the diagnosis and treatment of ear, nose, throat, and head and neck disorders. [Based on Wikipedia]

Value: outPatientMentalHealthAndSubstanceAbuseCentre

ServiceTypeValue

Definition:	This item comprises establishments with medical staff primarily engaged in providing out-patient services related to the diagnosis and treatment of mental health disorders and alcohol and other substance abuse. These establishments generally treat patients who do not require in-patient treatment. They may provide a counselling staff and information regarding a wide range of mental health and substance abuse issues and/or refer patients to more extensive treatment programmes, if necessary. Illustrative examples • out-patient alcoholism treatment centres and clinics (other than hospitals); • out-patient detoxification centre and clinics (other than hospitals); • out-patient drug addiction treatment centres and clinics (other than hospitals); • out-patient mental health centres and clinics (other than hospitals); • out-patient substance abuse treatment centres and clinics (other than hospitals). [ICHA-HP, OECD 2000]	

Value: outdoorSport

Definition:	Services concerned with outdoor sport facilities and activities.

Value: outdoorTheatreScreen

Definition:	Large outdoor screen for showing motion pictures.

Value: outpatientService

Definition:	Medical, dental and paramedical services delivered to outpatients by medical, dental and paramedical practitioners and auxiliaries. The services may be delivered at home, in individual or group consulting facilities, dispensaries or the outpatient clinics of hospitals and the like. Outpatient services include the medicaments, prostheses, medical appliances and equipment and other health-related products supplied directly to outpatients by medical, dental and paramedical practitioners and auxiliaries. [Based on COFOG 1999]

Value: paediatrics

Definition:	Practice of Paediatrics. Paediatrics is the branch of medicine that deals with the medical care of infants, children, and adolescents. [Based on Wikipedia]

Value: paramedicalService

Definition:	Provision of paramedical health services to outpatients; Administration, inspection, operation or support of health services delivered by clinics supervised by nurses, midwives, physiotherapists, occupational therapists, speech therapists or other paramedical personnel and of health services delivered by nurses, midwives and paramedical personnel in non-consulting rooms, in patients' homes or other non-medical institutions. [COFOG 1999]
Description:	Includes: acupuncturists, chiropodists, chiropractors, optometrists, practitioners of traditional medicine, etc.; medical analysis laboratories and x-ray centres; hire of therapeutic equipment; medically prescribed corrective-gymnastic therapy; outpatient thermal bath or sea-water treatments; ambulance services other than ambulance services operated by hospitals. Excludes: public health service laboratories; laboratories engaged in determining the causes of disease. [COFOG 1999]

Value: park

Definition:	Area of open land, sometimes with grass and formal flowerbeds or trees, usually within a town, that is open to the public. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: parkingGarage

Definition:	Sheltered location where vehicles may be parked.

Value: petrolStation

Definition:	Service providing motor fuels.

ServiceTypeValue

Value: pharmaceuticalProducts

Definition: Services concerned with the provision of pharmaceutical products such as medicinal preparations, medicinal drugs, patent medicines, serums and vaccines, vitamins and minerals, cod liver oil and halibut liver oil, oral contraceptives (e.g. pharmacies). [Based on COFOG 1999]

Value: picnicSite

Definition: Open area of land set aside for picnics. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: playSchool

Definition: Organised group providing care and socialisation for children under five. [Based on Wikipedia]

Value: playground

Definition: Public area where there are swings, slides, climbing frames, etc. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: pointOfTouristicInterest

Definition: Specific location that might be of interest to tourists (not elsewhere classified).

Value: policeService

Definition: Services concerned with police affairs, including alien registration, issuing work and travel documents to immigrants, maintenance of arrest records and statistics related to police work, road traffic regulation and control, prevention of smuggling and control of offshore and ocean fishing; operation of regular and auxiliary police forces, of port, border and coast guards, and of other special police forces maintained by public authorities; operation of police laboratories; operation or support of police training programmes. [Based on COFOG 1999]

Value: postOffice

Definition: Location where postal services are offered to the public, either as a dedicated service or within other retail outlets. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: postSecondaryNonTertiaryEducation

Definition: Provision of post-secondary non-tertiary education at ISCED-97 level 4 (International Standard Classification of Education). [Based on COFOG 1999]

Description: Includes: out-of-school post-secondary non-tertiary education for adults and young people.
[COFOG 1999]

Value: prePrimaryAndPrimaryEducation

Definition: Services concerned with pre-primary and primary education.

Value: prePrimaryEducation

Definition: Provision of pre-primary education at ISCED-97 level 0 (International Standard Classification of Education). [Based on COFOG 1999]

Value: primaryEducation

Definition: Provision of primary education at ISCED-97 level 1 (International Standard Classification of Education). [Based on COFOG 1999]

Description: Includes: literacy programmes for students too old for primary school. [COFOG 1999]

Value: prison

ServiceTypeValue

Definition:	Services concerned with prisons and other places for the detention or rehabilitation of criminals such as prison farms, workhouses, reformatories, borstals, asylums for the criminally insane, etc. [Based on COFOG 1999]

Value: privateHouseholdAsProviderOfHomeCare

Definition:	Services comprising private households as providers of home care.

Value: professionalFireBrigade

Definition:	Organized body of professional firemen. [Based on Oxford English Dictionary]

Value: protectionFacilityAgainstNaturalHazards

Definition:	Installation for identifying, assessing and reducing the risks of natural hazards like earthquakes, floods, tsunamis, storms, avalanches/landslides, volcanoes.

Value: protectionForest

Definition:	Forest, established and tended as a protection against natural hazards.

Value: protectionOfBiodiversityAndLandscape

Definition:	Services relating to the protection of biodiversity and landscape. [Based on COFOG 1999]

Value: protectiveWall

Definition:	Solid man-made barrier of heavy material used as an enclosure or boundary or for protection. [Based on DGIWG Feature Data Dictionary 2010]

Value: providerOfHomeHealthCareService

Definition:	This item comprises establishments primarily engaged in providing skilled nursing services in the home, along with a range of the following: personal care services; homemaker and companion services; physical therapy; medical social services; medications; medical equipment and supplies; counselling; 24-hour home care; occupation and vocational therapy; dietary and nutritional services; speech therapy; audiology; and high-tech care, such as intravenous therapy. [ICHA-HP, OECD 2000]

Value: psychotherapy

Definition:	Practice of psychotherapy or personal counselling with a psychotherapist. Psychotherapy is an intentional interpersonal relationship used by trained psychotherapists to aid a client or patient in problems of living. [Based on Wikipedia]

Value: publicAdministrationOffice

Definition:	Public administration offices (not further differentiated).

Value: publicOrderAndSafety

Definition:	Services concerned with public order and safety.

Value: publicTransportationServicePoint

Definition:	Information and service centre for the public transport system offering information material or services, e.g. purchasing tickets.
Description:	Often located at central stations of the public transport system.

Value: radiology

Definition:	Practice of radiology. Radiology is a medical specialty that employs the use of imaging to both diagnose and treat disease visualized within the human body. [Based on Wikipedia]

Value: recreationCultureAndReligion

Definition:	Services concerned with recreation, culture and religion.

ServiceTypeValue

Value: recreationalAndSportingService

Definition: Services concerned with recreation and sport.

Value: recreationalPier

Definition: Structure extending into the water used as a platform for recreational purposes, not intended as a berthing place for vessels. [Based on DGIWG Feature Data Dictionary 2010]

Value: rehabilitationCentre

Definition: Services providing long-term support for patients rather than health care and rehabilitative therapy. [Based on COPNI 2001]

Value: religiousAndOtherCommunityService

Definition: Services concerned with religious and other community affairs.

Value: religiousService

Definition: Services concerned with religious affairs.

Value: rescueService

Definition: Services dedicated to the search-and-rescue of people, animals and goods in emergency situations.

Value: rescueStation

Definition: Services concerned with the housing of personnel and/or equipment for emergency rescues.

Value: residenceForPeopleWithDisabilities

Definition: Services concerned with any home, residence, facility, or premises which provides temporary, interim, or permanent housing to people with disabilities. [Pasadena Municipal Code, California, 2011]

Value: residentialMentalRetardationMentalHealthAndSubstanceAbuseFacility

Definition: This item comprises establishments primarily engaged in providing in-patient nursing and rehabilitative services. The care is generally provided for an extended period of time to individuals requiring nursing care. These establishments have a permanent core staff of registered or licensed practical nurses who, along with other staff, provide nursing and continuous personal care services. Illustrative examples: • convalescent homes or convalescent hospitals (other than mental health and substance abuse facilities); • homes for the elderly with nursing care; • in-patient care hospices; • nursing homes; • rest homes with nursing care; • skilled nursing facilities (USA); • teaching nursing homes. [ICHA-HP, OECD 2000]

Value: rockfallCatchmentFence

Definition: Fence on or below the slope to catch large rocks travelling at high speeds.

Value: roofing

Definition: Roofing of traffic infrastructures to reduce noise emissions.

Value: secondStageOfTertiaryEducation

Definition: Provision of tertiary education at ISCED-97 level 6 (International Standard Classification of Education). [Based on COFOG 1999]

Value: secondaryEducation

Definition: Services concerned with all levels of secondary education.

Value: serviceForFamilyAndChildren

ServiceTypeValue

Definition:	Services concerned with benefits in kind to households with dependent children; Benefits in kind, such as shelter and board provided to pre-school children during the day or part of the day, financial assistance towards payment of a nurse to look after children during the day, shelter and board provided to children and families on a permanent basis, goods and services provided at home to children or to those who care for them, miscellaneous services and goods provided to families, young people or children. [Based on COFOG 1999]

Value: shelter

Definition:	Services concerned with the provision of temporary shelters or housing for homeless persons. [Based on COPNI 2001]

Value: shelteredWorkshop

Definition:	Service concerned with employment opportunities for people with disabilities. [Based on Wikipedia]

Value: shop

Definition:	Stand-alone unit for the sale of merchandize.

Value: shoppingCentre

Definition:	Conglomeration of shops and retail units. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: shoppingFacility

Definition:	Location for the sale of merchandize.

Value: singleParentAgency

Definition:	Services concerned with the issues of single parenting. [Based on COPNI 2001]

Value: siren

Definition:	Device, often electrically operated, for producing a penetrating warning sound like e.g. an ambulance siren or an air-raid siren. [Based on Merriam-Webster Online Dictionary]

Value: socialProtection

Definition:	Services concerned with social protection.

Value: socialSecurityFund

Definition:	This item comprises the funding and administration of government-provided compulsory social security programmes compensating for reduction of loss of income or inadequate earning capacity due to sickness (as part of ISIC 7530). Illustrative examples: - administration of compulsory social health insurance and sickness funds; - administration of compulsory employer's sickness funds; - administration of compulsory social health insurance covering various groups of state employees (army, veterans, railroad and other public transport, police, state officials, etc.). [ICHA-HP, OECD 2000]

Value: spa

Definition:	Place where mineral water bubbles out of the ground. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: specialSchool

Definition:	Services concerned with learning opportunities for people with disabilities.

Value: specializedAdministrationOffice

ServiceTypeValue

Definition:	Specialized administration offices which can not be allocated to the following areas: social protection, education, recreation, culture and religion, health, environmental protection, economic affairs, public order and safety (e. g. surveying administration).	

Value: specializedHospital

Definition:	Hospital services that limit their services to a particular medical speciality (except mental health and substance abuse hospital services). [Based on COFOG 1999]
Description:	Specialized hospitals differ from general hospitals in that their services are limited to treatment of a particular condition, disease, or class of patient, for example, diseases of the chest and tuberculosis, leprosy, cancer, otorhinolaryngology, psychiatry, obstetrics, paediatrics and so forth. [COFOG 1999]

Value: specializedMedicalService

Definition:	Specialized medical services delivered by specialized medical clinics and specialist medical practitioners. [COFOG 1999]
Description:	Specialized medical clinics and specialist medical practitioners differ from general medical clinics and general medical practitioners in that their services are limited to treatment of a particular condition, disease, medical procedure or class of patient. [COFOG 1999]

Value: specializedServiceForTheDisabled

Definition:	Services specifically concerned with education and employment of people with disabilities.

Value: specializedServiceOfSocialProtection

Definition:	Various specialized services concerned with transport, home-,day and holiday-care.

Value: sport

Definition:	Services concerned with sport facilities and activities.

Value: sportsMedicine

Definition:	Practice of sports medicine. Sports medicine is an area of health and special services that apply medical and scientific knowledge to prevent, recognize, manage, and rehabilitate injuries related to sport, exercise, or recreational activity. [Based on Wikipedia]

Value: stockExchange

Definition:	Market for the buying and selling of shares.

Value: subsidiaryServicesToEducation

Definition:	Provision of subsidiary services to education; Services concerned with transportation, food, lodging, medical and dental care and related subsidiary services chiefly for students regardless of level. [Based on COFOG 1999]

Value: surgery

Definition:	Surgical practice. Surgery is a broad category of invasive medical treatment that involves the cutting of a body, whether human or animal, for a specific reason such as the removal of diseased tissue or to repair a tear or breakage. [Based on Wikipedia]

Value: tertiaryEducation

Definition:	Services concerned with all levels of tertiary education.

Value: theatre

Definition:	Services provided by or at theatres.

Value: therapeuticAppliancesAndEquipmentOtherThanOpticalGlassesAndHearingAids

ServiceTypeValue

Definition:	Provision of therapeutic appliances and equipment such as artificial limbs and other prosthetic devices, orthopaedic braces and supports, orthopaedic footwear, surgical belts, trusses and supports, neck braces, medical massage equipment and health lamps, powered and unpowered wheelchairs and invalid carriages, "special" beds, crutches, electronic and other devices for monitoring blood pressure, etc.; Administration, operation or support of the provision of prescribed therapeutic appliances and equipment. [COFOG 1999]

Value: tourism

Definition:	Services concerned with tourism; promotion and development of tourism; liaison with the transport, hotel and restaurant industries and other industries benefiting from the presence of tourists; Operation of tourist offices at home and abroad, etc.; organization of advertising campaigns, including the production and dissemination of promotional literature and the like; Compilation and publication of statistics on tourism. [Based on COFOG 1999]

Value: touristBoard

Definition:	Regional or local organization responsible for marketing the region and improving the touristic offerings. [Based on Wikipedia]

Value: touristInformation

Definition:	Location that provides tourist information to the public. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: transport

Definition:	Services concerned with the movement of people and goods from one location to another. Modes of transport include air, rail, road, water, cable, pipeline, and space. [Based on Wikipedia]

Value: transportService

Definition:	Services concerned with the transport of elderly and disabled persons. [Based on COPNI 2001]

Value: unemployment

Definition:	Services in the form of cash benefits and benefits in kind to persons who are capable of work, available for work but are unable to find suitable employment; Cash benefits, such as full and partial unemployment benefits, early retirement benefits paid to older workers who retire before reaching the standard retirement age due to unemployment or job reduction caused by economic measures, allowances to targeted groups in the labour force who take part in training schemes intended to develop their potential for employment, redundancy compensation, other periodic or lump-sum payments to the unemployed, particularly the long-term unemployed; Benefits in kind, such as mobility and resettlement payments, vocational training provided to persons without a job or retraining provided to persons at risk of losing their job, accommodation, food or clothes provided to unemployed persons and their families. [Based on COFOG 1999]

Value: upperSecondaryEducation

Definition:	Provision of upper-secondary education at ISCED-97 level 3 (International Standard Classification of Education). [Based on COFOG 1999]
Description:	Includes: out-of-school upper-secondary education for adults and young people. [COFOG 1999]

Value: urology

Definition:	Practice of Urology. Urology is the medical and surgical specialty that focuses on the urinary tracts of males and females, and on the reproductive system of males. [Based on Wikipedia]

ServiceTypeValue

Value: venue

Definition: Appointed place of meeting, esp. for a match or competition. [Based on Oxford English Dictionary]

Value: veterinaryMedicine

Definition: Practice of veterinary medicine. Veterinary medicine is the branch of science that deals with the application of medical, surgical, public health, dental, diagnostic, and therapeutic principles to animals, including wildlife and domesticated animals, including livestock, working animals, and companion animals. [Based on Wikipedia]

Value: weatherMonitoringFacility

Definition: Service for taking, recording, and reporting meteorological observations. [Based on Merriam-Webster Online Dictionary]

Value: welfareCentre

Definition: Services concerned with the provision of cash assistance, food, clothing, shelter and other services to persons who are refugees, immigrants, destitute, low-income earners or generally in need. [Based on COPNI 2001]

Value: winterService

Definition: Road maintenance during winterly weather conditions.

Value: youthCentre

Definition: Services concerned with any home, residence, facility, or premises which provides temporary, interim, or permanent housing to young persons. [Pasadena Municipal Code, California, 2011]

Value: youthClub

Definition: Services concerned with centres where the young (teenagers) can meet and pursue various activities. [Based on Ordnance Survey, OS MasterMap Real-World Object Catalogue 2001]

Value: zooSafariPark

Definition: Site where wild animals are kept for exhibition to the public, that may also support breeding and/or study. [Based on DGIWG Feature Data Dictionary 2010]

5.4.2.5.   Imported types (informative)

This section lists definitions for feature types, data types and enumerations and code lists that are defined in other application schemas. The section is purely informative and should help the reader understand the feature catalogue presented in the previous sections. For the normative documentation of these types, see the given references.

5.4.2.5.1.   Abstract

Abstract

Package:	INSPIRE Consolidated UML Model::Themes::Annex III::Buildings::Buildings [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	A building is a covered facility, usable for the protection of humans, animals, things or the production of economic goods. A building refers to any structure permanently constructed or erected on its site.

5.4.2.5.2.   Address

Address

Package:	INSPIRE Consolidated UML Model::Themes::Annex I::Addresses::Addresses [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

Address

Definition:	An identification of the fixed location of property by means of a structured composition of geographic names and identifiers.	
Description:	NOTE 1 The spatial object, referenced by the address, is defined as the "addressable object". The addressable object is not within the application schema, but it is possible to represent the address' reference to a cadastral parcel or a building through associations. It should, however, be noted that in different countries and regions, different traditions and/or regulations determine which object types should be regarded as addressable objects.	
	NOTE 2 In most situations the addressable objects are current, real world objects. However, addresses may also reference objects which are planned, under construction or even historical.	
	NOTE 3 Apart from the identification of the addressable objects (like e.g. buildings), addresses are very often used by a large number of other applications to identify object types e.g. statistics of the citizens living in the building, for taxation of the business entities that occupy the building, and the utility installations.	
	NOTE 4 For different purposes, the identification of an address can be represented in different ways (see example 3).	
	EXAMPLE 1 A property can e.g., be a plot of land, building, part of building, way of access or other construction,	
	EXAMPLE 2 In the Netherlands the primary addressable objects are buildings and dwellings which may include parts of buildings, mooring places or places for the permanent placement of trailers (mobile homes), in the UK it is the lowest level of unit for the delivery of services, in the Czech Republic it is buildings and entrance doors.	
	EXAMPLE 3 Addresses can be represented differently. In a human readable form an address in Spain and an address in Denmark could be represented like this: "Calle Mayor, 13, Cortijo del Marques, 41037 Ecija, Sevilla, Espana" or "Wildersgade 60A, st. th, 1408 Copenhagen K., Denmark".	

5.4.2.5.3.   AdministrativeUnit

AdministrativeUnit

Package:	INSPIRE Consolidated UML Model::Themes::Annex I::Administrative Units::AdministrativeUnits [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]	
Definition:	Unit of administration where a Member State has and/or exercises jurisdictional rights, for local, regional and national governance.	

5.4.2.5.4.   CI_Citation

CI_Citation

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19115:2006 Metadata (Corrigendum)::Citation and responsible party information [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]	

5.4.2.5.5.   CI_ResponsibleParty

CI_ResponsibleParty

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19115:2006 Metadata (Corrigendum)::Citation and responsible party information [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]	

5.4.2.5.6.   DateTime

DateTime

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Primitive::Date and Time [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.4.2.5.7.   Facility

Facility

Package:	INSPIRE Consolidated UML Model::Themes::Annex III::*Utility and Governmental Services*::*Utility and Governmental Services*::Waste Management [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	A physical structure designed, built or installed to serve specific functions, or a delimitable area of land or water used to serve specific functions.
Description:	EXAMPLE In the context of waste management the "specific function" will be a waste management related one. Typically, waste management sites and waste management installations (such as incineration plants, landfills or storages) get distinguished. Multiple waste management installations may be found at the same site. Waste management installations can be a part of other waste management installations.

5.4.2.5.8.   GM_MultiSurface

GM_MultiSurface

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19107:2003 Spatial Schema:: Geometry::Geometric aggregates [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.4.2.5.9.   GM_Object

GM_Object (abstract)

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19107:2003 Spatial Schema:: Geometry::Geometry root [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.4.2.5.10.   GeographicalName

GeographicalName

Package:	INSPIRE Consolidated UML Model::Themes::Annex I::Geographical Names::Geographical Names [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	Proper noun applied to a real world entity.

5.4.2.5.11.   Identifier

Identifier

Package:	INSPIRE Consolidated UML Model::Generic Conceptual Model::Base Types [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	External unique object identifier published by the responsible body, which may be used by external applications to reference the spatial object.
Description:	NOTE1 External object identifiers are distinct from thematic object identifiers.
	NOTE 2 The voidable version identifier attribute is not part of the unique identifier of a spatial object and may be used to distinguish two versions of the same spatial object.
	NOTE 3 The unique identifier will not change during the life-time of a spatial object.

5.4.2.5.12.   Integer

Integer	
Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Primitive::Numerics [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.4.2.5.13.   Measure

Measure	
Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Derived::Units of Measure [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.4.2.5.14.   NamedPlace

NamedPlace	
Package:	INSPIRE Consolidated UML Model::Themes::Annex I::Geographical Names::Geographical Names [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	Any real world entity referred to by one or several proper nouns.

5.4.2.5.15.   NetworkReference

NetworkReference	
Package:	INSPIRE Consolidated UML Model::Generic Conceptual Model::Base Models::Network [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	A reference to a network element.

5.4.2.5.16.   PT_FreeText

PT_FreeText	
Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19139 Metadata - XML Implementation::Cultural and linguistic adapdability [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.4.2.5.17.   URL

URL	
Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19115:2006 Metadata (Corrigendum)::Citation and responsible party information [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.5   Application schema "Waste Management"

5.5.1   Description

5.5.1.1.   Narrative description and UML overview

The Waste Management application schema introduces a single Feature Type named *Facility*.

The application schema includes several data types and code lists covering various aspects of facilities:

- Classification of the type of facility;
- Activities, such as economic activities, taking place at the facility;
- Facility inputs and outputs, such as materials or products;
- Facility capacities, in relation to activities and inputs/outputs;
- Permissions granted in relation to the facility;
- Parties related to the facility, such as operators, owners or competent authorities;
- Facility status information, such as functional, passive, abandoned or illegal;
- Facility service hours.

Parent facilities can be specified for facilities, thus providing support for collecting and transmitting data on facility hierarchies, such as installations of one site, or installations that are parts of another installation. The application schema defines that any type of geometry can optionally be specified with instances of the *Facility* Feature Type.

The Waste Management application schema has been devised with the following objectives in mind:

- Coverage of waste management use case requirements;
- Harmonization with respect to identical or similar requirements of other themes, especially Production and Industrial Facilities (PF) and Agricultural Facilities (AF);
- Support of redundancy avoidance in data instances;
- Redundancy avoidance in the application schema.

These objectives led to the specification of a single Feature Type *Facility* defined as follows:

A physical structure designed, built or installed to serve specific functions, or a delimitable area of land or water used to serve specific functions.

The concepts of *site* and *installation*, which are typically used in the field of waste management, such as in European waste management legislation (e.g. Directive 2008/98/EC), are covered with a single Feature Type *Facility* in the Waste Management application schema for the following two reasons:

1. While in the majority of cases there is clarity about whether something qualifies as a site or as an installation, there are also other cases where such a clear distinction may not be possible. For example, a landfill could qualify as both site and installation;
2. The information relevant to sites, such as spatial extents or positions, permissions, operators, etc. is the same or very similar to the information relevant to installations. Thus redundancy in the application schema is avoided by using a single Feature Type.

As a result of harmonisation consultations with PF and AF, names and definitions of the Waste Management application schema are kept as generic as possible (and as specific as necessary) in order to allow for the cross-thematic sharing or reuse of common structures.

The application schema takes into account the following temporality requirements:

- Many aspects of facilities need to be expected as changing as time progresses, such as operator, owner or permissions. The majority of such changes will not affect the identity of the facility: That is, after such changes apply, the facility will still be considered as the same facility as before, rather than a new facility that has emerged out of the previously existing facility.
- Information on a facility may be required to cover not only a single point in time, but to cover a period of time, such as a particular year. If changes occurred to the facility within that period of time, then this should reflect in data instances.

It is these requirements that led to the inclusion of a temporal reference to many of the facility aspects in the application schema. The temporal reference is provided as a period of time with start and end date. There are associations with (in data instances references to) four of the Annex I Feature Types from *Facility*:

1. *Address* (facility address);
2. *AdministrativeUnit* (administrative units with competence for the facility);
3. *CadastralParcel* (cadastral parcels covered by the facility);
4. *Building* (buildings wherein the facility is located or considered part of the facility);

Two of the Waste Management application schema codelists are extensions of Foundation Schema and Generic Conceptual Model codelists:

1. *RoleListType* is an extension of *CI_RoleCode* (party roles, such as operator or owner)
2. *StatusListType* is an extension of *ConditionOfFacilityValue* (facility status, such as functional or passive)

The application schema makes use of several standardised codelists:

- Statistical Classification of Economic Activities in the European Community (NACE)
  http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_CLS_DLD&StrNom =NACE_REV2&StrLanguageCode=EN&StrLayoutCode=HIERARCHIC
  Sample entries (out of a total number of 615 entries):
  - 01.11 - Growing of cereals (except rice), leguminous crops and oil seeds
    ...
  - 38.11 - Collection of non-hazardous waste
  - 38.12 - Collection of hazardous waste
  - 38.21 - Treatment and disposal of non-hazardous waste
  - 38.22 - Treatment and disposal of hazardous waste
  - 38.31 - Dismantling of wrecks
  - 38.32 - Recovery of sorted materials
  - 39.00 - Remediation activities and other waste management services
    ...
  - 99.00 - Activities of extraterritorial organisations and bodies
- List of economic activities according to Annex I Section 8 of Regulation (EC) No 2150/2002 on waste statistics
  http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002R2150:EN:NOT
  Sample entries (out of a total number of 20 entries):
  - 1 – Agriculture, hunting and forestry
    ...
  - 17 – Recycling
  - 18 – Wholesale of waste and scrap
  - 19 – Sewage and refuse disposal, sanitation and similar activities
  - 20 – Waste generated by households
- List of disposal and recovery operations according to Annex I and Annex II of Directive 2008/98/EC on waste
  http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0098:EN:NOT
  Sample entries (out of a total number of 28 entries):
  - R1 - Use principally as a fuel or other means to generate energy
  - R2 - Solvent reclamation/regeneration
    ...
  - R10 - Land treatment resulting in benefit to agriculture or ecological improvement
  - R11 - Use of waste obtained from any of the operations numbered R 1 to R 10
  - R12 - Exchange of waste for submission to any of the operations numbered R 1 to R 11
  - R13 - Storage of waste pending any of the operations numbered R 1 to R 12 (excluding temporary storage, pending collection, on the site where the waste is produced)
  - D1 - Deposit into or on to land (e.g. landfill, etc.)
  - D2 - Land treatment (e.g. biodegradation of liquid or sludgy discards in soils, etc.)
  - D3 - Deep injection (e.g. injection of pumpable discards into wells, salt domes or naturally occurring repositories, etc.)
    ...
  - D11 - Incineration at sea
  - D12 - Permanent storage (e.g. emplacement of containers in a mine, etc.)

- o D13 - Blending or mixing prior to submission to any of the operations numbered D 1 to D 12
- o D14 - Repackaging prior to submission to any of the operations numbered D 1 to D 13
- o D15 - Storage pending any of the operations numbered D 1 to D 14 (excluding temporary storage, pending collection, on the site where the waste is produced)
- EU Decision 2000/532 List of Wastes
  http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000D0532:EN:NOT
  http://www5.umweltbundesamt.at/dataharmonisation/codelist/ev7jv8yw2ndj9awiygm7z5kee7qy.html
  Sample entries (out of a total number of 839 entries):
  - o 01 01 01 - Wastes from mineral metalliferous excavation
  - o 01 01 02 - Wastes from mineral non-metalliferous excavation
    ...
  - o 20 03 06 - Waste from sewage cleaning
  - o 20 03 07 - Bulky waste
  - o 20 03 99 - Municipal wastes not otherwise specified
- Eurostat Statistical Classification of Products by Activity in the European Economic Community
  http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_CLS_DLD&StrNom=CPA_2008&StrLanguageCode=EN&StrLayoutCode=HIERARCHIC
  Sample entries (out of a total number of 3520 entries):
  - o 01.11.11 - Durum wheat
  - o 01.11.12 - Wheat, except durum wheat
    ...
  - o 38.11.11 - Collection services of non-hazardous recyclable waste, municipal
  - o 38.11.19 - Collection services of non-hazardous recyclable waste, other
    ...
  - o 38.11.51 - Glass waste
  - o 38.11.52 - Paper and paperboard waste
    ...
  - o 38.11.55 - Plastic waste
    ...
  - o 99.00.10 - Services provided by extraterritorial organisations and bodies
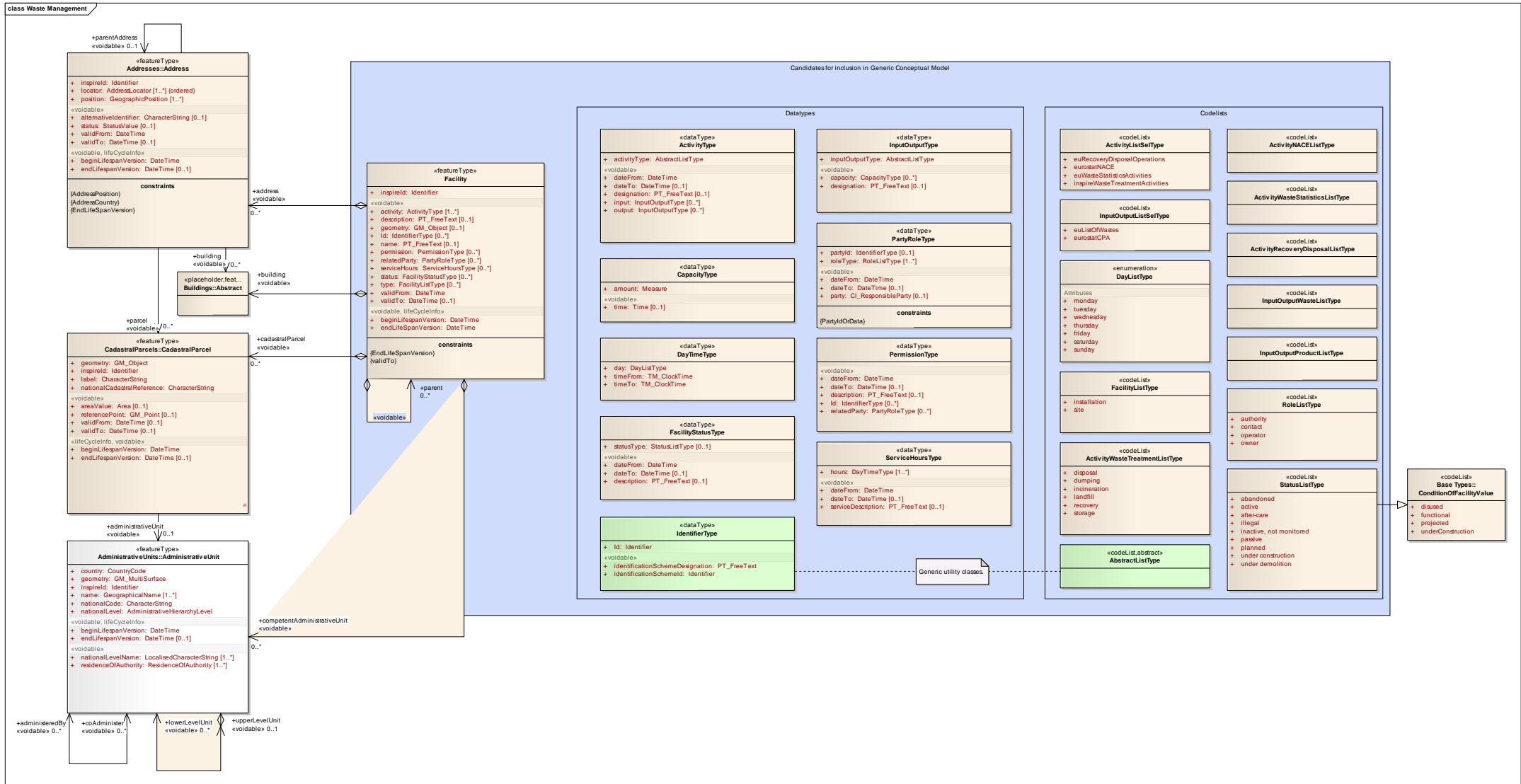
Figure 15 – UML class diagram: Overview of the US "Waste Management" application schema (*global view*)
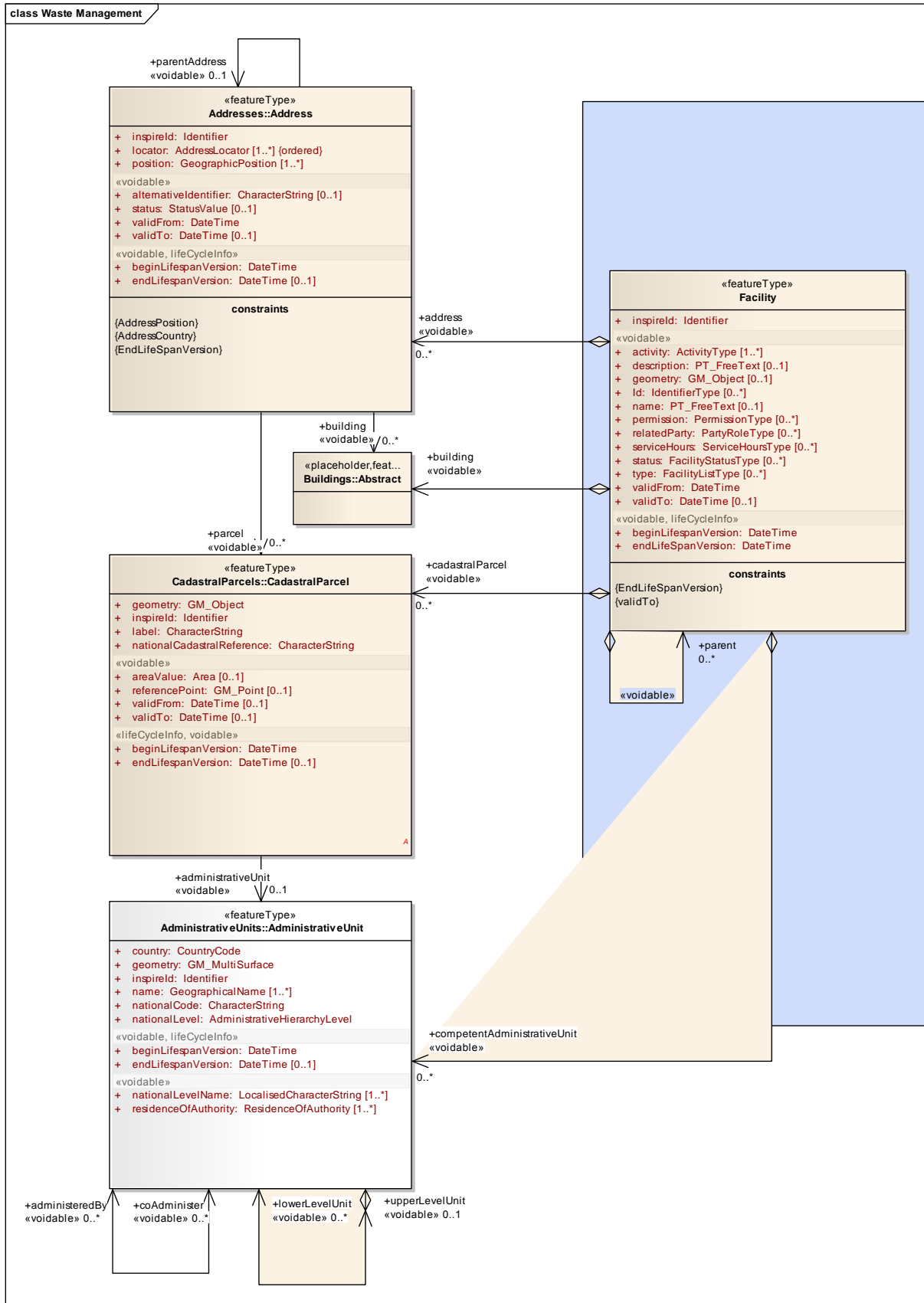
Figure 16 – UML class diagram: Overview of the US "Waste Management" application schema (*zoom on the left part*)
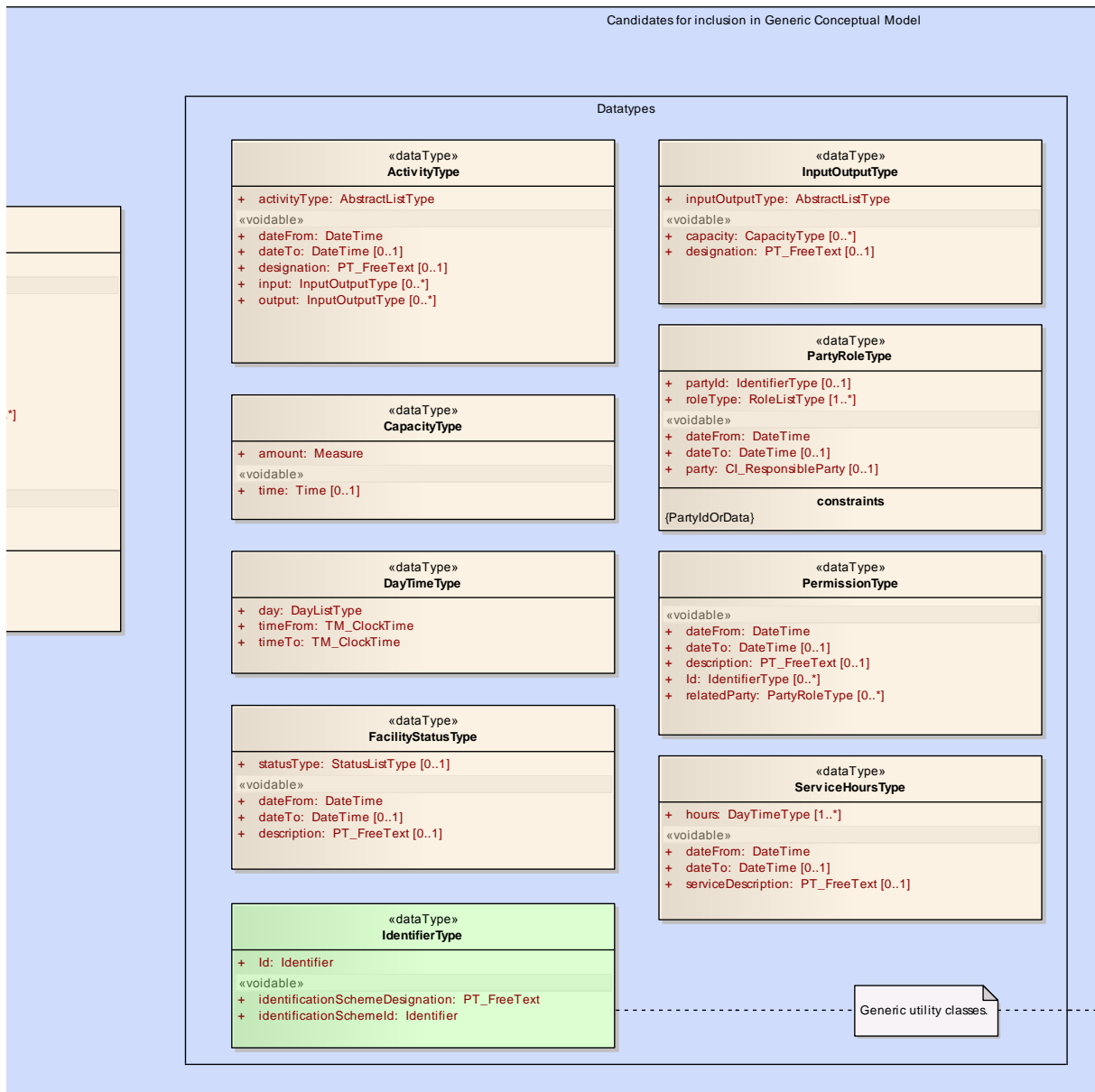
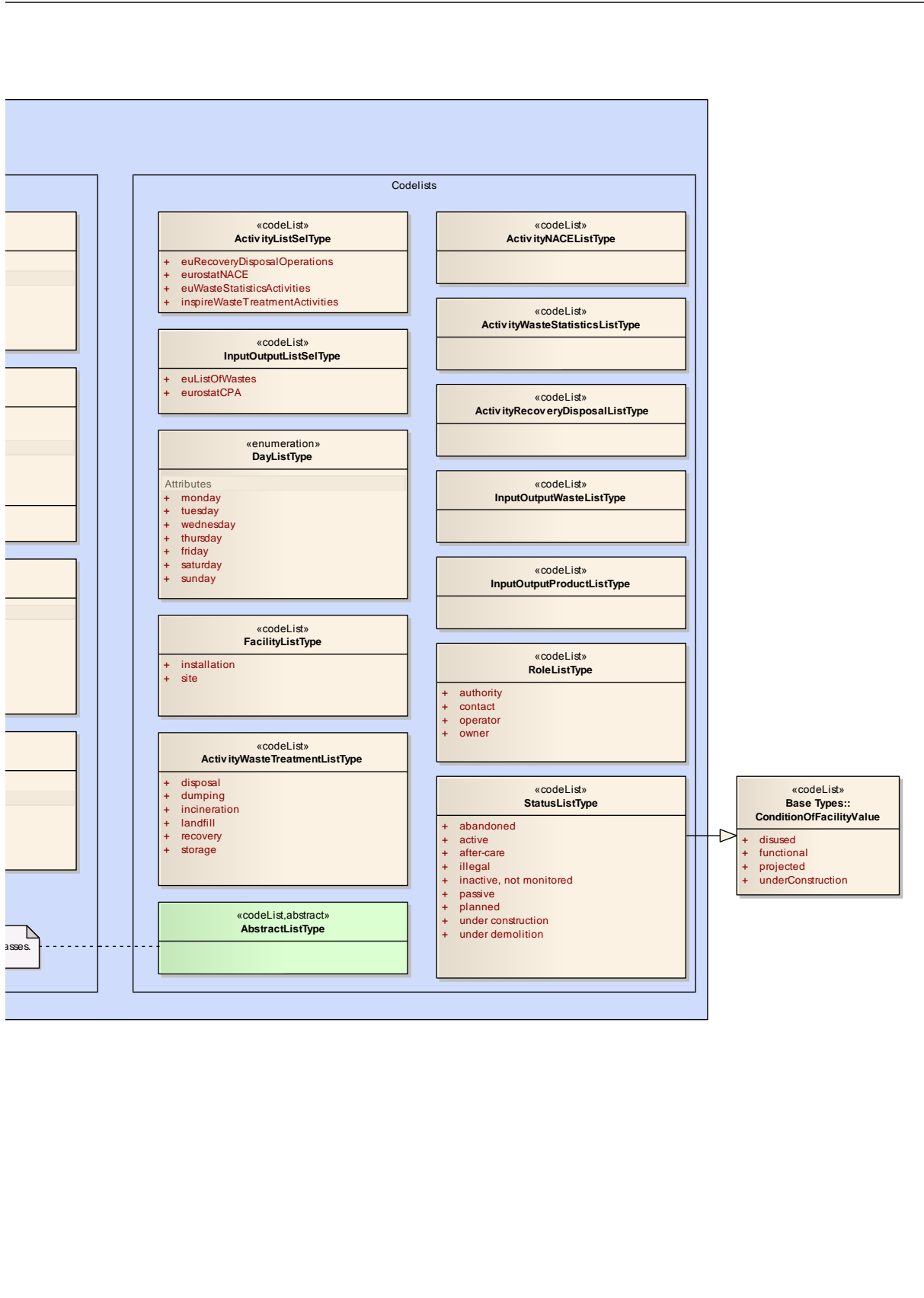**Figure 17 – UML class diagram: Overview of the US "Waste Management" application schema (*zoom on the central part*)**

Figure 18 – UML class diagram: Overview of the US "Waste Management" application schema (*zoom on the right part*)

5.5.1.2. Consistency between spatial data sets

Nothing more than what's written in the general paragraph 5.2.1.2.

5.5.1.3. Identifier management

The *Waste Management Facilities* data specification uses the Identifier dataType from the INSPIRE General Conceptual Model [DS-D2.5]. These identifiers include version number, so can be used to track changes to an object.

Waste Management Facilities are subject to a multitude of identifiers depending of applicability of the datasets in which are originally included (legal registration, registry based on legislation, …).
Based on this multiplicity is quite difficult to harmonize a criterion in order to avoid duplicity. For this reason, and based on the applicability of layers to specific use cases. The model has include the attribute voidable attribute "IdentifierType" with multiplicity [0.*] in order to define the origin of the Identifier.

> **Recommendation 8** The identifier provided must be unique and representative for the Facility from the point of view of the geographical representation. Generic Identifiers not directly linked with real geographical entities should be avoided (e.g. Company Name Identifier).

5.5.1.4. Modelling of object references

References between classes within the Waste Management UML model are represented using the objectIdentifier attribute. References to data types are represented using attributes of the relevant data type. This also applies to references to other INSPIRE data themes (for example, the Geographical Names theme).

5.5.1.5. Geometry representation

In general, the geographical information (datasets) should be provided by different organizations (Private and Public Administration related with Waste and Waste Water Management referring at least the geographical position of the facility as a "points" independently of the level of detail.
Onto the most generic legislation (waste, IPPC, E-PRTR) the geographical information is required by Geographical coordinates (X,Y). In certain cases the geographical position could be estimated by automatic process through the "Address" provided on the registration forms. This kind of activity can derive on wrong geospatial position as result of the Address provided (e.g. legal address instead of facility address).

In case of Facilities composed by different "Sites" not continuous geographically, it would be valid to provide the geographical information linked to the main one. It's not valid, if the lacks between different "Sites" is representative, defining the positions as a centroïd of all of them.
In some cases related with activities which cover a representative extension of land, "Sites", this could be provided as the geographical representation of the facility, described as polygons (2D) in Local – Regional Datasets. Based on this option, the model includes an extension for this particular case. In some cases "Sites" or Polygons in which the facility is placed could be linked with cadastral parcels but this relation seems to be quite complex from the ontological point of view.
Other kind of potential geo-referenced information is required under the legislation embedded on documents and descriptions requested without references to specific formats. This option only could be resolved with external elements (like URL's) or the inclusion of raster layers (out of the scope).
The model is open to other kind of detailed elements included on the Facility (e.g. Installations, Technical Units). These elements should be represented by points topologically related with the "Site" or the Facility. In some cases, the geographical representation could be coincident and inherited from the higher hierarchical level to which they belong.

Recommendation 9 Recommendation 2 Based on this requirements the value domain of spatial properties used in this specification is based on the "GM_Object" described by ISO 19107.

IR Requirement 5 The value domain of spatial properties used in this specification shall be restricted to the Simple Feature spatial schema as defined by EN ISO 19125-1.

Recommendation 10 Based on this requirements the value domain of spatial properties used in this specification is based on the "GM_Object" described by ISO 19107

Recommendation 11 Only tested geographical information should be provided in order to guarantee a minimum error respecting the real perimeter (real emplacement) of the Facility. Information is valid if the coordinates are inside the perimeter (It's not required the centroïd) or in a margin of 100 meters around it for State or European scale.

5.5.1.6. Temporality representation

Nothing more than what's written in the general paragraph 5.2.1.6.

5.5.2 Feature catalogue

Table 3 - Feature catalogue metadata

Feature catalogue name	INSPIRE feature catalogue Waste Management
Scope	Waste Management
Version number	2.0
Version date	2011-06-17
Definition source	INSPIRE data specification Waste Management

Table 4 - Types defined in the feature catalogue

Type	Package	Stereotypes	Section
AbstractListType	Waste Management	«codeList,abstract»	5.5.2.4.1
ActivityListSelType	Waste Management	«codeList»	5.5.2.4.2
ActivityNACEListType	Waste Management	«codeList»	5.5.2.4.3
ActivityRecoveryDisposalListType	Waste Management	«codeList»	5.5.2.4.4
ActivityType	Waste Management	«dataType»	5.5.2.2.1
ActivityWasteStatisticsListType	Waste Management	«codeList»	5.5.2.4.5
ActivityWasteTreatmentListType	Waste Management	«codeList»	5.5.2.4.6
CapacityType	Waste Management	«dataType»	5.5.2.2.2
DayListType	Waste Management	«enumeration»	5.5.2.3.1
DayTimeType	Waste Management	«dataType»	5.5.2.2.3
Facility	Waste Management	«featureType»	5.5.2.1.1
FacilityListType	Waste Management	«codeList»	5.5.2.4.7
FacilityStatusType	Waste Management	«dataType»	5.5.2.2.4
IdentifierType	Waste Management	«dataType»	5.5.2.2.5
InputOutputListSelType	Waste Management	«codeList»	5.5.2.4.8
InputOutputProductListType	Waste Management	«codeList»	5.5.2.4.9
InputOutputType	Waste Management	«dataType»	5.5.2.2.6
InputOutputWasteListType	Waste Management	«codeList»	5.5.2.4.10

Type	Package	Stereotypes	Section
PartyRoleType	Waste Management	«dataType»	5.5.2.2.7
PermissionType	Waste Management	«dataType»	5.5.2.2.8
RoleListType	Waste Management	«codeList»	5.5.2.4.11
ServiceHoursType	Waste Management	«dataType»	5.5.2.2.9
StatusListType	Waste Management	«codeList»	5.5.2.4.12

5.5.2.1. Spatial object types

5.5.2.1.1. Facility

Facility

Name:	Facility	
Definition:	A physical structure designed, built or installed to serve specific functions, or a delimitable area of land or water used to serve specific functions.	
Description:	EXAMPLE In the context of waste management the "specific function" will be a waste management related one. Typically, waste management sites and waste management installations (such as incineration plants, landfills or storages) get distinguished. Multiple waste management installations may be found at the same site. Waste management installations can be a part of other waste management installations.	
Status:	Proposed	
Stereotypes:	«featureType»	
URI:	null	

Attribute: Id

Value type:	IdentifierType
Definition:	Identifiers of the facility using a specified identification scheme, such as a national register.
Multiplicity:	0..*
Stereotypes:	«voidable»

Attribute: activity

Value type:	ActivityType
Definition:	Activities taking place at the facility.
Multiplicity:	1..*
Stereotypes:	«voidable»

Attribute: beginLifespanVersion

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

Attribute: description

Value type:	PT_FreeText
Definition:	A general description of the facility and its characteristics.
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: endLifeSpanVersion

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

Facility

Attribute: geometry

    Value type: GM_Object
    Definition: The geometry defining the extent or position of the facility.
    Multiplicity: 0..1
    Stereotypes: «voidable»

Attribute: inspireId

    Value type: Identifier
    Definition: External object identifier of the facility.
    Multiplicity: 1

Attribute: name

    Value type: PT_FreeText
    Definition: Name of the facility.
    Multiplicity: 0..1
    Stereotypes: «voidable»

Attribute: permission

    Value type: PermissionType
    Definition: Permissions granted in relation to the facility.
    Multiplicity: 0..*
    Stereotypes: «voidable»

Attribute: relatedParty

    Value type: PartyRoleType
    Definition: Parties related to the facility, such as operators or owners.
    Multiplicity: 0..*
    Stereotypes: «voidable»

Attribute: serviceHours

    Value type: ServiceHoursType
    Definition: Service hours of the facility.
    Multiplicity: 0..*
    Stereotypes: «voidable»

Attribute: status

    Value type: FacilityStatusType
    Definition: Statuses of the facility, such as conditions of being illegal or abandoned.
    Multiplicity: 0..*
    Stereotypes: «voidable»

Attribute: type

    Value type: FacilityListType
    Definition: The type or types of facility, such as installation or site.
    Multiplicity: 0..*
    Stereotypes: «voidable»

Attribute: validFrom

    Value type: DateTime
    Definition: The time when the facility started to exist in the real world.
    Multiplicity: 1
    Stereotypes: «voidable»

Attribute: validTo

Facility

Value type:	DateTime
Definition:	The time when the facility no longer exists in the real world.
Multiplicity:	0..1
Stereotypes:	«voidable»

Association role: address

Value type:	Address
Multiplicity:	0..*
Stereotypes:	«voidable»

Association role: building

Value type:	Abstract
Definition:	Buildings containing the facility or considered to be the facility.
Multiplicity:	
Stereotypes:	«voidable»

Association role: cadastralParcel

Value type:	CadastralParcel
Definition:	Cadastral parcels covered by the facility.
Multiplicity:	0..*
Stereotypes:	«voidable»

Association role: competentAdministrativeUnit

Value type:	AdministrativeUnit
Definition:	Identification of administrative units with competence for the facility.
Multiplicity:	0..*
Stereotypes:	«voidable»

Association role: parent

Value type:	Facility
Multiplicity:	0..*

Constraint: EndLifeSpanVersion

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

Constraint: validTo

Natural language:	If set, the date validTo shall be equal or later than validFrom.
OCL:	inv: self.validTo .isEqual(self.validFrom) or self.validTo .isAfter(self.validFrom)

5.5.2.2. Data types

5.5.2.2.1. ActivityType

ActivityType

Name:	Activity Type
Definition:	An economic activity selected from a list of economic activities, such as Eurostat NACE.
Status:	Proposed
Stereotypes:	«dataType»
URI:	null

Attribute: activityType

Value type:	AbstractListType

ActivityType

Definition:	Identification of an entry from the list of activities.
Multiplicity:	1

Attribute: dateFrom

Value type:	DateTime
Definition:	A date starting from which the activity takes places.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: dateTo

Value type:	DateTime
Definition:	A date up to which the activity takes place.
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: designation

Value type:	PT_FreeText
Definition:	A designation of the type of economic activity identified from the list.
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: input

Value type:	InputOutputType
Definition:	Inputs in connection with the activity.
Multiplicity:	0..*
Stereotypes:	«voidable»

Attribute: output

Value type:	InputOutputType
Definition:	Outputs in connection with the activity.
Multiplicity:	0..*
Stereotypes:	«voidable»

5.5.2.2.2.   CapacityType

CapacityType

Name:	Capacity Type
Definition:	An actual or potential ability to perform, yield, withstand, receive or contain, such as a remaining storage capacity.
Status:	Proposed
Stereotypes:	«dataType»
URI:	null

Attribute: amount

Value type:	Measure
Definition:	The capacity amount measure, such as a volume or mass.
Multiplicity:	1

Attribute: time

Value type:	Time
Definition:	The duration of time to which the specified capacity refers, such as 1 year for an annual capacity.
Description:	For a total capacity, such as the total capacity of a landfill, no time reference is provided.
Multiplicity:	0..1

CapacityType

Stereotypes:	«voidable»

5.5.2.2.3.   DayTimeType

DayTimeType

Name:	Day Time Type
Definition:	A period of time at a particular day of any week, such as Monday 12:00 to 13:00.
Status:	Proposed
Stereotypes:	«dataType»
URI:	null

Attribute: day

Value type:	DayListType
Definition:	The day of the week, such as Monday.
Multiplicity:	1

Attribute: timeFrom

Value type:	TM_ClockTime
Definition:	The start time.
Multiplicity:	1

Attribute: timeTo

Value type:	TM_ClockTime
Definition:	The end time.
Multiplicity:	1

5.5.2.2.4.   FacilityStatusType

FacilityStatusType

Name:	Facility Status Type
Definition:	A state or condition of a facility.
Status:	Proposed
Stereotypes:	«dataType»
URI:	null

Attribute: dateFrom

Value type:	DateTime
Definition:	A date starting from which the status applies.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: dateTo

Value type:	DateTime
Definition:	A date up to which the status applies.
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: description

Value type:	PT_FreeText
Definition:	The status description.
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: statusType

Value type:	StatusListType
Definition:	The status.

FacilityStatusType

Multiplicity:	0..1

5.5.2.2.5.   IdentifierType

IdentifierType

Name:	Identifier Type
Definition:	An identifier from a specified identification scheme.
Status:	Proposed
Stereotypes:	«dataType»
URI:	null

Attribute: Id

Value type:	Identifier
Definition:	The identifier of the identified object.
Multiplicity:	1

Attribute: identificationSchemeDesignation

Value type:	PT_FreeText
Definition:	The designation of the identification scheme from which the object identifier originates.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: identificationSchemeId

Value type:	Identifier
Definition:	The identifier of the identification scheme from which the object identifier originates.
Multiplicity:	1
Stereotypes:	«voidable»

5.5.2.2.6.   InputOutputType

InputOutputType

Name:	Input Output Type
Definition:	Something that enters or leaves a process or facility that is susceptible to be measured.
Status:	Proposed
Stereotypes:	«dataType»
URI:	null

Attribute: capacity

Value type:	CapacityType
Definition:	Capacities related to the input or output.
Multiplicity:	0..*
Stereotypes:	«voidable»

Attribute: designation

Value type:	PT_FreeText
Definition:	A designation of the type of input or output.
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: inputOutputType

Value type:	AbstractListType
Definition:	Identification of an entry from the list of inputs and outputs.
Multiplicity:	1

5.5.2.2.7. PartyRoleType

PartyRoleType

Name:	Party Role Type
Definition:	An organisation or person with its role in a specific context.
Status:	Proposed
Stereotypes:	«dataType»
URI:	null

Attribute: dateFrom

Value type:	DateTime
Definition:	A date starting from which the party is in the specified roles.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: dateTo

Value type:	DateTime
Definition:	A date up to which the party is in the specified roles.
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: party

Value type:	CI_ResponsibleParty
Definition:	
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: partyId

Value type:	IdentifierType
Definition:	The identifier of the party.
Multiplicity:	0..1

Attribute: roleType

Value type:	RoleListType
Definition:	Roles of the party in the respective context.
Multiplicity:	1..*

Constraint: PartyIdOrData

Natural language:	Parties must either be referenced via ID or provided with data like name
OCL:	inv: (self.partyId->isEmpty implies self.party->notEmpty) and (self.party->isEmpty implies self.partyId->notEmpty)

5.5.2.2.8. PermissionType

PermissionType

Name:	Permission Type
Definition:	A formal consent, such as to the operation of a facility.
Status:	Proposed
Stereotypes:	«dataType»
URI:	null

Attribute: Id

Value type:	IdentifierType
Definition:	Identifiers of the permission using a specified identification scheme, such as a national register.
Multiplicity:	0..*

PermissionType

Stereotypes:	«voidable»

Attribute: dateFrom

Value type:	DateTime
Definition:	A date starting from which the permission applies.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: dateTo

Value type:	DateTime
Definition:	A date up to which the permission applies.
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: description

Value type:	PT_FreeText
Definition:	A description of the permission.
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: relatedParty

Value type:	PartyRoleType
Definition:	Parties related to the permission, such as the authorities that granted the permission.
Multiplicity:	0..*
Stereotypes:	«voidable»

5.5.2.2.9.   ServiceHoursType

ServiceHoursType

Name:	Service Hours Type
Definition:	Hours during which service is available.
Status:	Proposed
Stereotypes:	«dataType»
URI:	null

Attribute: dateFrom

Value type:	DateTime
Definition:	A date starting from which the service hours apply.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: dateTo

Value type:	DateTime
Definition:	A date up to which the service hours apply.
Multiplicity:	0..1
Stereotypes:	«voidable»

Attribute: hours

Value type:	DayTimeType
Definition:	The hours of a day during which service is available.
Multiplicity:	1..*

Attribute: serviceDescription

Value type:	PT_FreeText

ServiceHoursType	
Definition:	A description of the service to which the service hours apply, such as being open to the public or operational.
Multiplicity:	0..1
Stereotypes:	«voidable»

5.5.2.3. Enumerations

5.5.2.3.1. DayListType

DayListType	
Name:	Day List Type
Definition:	Days of the week.
Status:	Proposed
Stereotypes:	«enumeration»
URI:	null

Value: friday	
Definition:	Day of the week between Thursday and Saturday.

Value: monday	
Definition:	Day of the week between Sunday and Tuesday.

Value: saturday	
Definition:	Day of the week between Friday and Saturday.

Value: sunday	
Definition:	Day of the week between Saturday and Monday.

Value: thursday	
Definition:	Day of the week between Wednesday and Friday.

Value: tuesday	
Definition:	Day of the week between Monday and Wednesday.

Value: wednesday	
Definition:	Day of the week between Tuesday and Thursday.

5.5.2.4. Code lists

5.5.2.4.1. AbstractListType

AbstractListType	
Name:	Abstract List Type
Definition:	Abstract code list. Used where codes from one of multiple codelists are allowed.
Description:	For activity types, the list of allowable codelists is ActivityListSelType. For input output types, the list of allowable codelists is InputOutputListSelType.
Status:	Proposed
Stereotypes:	«codeList,abstract»
Governance:	May not be extended by Member States.
URI:	null

5.5.2.4.2. ActivityListSelType

ActivityListSelType	
Name:	Activity List Sel Type
Definition:	Lists used for the classification of activities.
Description:	Extensible list.
Status:	Proposed
Stereotypes:	«codeList»

ActivityListSelType

Governance:	May not be extended by Member States.
URI:	null

Value: euRecoveryDisposalOperations

Definition:	List of disposal and recovery operations according to Annex I and Annex II of Directive 2008/98/EC on waste.

Value: euWasteStatisticsActivities

Definition:	List of economic activities according to Regulation (EC) No 2150/2002 on waste statistics.

Value: eurostatNACE

Definition:	NACE Rev. 2 Statistical Classification of Economic Activities in the European Community published by Eurostat.

Value: inspireWasteTreatmentActivities

Definition:	INSPIRE list of waste treatment activities.

5.5.2.4.3.   ActivityNACEListType

ActivityNACEListType

Name:	ActivityNACE List Type
Definition:	Statistical Classification of Economic Activities in the European Community (NACE).
Description:	Accessible at Eurostat reposi http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_CLS_DLD&StrNom=NACE
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

5.5.2.4.4.   ActivityRecoveryDisposalListType

ActivityRecoveryDisposalListType

Name:	Activity Recovery Disposal List Type
Definition:	List of disposal and recovery operations according to Annex I and Annex II of Directive 2008/98/EC on waste.
Description:	Accessible at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0098:EN:NOT
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

5.5.2.4.5.   ActivityWasteStatisticsListType

ActivityWasteStatisticsListType

Name:	Activity Waste Statistics List Type
Definition:	List of economic activities according to Annex I Section 8 of Regulation (EC) No 2150/2002 on waste statistics.
Description:	Accessible at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002R2150:EN:NOT.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

5.5.2.4.6.   ActivityWasteTreatmentListType

ActivityWasteTreatmentListType

ActivityWasteTreatmentListType

Name:	Activity Waste Treatment List Type
Definition:	List of waste treatment activities.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: disposal

Definition:	Any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy.

Value: dumping

Definition:	Unloading of waste.

Value: incineration

Definition:	The process of burning completely and reducing to ashes.

Value: landfill

Definition:	Deposit of waste onto or into land.

Value: recovery

Definition:	Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy.

Value: storage

Definition:	Keeping, setting aside, or accumulating waste for future use.

5.5.2.4.7.   FacilityListType

FacilityListType

Name:	Facility List Type
Definition:	Types of facilities, such as sites or installations.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: installation

Definition:	Something installed, such as machinery, an apparatus, a device, a system, or a piece of equipment placed in position or connected for use.

Value: site

Definition:	A single piece of land that serves a specific function, or where units that serve specific functions are located and shared or used in combination.

5.5.2.4.8.   InputOutputListSelType

InputOutputListSelType

Name:	Input Output List Sel Type
Definition:	Lists used for the classification of inputs and outputs to facilities.
Description:	Extensible list.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

InputOutputListSelType

Value: euListOfWastes

Definition:	EU Decision 2000/532 List of Wastes

Value: eurostatCPA

Definition:	Eurostat Statistical Classification of Products by Activity in the European Economic Community.

5.5.2.4.9.   InputOutputProductListType

InputOutputProductListType

Name:	Input Output Product List Type
Definition:	Eurostat Statistical Classification of Products by Activity in the European Economic Community.
Description:	Accessible http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_CLS_DLD&StrNom=CPA_
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

5.5.2.4.10.   InputOutputWasteListType

InputOutputWasteListType

Name:	Input Output Waste List Type
Definition:	EU Decision 2000/532 List of Wastes.
Description:	Accessible at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000D0532:EN:NOT and at http://www5.umweltbundesamt.at/dataharmonisation/codelist/ev7jv8yw2ndj9awiygm7z5kee7qy.html
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

5.5.2.4.11.   RoleListType

RoleListType

Name:	Role List Type
Definition:	A list of purposes or functions someone can have in a particular context., such as operator, owner, contact or authority.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: authority

Definition:	A person or group of people having the power or right to control, judge, or prohibit the actions of others, such as a government, police force, etc.

Value: contact

Definition:	A connection through which it is possible to gain access to someone or something.

Value: operator

Definition:	Any natural or legal person who operates or controls the facility or, where this is provided for in national legislation, to whom decisive economic power over the technical functioning of the facility has been delegated.

Value: owner

Definition:	Someone to which something belongs.

5.5.2.4.12. *StatusListType*

StatusListType	
Name:	Status List Type
Subtype of:	ConditionOfFacilityValue
Definition:	States, such as illegal or abandoned.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	null

Value: abandoned	
Definition:	Left, discontinued or deserted completely and finally.

Value: active	
Definition:	Operative and in use.

Value: after-care	
Definition:	Treatment and supervision that may follow the end of an active operational phase.

Value: illegal	
Definition:	Not permitted by law.

Value: inactive, not monitored	
Definition:	Not used (inactive), despite being usable, and not under surveillance or observation.

Value: passive	
Definition:	Not used (inactive), despite being usable.

Value: planned	
Definition:	Intended to be constructed and become operative at a later point in time.

Value: under construction	
Definition:	Being built or erected.

Value: under demolition	
Definition:	Being torn down or destroyed.

5.5.2.5. Imported types (informative)

This section lists definitions for feature types, data types and enumerations and code lists that are defined in other application schemas. The section is purely informative and should help the reader understand the feature catalogue presented in the previous sections. For the normative documentation of these types, see the given references.

5.5.2.5.1. *Abstract*

Abstract	
Package:	INSPIRE Consolidated UML Model::Themes::Annex III::Buildings::Buildings [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	A building is a covered facility, usable for the protection of humans, animals, things or the production of economic goods. A building refers to any structure permanently constructed or erected on its site.

5.5.2.5.2. *Address*

Address	
Package:	INSPIRE Consolidated UML Model::Themes::Annex I::Addresses::Addresses [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

Address

Definition:		An identification of the fixed location of property by means of a structured composition of geographic names and identifiers.
Description:		NOTE 1 The spatial object, referenced by the address, is defined as the "addressable object". The addressable object is not within the application schema, but it is possible to represent the address' reference to a cadastral parcel or a building through associations. It should, however, be noted that in different countries and regions, different traditions and/or regulations determine which object types should be regarded as addressable objects.
		NOTE 2 In most situations the addressable objects are current, real world objects. However, addresses may also reference objects which are planned, under construction or even historical.
		NOTE 3 Apart from the identification of the addressable objects (like e.g. buildings), addresses are very often used by a large number of other applications to identify object types e.g. statistics of the citizens living in the building, for taxation of the business entities that occupy the building, and the utility installations.
		NOTE 4 For different purposes, the identification of an address can be represented in different ways (see example 3).
		EXAMPLE 1 A property can e.g., be a plot of land, building, part of building, way of access or other construction,
		EXAMPLE 2 In the Netherlands the primary addressable objects are buildings and dwellings which may include parts of buildings, mooring places or places for the permanent placement of trailers (mobile homes), in the UK it is the lowest level of unit for the delivery of services, in the Czech Republic it is buildings and entrance doors.
		EXAMPLE 3 Addresses can be represented differently. In a human readable form an address in Spain and an address in Denmark could be represented like this: "Calle Mayor, 13, Cortijo del Marques, 41037 Ecija, Sevilla, Espana" or "Wildersgade 60A, st. th, 1408 Copenhagen K., Denmark".

5.5.2.5.3.   AdministrativeUnit

AdministrativeUnit

Package:		INSPIRE Consolidated UML Model::Themes::Annex I::Administrative Units::AdministrativeUnits [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:		Unit of administration where a Member State has and/or exercises jurisdictional rights, for local, regional and national governance.

5.5.2.5.4.   CI_ResponsibleParty

CI_ResponsibleParty

Package:		INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19115:2006 Metadata (Corrigendum)::Citation and responsible party information [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.5.2.5.5.   CadastralParcel

CadastralParcel

Package:		INSPIRE Consolidated UML Model::Themes::Annex I::Cadastral Parcels::CadastralParcels [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:		Areas defined by cadastral registers or equivalent.

CadastralParcel

Description:	SOURCE [INSPIRE Directive:2007].	
	NOTE As much as possible, in the INSPIRE context, cadastral parcels should be forming a partition of national territory. Cadastral parcel should be considered as a single area of Earth surface (land and/or water), under homogeneous real property rights and unique ownership, real property rights and ownership being defined by national law (adapted from UN ECE 2004 and WG-CPI, 2006). By unique ownership is meant that the ownership is held by one or several joint owners for the whole parcel.	

5.5.2.5.6.   ConditionOfFacilityValue

ConditionOfFacilityValue

Package:	INSPIRE Consolidated UML Model::Generic Conceptual Model::Base Types [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	The status of a facility with regards to its completion and use.

5.5.2.5.7.   DateTime

DateTime

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Primitive::Date and Time [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.5.2.5.8.   GM_Object

GM_Object (abstract)

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19107:2003 Spatial Schema:: Geometry::Geometry root [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.5.2.5.9.   Identifier

Identifier

Package:	INSPIRE Consolidated UML Model::Generic Conceptual Model::Base Types [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]
Definition:	External unique object identifier published by the responsible body, which may be used by external applications to reference the spatial object.
Description:	NOTE1 External object identifiers are distinct from thematic object identifiers. NOTE 2 The voidable version identifier attribute is not part of the unique identifier of a spatial object and may be used to distinguish two versions of the same spatial object. NOTE 3 The unique identifier will not change during the life-time of a spatial object.

5.5.2.5.10.   Measure

Measure

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Derived::Units of Measure [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.5.2.5.11.   PT_FreeText

PT_FreeText

PT_FreeText

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19139 Metadata - XML Implementation::Cultural and linguistic adapdability [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.5.2.5.12.   TM_ClockTime

TM_ClockTime

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19108:2006 Temporal Schema::Temporal Reference System [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.5.2.5.13.   Time

Time

Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Derived::Units of Measure [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

6 Reference systems

6.1 Coordinate reference systems

6.1.1 Datum

> **IR Requirement 6** For the coordinate reference systems used for making available the INSPIRE spatial data sets, the datum shall be the datum of the European Terrestrial Reference System 1989 (ETRS89) in areas within its geographical scope, and the datum of the International Terrestrial Reference System (ITRS) or other geodetic coordinate reference systems compliant with ITRS in areas that are outside the geographical scope of ETRS89. Compliant with the ITRS means that the system definition is based on the definition of the ITRS and there is a well established and described relationship between both systems, according to EN ISO 19111.

6.1.2 Coordinate reference systems

> **IR Requirement 7** INSPIRE spatial data sets shall be made available using one of the three-dimensional, two-dimensional or compound coordinate reference systems specified in the list below.
>
> Other coordinate reference systems than those listed below may only be used for regions outside of continental Europe. The geodetic codes and parameters for these coordinate reference systems shall be documented, and an identifier shall be created, according to EN ISO 19111 and ISO 19127.

1. Three-dimensional Coordinate Reference Systems
   – Three-dimensional Cartesian coordinates
   – Three-dimensional geodetic coordinates (latitude, longitude and ellipsoidal height), using the parameters of the GRS80 ellipsoid

2. Two-dimensional Coordinate Reference Systems
   – Two-dimensional geodetic coordinates, using the parameters of the GRS80 ellipsoid
   – Plane coordinates using the Lambert Azimuthal Equal Area projection and the parameters of the GRS80 ellipsoid
   – Plane coordinates using the Lambert Conformal Conic projection and the parameters of the GRS80 ellipsoid
   – Plane coordinates using the Transverse Mercator projection and the parameters of the GRS80 ellipsoid

3. Compound Coordinate Reference Systems
    - For the horizontal component of the compound coordinate reference system, one of the two-dimensional coordinate reference systems specified above shall be used
    - For the vertical component on land, the European Vertical Reference System (EVRS) shall be used to express gravity-related heights within its geographical scope
    - Other vertical reference systems related to the Earth gravity field shall be used to express gravity-related heights in areas that are outside the geographical scope of EVRS. The geodetic codes and parameters for these vertical reference systems shall be documented and an identifier shall be created, according to EN ISO 19111 and ISO 19127
    - For the vertical component measuring the depth of the sea floor, where there is an appreciable tidal range, the Lowest Astronomical Tide shall be used as reference surface. In marine areas without an appreciable tidal range, in open oceans and effectively in waters that are deeper than 200 m, the depth of the sea floor shall be referenced to the Mean Sea Level
    - For the vertical component measuring depths above the sea floor in the free ocean, barometric pressure shall be used
    - For the vertical component in the free atmosphere, barometric pressure, converted to height using ISO 2533:1975 International Standard Atmosphere shall be used

6.1.3 Display

> **IR Requirement 8** For the display of the INSPIRE spatial data sets with the View Service specified in D003152/02 Draft Commission Regulation implementing Directive 2007/2/EC of the European Parliament and of the Council as regards Network Services, at least the two dimensional geodetic coordinate system shall be made available.

6.1.4 Identifiers for coordinate reference systems

> **IR Requirement 9** For referring to the non-compound coordinate reference systems listed in this Section, the identifiers listed below shall be used.
>
> For referring to a compound coordinate reference system, an identifier composed of the identifier of the horizontal component, followed by a slash (/), followed by the identifier of the vertical component, shall be used.

- ETRS89-XYZ for Cartesian coordinates in ETRS89
- ETRS89-GRS80h for three-dimensional geodetic coordinates in ETRS89 on the GRS80 ellipsoid
- ETRS89-GRS80 for two-dimensional geodetic coordinates in ETRS89 on the GRS80
- EVRS for height in EVRS
- LAT for depth of the sea floor, where there is an appreciable tidal range
- MSL for depth of the sea floor, in marine areas without an appreciable tidal range, in open oceans and effectively in waters that are deeper than 200m
- ISA for pressure coordinate in the free atmosphere
- PFO for Pressure coordinate in the free ocean
- ETRS89-LAEA for ETRS89 coordinates projected into plane coordinates by the Lambert Azimuthal Equal Area projection
- ETRS89-LCC for ETRS89 coordinates projected into plane coordinates by the Lambert Conformal Conic projection
- ETRS89-TMzn for ETRS89 coordinates projected into plane coordinates by the Transverse Mercator projection

6.2 Temporal reference system

> **IR Requirement 10** The Gregorian Calendar shall be used for as a reference system for date values, and the Universal Time Coordinated (UTC) or the local time including the

time zone as an offset from UTC shall be used as a reference system for time values.

6.3 Theme-specific requirements and recommendations on reference systems

There are no theme-specific requirements or recommendations on reference systems.

7 Data quality

This chapter includes a description of data quality elements and sub-elements as well as the associated data quality measures (section 7.1). The selected data quality measures should be used to evaluate quality of data sets for a specific data quality element / sub-element. The evaluation can be performed at the level of spatial object, spatial object type, dataset or dataset series.

The results of the evaluation are then reported at the spatial object type or dataset level in metadata utilising the same data quality elements and measures (see chapter 8).

NOTE   The selection of appropriate data quality measures represents the first step towards the harmonisation of documenting data quality.

For *Utility Networks* sub-theme, the provision of data quality information is necessary to cover the following specific purposes:
-   Check that the different data providers supply a minimum set of data quality elements and sub-elements in order to evaluate and quantify the quality of datasets for specific purposes in the context of INSPIRE.

-   Guarantee that a continuous utility network can be built from the elements provided in the utility network datasets, by assessing their conformance to some basic topological consistency rules aimed to ensure at least *topologically clean* connections between features.

Data quality elements and sub-elements within this section follow "ISO CS 19157: Data Quality" specification, even if those are not yet validated.

This specification is also compliant with ISO 19113 and ISO 19114, but it does not fix any concrete conformance criteria for the data quality information proposed, since it should be valid for a wide range of European utility network datasets, with very different levels of detail and quality requirements.

In addition, for some of the data quality elements described in section 7.1, minimum data quality requirements or recommendations may be defined. These are described in the section 1.2.

Recommendation 12   If data quality information is required at spatial object level then it should be modelled in the data model as an attribute of a relevant spatial object type.

However, for the topological consistency rules mentioned above, a minimum set of measures are needed in order to make it possible the creation of a well-connected utility network.

Data quality information can be described at level of spatial object (feature), spatial object type (feature type), dataset or dataset series. Data quality information at spatial object level is modelled directly in the application schema (Chapter 5).

> **Recommendation 13**   Whenever possible, administrative and social governmental services data should be modelled as point objects (geometry type: GM_Point).

Chapter 8 describes the corresponding metadata elements to report about this data quality information.

The table below describes the usage (feature-level or dataset-level) and the main purpose (evaluation or network) for the data quality elements and sub-elements proposed in this specification.

Table 3 – Data quality elements used in the theme *Utility and Governmental services*

INSPIRE Data Specification - Utility Networks Section	Data quality element	Usage	Quality purpose
7.1.1	Rate of excess items	dataset-level	evaluation
7.1.2	Rate of missing items	dataset level	evaluation
7.1.3.1.1	Conceptual schema compliance	dataset level	evaluation
7.1.3.2.1	Value domain non conformance rate	dataset level	evaluation
7.1.3.3.1	Physical structure conflict rate	dataset-level	evaluation
7.1.3.4.1	Number of missing connections due to undershoots	dataset-level	network
7.1.3.4.2	Number of missing connections due to overshoots	dataset-level	network
7.1.3.4.3	Number of invalid self-overlap errors	dataset-level	network
7.1.4.1.1	Mean value of positional uncertainties	dataset-level	evaluation
7.1.4.1.2	Rate of positional uncertainties above a given threshold	dataset-level	evaluation
7.1.4.2.1	Relative horizontal error	dataset-level	evaluation
7.1.5.1.1	Misclassification rate	dataset-level	evaluation
7.1.6.1.1	Time accuracy at 50% significance level	dataset-level	evaluation
7.1.6.1.2	Time accuracy at 95% significance level	dataset-level	evaluation
7.1.6.1.1	Time accuracy at 50% significance level	dataset-level	evaluation
7.1.6.2.1	Value domain conformance rate	dataset-level	evaluation

7.1   Data quality elements and measures

Data quality information can be described at level of spatial object (feature), spatial object type (feature type), dataset or dataset series. Data quality information at spatial object level is modelled directly in the application schema (Chapter 5).

> **Recommendation 14**   Aggregated data quality information should ideally be collected at the level of spatial object types and included in the dataset (series) metadata.

Chapter 8 describes the corresponding metadata elements to report about this data quality information.

> **Recommendation 15**   To evaluate and report the data quality of data sets related to the spatial data theme *Utility and governmental services*, the elements and measures listed in the table below should be used.

Table 4 – Data quality elements for evaluating and reporting the data quality of data sets related to the spatial data theme *Utility and governmental services*

Section	Data quality element and sub-elements Data quality sub-element	Scope(s)
7.1.1	Completeness – Commission	dataset series; dataset; spatial object type

7.1.2	Completeness – Omission	dataset series; dataset; spatial object type
7.1.3.1	Logical Consistency – Conceptual consistency	dataset series; dataset; spatial object type
7.1.3.2	Logical Consistency – Domain consistency	dataset series; dataset; spatial object type
7.1.3.3	Logical Consistency – Format consistency	dataset series; dataset; spatial object type
7.1.3.4	Logical Consistency – Topological consistency	dataset series; dataset; spatial object type
7.1.4.1	Positional accuracy – Absolute or external accuracy	dataset series; dataset; spatial object type
7.1.4.2	Positional accuracy – Relative or internal accuracy	dataset series; dataset; spatial object type
7.1.5.1	Thematic accuracy – Classification correctness	dataset series; dataset; spatial object type
7.1.6.1	Temporal accuracy – Accuracy of time measuring	dataset series; dataset; spatial object type
7.1.6.2	Temporal accuracy – Temporal validity	dataset series; dataset; spatial object type

7.1.1 Completeness – Commission

Commission should be documented using the rate of excess items.

Name	Rate of excess items
Alternative name	–
Data quality element	Completeness
Data quality sub-element	Commission
Data quality basic measure	Error rate
Definition	Number of excess items in the dataset in relation to the number of items that should have been present.
Description	No specific description for version 2.0
Evaluation scope	Spatial object types Dataset Dataset series
Reporting scope	Spatial object types Dataset Dataset series
Parameter	–
Data quality value type	Real, percentage, ratio (example: 0,0189 ; 98,11% ; 11:582)
Data quality value structure	–
Source reference	–
Example	No specific example for version 2.0
Measure identifier	3 (ISO 19138)

7.1.2 Completeness – Omission

Omission should be documented using the rate of missing items.

Name	Rate of missing items
Alternative name	–
Data quality element	Completeness
Data quality sub-element	Omission
Data quality basic measure	Error rate

Definition	Number of missing items in the dataset in relation to the number of items that should have been present.
Description	No specific description for version 2.0
Evaluation scope	Spatial object types Dataset Dataset series
Reporting scope	Spatial object types Dataset Dataset series
Parameter	–
Data quality value type	Real, percentage, ratio (example: 0,0189 ; 98,11% ; 11:582)
Data quality value structure	–
Source reference	–
Example	No specific example for version 2.0
Measure identifier	7 (ISO 19138)

Note: Regarding *Administrative and social governmental services* sub-theme, FeatureTypeValue codelist may be considered as a basic structure on what kinds of items should be present in an INSPIRE dataset. Nevertheless, each data producer could define a richer codelist, more detailing the items within the given framework for this sub-theme and, thus, its own list of types of items to be captured. Then, completeness should be tested against these capture rules.

7.1.3 Logical Consistency – Topological consistency

Logical consistency elements enable the assessment of the degree of adherence to logical rules of data structure, attribution and relationships

Table 5 – Theme-specific data quality elements used in the spatial data theme Utility Networks

Section	Data quality element	Data quality sub-element	Scope(s)
7.1.3.1.1	Conceptual consistency	Conceptual schema compliance	Dataset
7.1.3.2.1	Domain consistency	Value domain non conformance rate	Dataset
7.1.3.3.1	Format consistency	Physical structure conflict rate	Dataset
7.1.3.4.1	Topological consistency	Number of missing connections due to undershoots	Dataset
7.1.3.4.2	Topological consistency	Number of missing connections due to overshoots	Dataset
7.1.3.4.3	Topological consistency	Number of invalid self-overlap errors	Dataset

7.1.3.1.   Conceptual consistency

7.1.3.1.1.   Conceptual schema compliance

This data quality sub-element should be assessed at feature level and the results should be stored in the metadata element: DQ_ConceptualConsistency.

Name	**Conceptual schema compliance**
Alternative name	-
Data quality element	Logical consistency
Data quality subelement	Conceptual consistency
Data quality basic measure	Rate of correct items
Definition	Number of items in the dataset in compliance with the rules of the conceptual schema in relation to the total number of items.

Description	No mandatory components or attributes are missing and no constraints are violated for any utility objects.
Evaluation scope	Dataset
Reporting scope	Dataset
Parameter	-
Data quality value type	Real, percentage, ratio
Data quality value structure	-
Source reference	-
Example	The 95% of the mandatory components or attributes exist and no constraints are violated within the dataset.
Measure identifier	13 (ISO 19138)

7.1.3.2. Domain consistency

7.1.3.2.1. Value domain non conformance rate

This quality sub-element shows the global adherence of values in the dataset to the predefined value domains.

The assessment of this quality sub-element should be included in the metadata element DQ_DomainConsistency.

Name	Value domain non conformance rate
Alternative name	-
Data quality element	Logical consistency
Data quality subelement	Domain consistency
Data quality basic measure	Incorrect items rate
Definition	Number of items in the dataset that are not in conformance with their value domain in relation to the total number of items in the dataset.
Description	Number of utility objects in the dataset that are not in conformance with their value domains in relation to the total number of objects in the utility network dataset.
Evaluation scope	Dataset
Reporting scope	Dataset
Parameter	-
Data quality value type	Percentage, ratio
Data quality value structure	-
Source reference	-
Example	95% of utility features consist of components whose values are within the domains stated in the application schema.
Measure identifier	17 (ISO 19138)

7.1.3.3. Format consistency

7.1.3.3.1. Physical structure conflict rate

This quality sub-element shows the percentage of items stored in conflict with the physical structure of the dataset.

The assessment of this quality sub-element should be included in the metadata element: DQ_FormatConsistency.

Name	Physical structure conflict rate
Alternative name	-
Data quality element	Logical consistency
Data quality subelement	Format consistency
Data quality basic measure	Error rate
Definition	Number of items in the dataset that are stored in conflict with the physical structure of the dataset divided by the total number of items

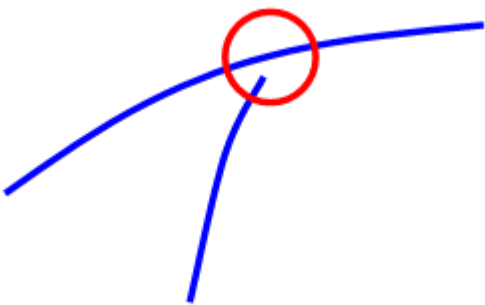| Description	-
Evaluation scope	Dataset
Reporting scope	Dataset
Parameter	-
Data quality value type	Real, percentage, ratio
Data quality value structure	-
Source reference	-
Example	-
Measure identifier	20 (ISO 19138)

7.1.3.4. Topological consistency

The assessment of the following data quality sub-elements should be included in the metadata element DQ_TopologicalConsistency.

7.1.3.4.1. Number of missing connections due to undershoots

The following topological consistency quality sub-element is required in order to ensure building a "clean" and connected utility network.
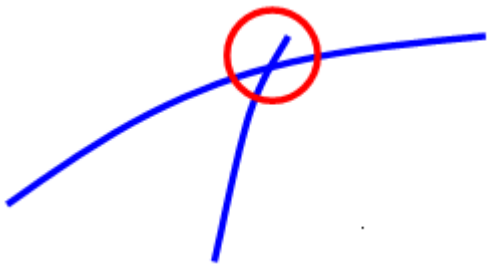
Name	Number of missing connections due to undershoots
Alternative name	Undershoots
Data quality element	Logical consistency
Data quality subelement	Topological consistency
Data quality basic measure	Error count
Definition	Count of items in the dataset that are mismatched due to undershoots, given the parameter *Connectivity tolerance*.
Description	Lacks of connectivity exceeding the *Connectivity tolerance* are considered as errors if the real features are connected in the utility network.
Evaluation scope	Dataset
Reporting scope	Dataset
Parameter	− Name: *Connectivity tolerance* − Definition: Search distance from the end of a dangling line. − Description: This parameter is specific for each data provider's dataset and must be reported as metadata in order to ensure automatic and unambiguous creation of centreline topology – connectivity - for the utility network. Connectivity tolerance must be specified by the data provider using the following elements of the DQ_TopologicalConsistency metadata element for the current measure: - 102. measureDescription (type: free text): Defined as "*Description of the measure*". - 107. Result (type DQ_Result): Defined as "*Value (or set of values) obtained from applying a data quality measure or the outcome of evaluating the obtained value (or set of values) against a specified acceptable conformance quality level*". Specifically, the tolerance must be defined within the two elements: - 130. specification - 131. explanation from DQ_Result class.

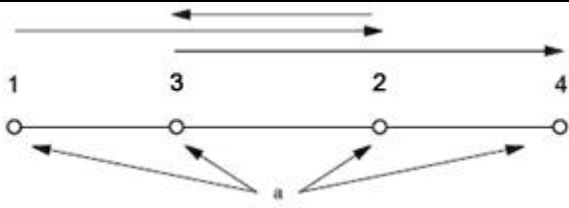|	Note: Metadata elements defined in ISO 19115.
Data quality value type	Integer
Data quality value structure	-
Source reference	-
Example Figure 30	 **Key** 1 Connectivity tolerance = 1 m
Measure identifier	23 (ISO 19138)

7.1.3.4.2.   Number of missing connections due to overshoots

The following topological consistency quality sub-element is required in order to ensure building a "clean" and connected utility network. See also Data Capture (10.2)

Name	Number of missing connections due to overshoots
Alternative name	Overshoots
Data quality element	Logical consistency
Data quality subelement	Topological consistency
Data quality basic measure	Error count
Definition	Count of items in the dataset that are mismatched due to overshoots, given the parameter *Connectivity tolerance*.
Description	Lacks of connectivity exceeding the *Connectivity tolerance* are considered as errors if the real features are connected in the utility network.
Evaluation scope	Dataset
Reporting scope	Dataset

Parameter	− Name: *Connectivity tolerance*
	− Definition: Search distance from the end of a dangling line.
	− Description:
	This parameter is specific for each data provider's dataset and must be reported as metadata in order to ensure automatic and unambiguous creation of centreline topology – connectivity - for the utility network.
	
	Connectivity tolerance must be specified by the data provider using the following elements of the DQ_TopologicalConsistency metadata element for the current measure:
	
	    - 102. measureDescription (type: free text):
	
	    Defined as "*Description of the measure*".
	
	    - 107. Result (type DQ_Result):
	
	    Defined as "*Value (or set of values) obtained from applying a data quality measure or the outcome of evaluating the obtained value (or set of values) against a specified acceptable conformance quality level*".
	    Specifically, the tolerance must be defined within the two elements:
	        - 130. specification

	- 131. explanation from DQ_Result class. Note: Metadata elements defined in ISO 19115.
Data quality value type	Integer
Data quality value structure	-
Source reference	-
Example Figure 31	 **Key** 1 Connectivity tolerance = 1 m
Measure identifier	24 (ISO 19138)

7.1.3.4.3.   Number of invalid self-overlap errors

Name	**Number of invalid self-overlap errors**
Alternative name	Kickbacks
Data quality element	Logical consistency
Data quality subelement	Topological consistency
Data quality basic measure	Error count
Definition	Count of all items in the data that illegally self overlap.
Description	-
Evaluation scope	Dataset
Reporting scope	Dataset
Parameter	-
Data quality value type	Integer
Data quality value structure	-
Source reference	-
Example Figure 34	 ^a Vertices.
Measure identifier	27 (ISO 19138)

7.1.4 Positional accuracy – Absolute or relative / Internal or external accuracy

Table 6 – Theme-specific data quality elements used in the spatial data theme *Utility and governmental services*

Section	Data quality element	Data quality sub-element	Scope(s)
7.1.4.1.1	Absolute or external accuracy	Mean value of positional uncertainties	Dataset
7.1.4.1.2	Absolute or external accuracy	Rate of positional uncertainties above a given threshold	Dataset

7.1.4.2.1	Relative or internal accuracy	Mean value of positional uncertainties	Dataset

7.1.4.1. Absolute or external accuracy

7.1.4.1.1. Mean value of positional uncertainties

This quality sub-element shows the closeness of reported coordinate values to values accepted as or being true. **It is used for the features of the Utility networks sub-theme only.**

The assessment of this quality sub-element should be stored in the metadata element DQ_AbsoluteExternalPositionalAccuracy.

Name	Mean value of positional uncertainties
Alternative name	Mean value of positional uncertainties (1D, 2D and 3D)
Data quality element	Positional accuracy
Data quality subelement	Absolute or external accuracy
Data quality basic measure	Not applicable
Definition	Mean value of the positional uncertainties for a set of positions where the positional uncertainties are defined as the distance between a measured position and what is considered as the corresponding true position.
Description	For a number of points (N), the measured positions are given as x_{mi}, y_{mi} and z_{mi} coordinates depending on the dimension in which the position of the point is measured. A corresponding set of coordinates, x_{ti}, y_{ti} and z_{ti}, are considered to represent the true positions. The errors are calculated as 1D: $e_i = \|x_{mi} - x_{ti}\|$ 2D: $e_i = \sqrt{[(x_{mi} - x_{ti})^2 + (y_{mi} - y_{ti})^2]}$ 3D: $e_i = \sqrt{[(x_{mi} - x_{ti})^2 + (y_{mi} - y_{ti})^2 + (z_{mi} - z_{ti})^2]}$ The mean positional uncertainties of the horizontal absolute or external positions are then calculated as $$\bar{e} = \frac{1}{N}\sum_{i=1}^{N} e_i$$ A criterion for the establishing of correspondence should also be stated (e.g. allowing for correspondence to the closest position, correspondence on vertices or along lines). The criterion/criteria for finding the corresponding points shall be reported with the data quality evaluation result. This data quality measure is different from the standard deviation.
Evaluation scope	Dataset
Reporting scope	Data set
Parameter	-
Data quality value type	Measure
Data quality value structure	-
Source reference	-
Example	-
Measure identifier	28 (ISO 19138)

7.1.4.1.2. Rate of positional uncertainties above a given threshold

This quality sub-element shows the closeness of reported coordinate values to values accepted as or being true. **It is used for the features of the Governmental services and Waste management sub-themes only.**

Line	Component	Description
1	Name	rate of positional uncertainties above a given threshold
2	Alias	–
3	Data quality element	absolute or external accuracy
4	Data quality basic measure	not applicable
5	Definition	number of positional uncertainties above a given threshold for a set of positions in relation to the total number of measured positions The errors are defined as the distance between a measured position and what is considered as the corresponding true position
6	Description	For a number of points (N), the measured positions are given as x_{mi}, y_{mi} and z_{mi} coordinates depending on the dimension in which the position of the point is measured. A corresponding set of coordinates, x_{ti}, y_{ti} and z_{ti}, are considered to represent the true positions. The calculation of e_i is given by the data quality measure "mean value of positional uncertainties" in one, two and three dimensions. All positional uncertainties above a defined threshold e_{max} ($e_i > e_{max}$) are then counted as error. The number of errors is set in relation to the total number of measured points. A criterion for the establishing of correspondence should also be stated (e.g. allowing for correspondence to the closest position, correspondence on vertices or along lines). The criterion/criteria for finding the corresponding points shall be reported with the data quality evaluation result.
7	Parameter	e_{max} is the threshold above which the positional uncertainties are counted
8	Data quality value type	real, percentage, ratio
9	Data quality value structure	–
10	Source reference	–
11	Example	25% of the nodes within the data quality scope have error distance bigger than 1 meter
12	Identifier	31

Once again, the POI nature of governmental services data and the needs expressed within the analyzed use cases have clear implications regarding their expected positional accuracy, in the sense that it can be stated that this parameter is not to be critical to assure their quality and their usability.

7.1.4.2. Relative or internal accuracy

7.1.4.2.1. Mean value of positional uncertainties

This quality sub-element should be documented using the relative horizontal error.

Name	Relative horizontal error
Alternative name	Rel CE90
Data quality element	Positional accuracy
Data quality subelement	Relative or internal accuracy
Data quality basic measure	Not applicable
Definition	Evaluation of the random errors in the horizontal position of one feature to another in the same dataset or on the same map/chart.
Description	See ISO 19138
Evaluation scope	Dataset
Reporting scope	Data set
Parameter	n = sample size
Data quality value type	Measure
Data quality value structure	-

Source reference	Mapping, Charting and Geodesy Accuracy
Example	-
Measure identifier	53 (ISO 19138)

7.1.5   Thematic accuracy

Table 7 – Theme-specific data quality elements used in the spatial data theme *Utility and governmental services*

Section	Data quality element	Data quality sub-element	Scope(s)
7.4.1.1.1	Classification correctness	Misclassification rate	Dataset

7.1.5.1.   Classification correctness

7.1.5.1.1.   Misclassification rate

This quality sub-element shows the comparison of the classes assigned to features or their attributes to a universe of discourse.

The assessment of this quality sub-element should be stored in the metadata element DQ_ThematicClassificationCorrectness.

Name	Misclassification rate
Alternative name	-
Data quality element	Thematic accuracy
Data quality subelement	Classification correctness
Data quality basic measure	Error rate
Definition	Average number of incorrectly classified features in relation to the number of features that are supposed to be within the dataset.
Description	To be provided globally as an average value for the whole dataset.
Evaluation scope	Dataset
Reporting scope	Data set
Parameter	-
Data quality value type	Real, percentage, ratio
Data quality value structure	-
Source reference	-
Example	-
Measure identifier	61 (ISO 19138)

7.1.6   Temporal accuracy

Table 8 – Theme-specific data quality elements used in the spatial data theme *Utility and governmental services*

Section	Data quality element	Data quality sub-element	Scope(s)
7.5.1.1.1	Accuracy of a time measuring	Time accuracy at 50% significance level	dataset
7.5.1.2.1	Accuracy of a time measuring	Time accuracy at 95% significance level	dataset
7.5.2.1.1	Temporal validity	Value domain conformance rate	dataset

7.1.6.1.   Accuracy of a time measuring
Two different measuring elements are proposed:

- Time accuracy at 50% significance level, for the use cases related to mapping and POI querying
- Time accuracy at 95% significance level, for the use cases related to disaster management

7.1.6.1.1.   Time accuracy at 50% significance level

Line	Component	Description
1	Name	time accuracy at 50 % significance level
2	Alias	–
3	Data quality element	accuracy of a time measurement
4	Data quality basic measure	LE50 or LE50(r), depending on the evaluation procedure
5	Definition	half length of the interval defined by an upper and a lower limit, in which the true value for the time instance lies with probability 50 %
6	Description	See D.3.2
7	Parameter	–
8	Data quality value type	Measure
9	Data quality value structure	–
10	Source reference	–
11	Example	–
12	Identifier	55

7.1.6.1.2.   Time accuracy at 95% significance level

Line	Component	Description
1	Name	time accuracy at 95 % significance level
2	Alias	–
3	Data quality element	accuracy of a time measurement
4	Data quality basic measure	LE95 or LE95(r), depending on the evaluation procedure
5	Definition	half length of the interval defined by an upper and a lower limit, in which the true value for the time instance lies with probability 95 %
6	Description	See D.3.2
7	Parameter	–
8	Data quality value type	Measure
9	Data quality value structure	–
10	Source reference	–
11	Example	–
12	Identifier	57

7.1.6.2.   Temporal validity

Regarding temporal validity of data, ISO CS19157 recommends to use the same data quality measures as for other domain specific attribute values. Between these, value domain conformance rate seems to be the most adequate.

7.1.6.2.1.   Value domain conformance rate

Line	Component	Description
1	Name	Value domain conformance rate
2	Alias	–
3	Data quality element	Domain consistency
4	Data quality basic measure	Correct items rate
5	Definition	number of items in the dataset that are in conformance with their value domain in relation to the total number of items in the dataset
6	Description	–
7	Parameter	–
8	Data quality value type	real, percentage, ratio
9	Data quality value structure	–
10	Source reference	–
11	Example	–
12	Identifier	17

7.2 Minimum data quality requirements and recommendations

No minimum data quality requirements and recommendations are defined.

8 Dataset-level metadata

Metadata can be reported for each individual spatial object (spatial object-level metadata) or once for a complete dataset or dataset series (dataset-level metadata). Spatial object-level metadata is fully described in the application schemas (Sections 5.2 to 5.5 included). If data quality elements are used at spatial object level, the documentation shall refer to the appropriate definition in section 7. This section only specifies dataset-level metadata elements.

For some dataset-level metadata elements, in particular on data quality and maintenance, a more specific scope can be specified. This allows the definition of metadata at sub-dataset level, e.g. separately for each spatial object type. When using ISO 19115/19139 to encode the metadata, the following rules should be followed:

- The scope element (of type DQ_Scope) of the DQ_DataQuality subtype should be used to encode the scope.
- Only the following values should be used for the level element of DQ_Scope: Series, Dataset, featureType.
- If the level is featureType the levelDescription/MDScopeDescription/features element (of type Set< GF_FeatureType>) shall be used to list the feature type names.

NOTEThe value featureType is used to denote spatial object type.

Mandatory or conditional metadata elements are specified in Section 8.1. Optional metadata elements are specified in Section 8. The tables describing the metadata elements contain the following information:
- The first column provides a reference to a more detailed description.
- The second column specifies the name of the metadata element.
- The third column specifies the multiplicity.
- The fourth column specifies the condition, under which the given element becomes mandatory (only for Table 9 and Table 10).

8.1 Common metadata elements

> **IR Requirement 11**   The metadata describing a spatial data set or a spatial data set series related to the theme *Utility and governmental services* shall comprise the metadata elements required by Regulation 1205/2008/EC (implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata) for spatial datasets and spatial dataset series (Table 9) as well as the metadata elements specified in Table 10.

Table 9 – Metadata for spatial datasets and spatial dataset series specified in Regulation 1205/2008/EC (implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata)

Metadata Regulation Section	Metadata element	Multiplicity	Condition
1.1	Resource title	1	
1.2	Resource abstract	1	
1.3	Resource type	1	

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

Table 10 – Mandatory and conditional common metadata elements

INSPIRE Data Specification *Utility and governmental services* **Section**	Metadata element	Multiplicity	Condition
8.1.1	Coordinate Reference System	1	
8.1.2	Temporal Reference System	0..*	Mandatory, if the spatial data set or one of its feature types contains temporal information that does not refer to the Gregorian Calendar or the Coordinated Universal Time.
8.1.3	Encoding	1..*	
8.1.4	Character Encoding	0..*	Mandatory, if an encoding is used that is not based on UTF-8.

8.1.5	Data Quality – Logical Consistency – Topological Consistency	0..*	Mandatory, if the data set includes types from the Generic Network Model and does not assure centreline topology (connectivity of centrelines) for the network.

8.1.1 Coordinate Reference System

Metadata element name	Coordinate Reference System
Definition	Description of the coordinate reference system used in the dataset.
ISO 19115 number and name	13. referenceSystemInfo
ISO/TS 19139 path	referenceSystemInfo
INSPIRE obligation / condition	mandatory
INSPIRE multiplicity	1
Data type(and ISO 19115 no.)	189. MD_CRS
Domain	Either the referenceSystemIdentifier (RS_Identifier) or the projection (RS_Identifier), ellipsoid (RS_Identifier) and datum (RS_Identifier) properties shall be provided. NOTE More specific instructions, in particular on pre-defined values for filling the referenceSystemIdentifier attribute should be agreed among Member States during the implementation phase to support interoperability.
Implementing instructions	

Example	referenceSystemIdentifier:
	    code: ETRS_89
	    codeSpace: INSPIRE RS registry

Example XML encoding	<gmd:referenceSystemInfo>
	        <gmd:MD_ReferenceSystem>
	            <gmd:referenceSystemIdentifier>
	                <gmd:RS_Identifier>
	                <gmd:code>
	                    <gco:CharacterString>ETRS89 </gco:CharacterString>
	                </gmd:code>
	                <gmd:codeSpace>
	                    <gco:CharacterString>INSPIRE RS registry</gco:CharacterString>
	                </gmd:codeSpace>
	                </gmd:RS_Identifier>
	            </gmd:referenceSystemIdentifier>
	        </gmd:MD_ReferenceSystem>
	</gmd:referenceSystemInfo>

Comments	

8.1.2 Temporal Reference System

Metadata element name	Temporal Reference System
Definition	Description of the temporal reference systems used in the dataset.
ISO 19115 number and name	13. referenceSystemInfo
ISO/TS 19139 path	referenceSystemInfo
INSPIRE obligation / condition	Mandatory, if the spatial data set or one of its feature types contains temporal information that does not refer to the Gregorian Calendar or the Coordinated Universal Time.
INSPIRE multiplicity	0..*
Data type(and ISO 19115 no.)	186. MD_ReferenceSystem

Domain	No specific type is defined in ISO 19115 for temporal reference systems. Thus, the generic MD_ReferenceSystem element and its reference SystemIdentifier (RS_Identifier) property shall be provided. NOTEMore specific instructions, in particular on pre-defined values for filling the referenceSystemIdentifier attribute should be agreed among Member States during the implementation phase to support interoperability.
Implementing instructions	

Example	referenceSystemIdentifier:
	    code: GregorianCalendar
	    codeSpace: INSPIRE RS registry

Example XML encoding	`<gmd:referenceSystemInfo>`
	  `<gmd:MD_ReferenceSystem>`
	    `<gmd:referenceSystemIdentifier>`
	      `<gmd:RS_Identifier>`
	        `<gmd:code>`
	
	  `<gco:CharacterString>GregorianCalendar</gco:CharacterString>`
	        `</gmd:code>`
	        `<gmd:codeSpace>`
	          `<gco:CharacterString>INSPIRE RS registry</gco:CharacterString>`
	        `</gmd:codeSpace>`
	      `</gmd:RS_Identifier>`
	    `</gmd:referenceSystemIdentifier>`
	  `</gmd:MD_ReferenceSystem>`
	`</gmd:referenceSystemInfo>`

Comments	

8.1.3 Encoding

Metadata element name	Encoding
Definition	Description of the computer language construct that specifies the representation of data objects in a record, file, message, storage device or transmission channel
ISO 19115 number and name	271. distributionFormat
ISO/TS 19139 path	distributionInfo/MD_Distribution/distributionFormat
INSPIRE obligation / condition	mandatory
INSPIRE multiplicity	1
Data type (and ISO 19115 no.)	284. MD_Format
Domain	See B.2.10.4. The property values (name, version, specification) specified in section **9** shall be used to document the default and alternative encodings.
Implementing instructions	
Example	name: *Utility and governmental services* GML application schema version: version 2.0, GML, version 3.2.1 specification: D2.8.III.6 Data Specification on *Utility and governmental services* – Draft Guidelines

Example XML encoding	`<gmd:MD_Format>`
	        `<gmd:name>`
	            `<gco:CharacterString>` *Utility and governmental services* GML application schema `</gco:CharacterString>`
	        `</gmd:name>`
	        `<gmd:version>`
	            `<gco:CharacterString>`**2.0**, GML, version 3.2.1`</gco:CharacterString>`
	        `</gmd:version>`
	        `<gmd:specification>`
	            `<gco:CharacterString>`D2.8.**III**.6 Data Specification on *Utility and governmental services* – Draft Guidelines`</gco:CharacterString>`
	        `</gmd:specification>`
	`</gmd:MD_Format>`

Comments	

8.1.4   Character Encoding

Metadata element name	Character Encoding
Definition	The character encoding used in the data set.
ISO 19115 number and name	
ISO/TS 19139 path	
INSPIRE obligation / condition	Mandatory, if an encoding is used that is not based on UTF-8.
INSPIRE multiplicity	0..*
Data type (and ISO 19115 no.)	
Domain	
Implementing instructions	
Example	-

Example XML encoding	`<gmd:characterSet>`
	        `<gmd:MD_CharacterSetCode codeListValue="8859part2" codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmxCodelists.xml#CharacterSetCode">`8859-2`</gmd:MD_CharacterSetCode>`
	`</gmd:characterSet>`

Comments	

8.1.5   Data Quality – Logical Consistency – Topological Consistency

Metadata element name	Data Quality – Logical Consistency – Topological Consistency
Definition	Correctness of the explicitly encoded topological characteristics of the dataset as described by the scope
ISO 19115 number and name	18. dataQualityInfo
ISO/TS 19139 path	dataQualityInfo
INSPIRE obligation / condition	Mandatory, if the data set includes types from the Generic Network Model and does not assure centreline topology (connectivity of centrelines) for the network.
INSPIRE multiplicity	0..*
Data type (and ISO 19115 no.)	115. DQ_TopologicalConsistency
Domain	Lines 100-107 from ISO 19115
Implementing instructions	This metadata should be filled, at least, with these elements: - valueUnit: UnitOfMeasure - value: Record
Example	
Example XML encoding	

Comments	See clauses on topological consistency in section 7 for detailed information. This metadata element is mandatory if connectivity is not assured for network centrelines in the dataset. In this case the *Connectivity tolerance* parameter – as described in section 7 – must be provided in order to ensure automatic and unambiguous creation of centreline topology in post-process.

8.2 Metadata elements for reporting data quality

Recommendation 16 For reporting the results of the data quality evaluation quantitatively, the data quality elements and measures defined in chapter 7 should be used.

The scope for reporting may be different from the scope for evaluating data quality (see section 7). If data quality is reported at the data set or spatial object type level, the results are usually derived or aggregated.

Metadata element name	See chapter 7
Definition	See chapter 7
ISO 19115 number and name	80. report
ISO/TS 19139 path	dataQualityInfo/*/report
INSPIRE obligation / condition	optional
INSPIRE multiplicity	0..*
Data type (and ISO 19115 no.)	Corresponding DQ_xxx element from ISO 19115, e.g. 109. DQ_CompletenessCommission
Domain	Lines 100-107 from ISO 19115 100. nameOfMeasure : CharacterString [0..*] 101. measureIdentification : MD_Identifier [0..1] 102. measureDescription : CharacterString [0..1] 103. evaluationMethodType : DQ_EvaluationMethodTypeCode [0..1] 104. evaluationMethodDescription : CharacterString [0..1] 105. evaluationProcedure : CI_Citation [0..1] 106. dateTime : DateTime [0..*] 107. result : DQ_Result [1..2]

Implementing instructions	**Recommendation 17** For each DQ result included in the metadata, at least the following properties should be provided: 100. nameOfMeasure NOTE This should be the name as defined in Chapter 7. 103. evaluationMethodType 104. evaluationMethodDescription NOTE If the reported data quality results are derived or aggregated (i.e. the scope levels for evaluation and reporting are different), the derivation or aggregation should also be specified using this property. 106. dateTime NOTE This should be data or range of dates on which the data quality measure was applied. 107. result NOTE This should be of type DQ_QuantitativeResult
Example	
Example XML encoding	
Comments	See Chapter 7 for detailed information on the individual data quality elements and measures to be used.

Open issue 7: In the ongoing revision of ISO 19115 and development of new ISO 19157 standard (Geographic Information – Data quality), a new element is introduced (DQ_DescriptiveResult). This element enables to describe and report qualitative results of the data quality evaluation and could be used instead of DQ_QuantitativeResult. Once the new (version of the) standards are approved, these guidelines will be revisited and be updated if necessary.

Open issue 8: For reporting compliance with minimum data quality requirements and recommendations specified in section 7, the INSPIRE conformity metadata element should be used.

However, since this issue is part of the larger discussion on the Abstract Test Suite and the definition of conformance classes for the data specification, detailed instructions on how to provide metadata on compliance with minimum data quality requirements and recommendations will only be provided for v3.0.

8.3   Theme-specific metadata elements

No mandatory theme-specific metadata elements are defined for this theme.

No optional theme-specific metadata elements are defined for this theme.

8.3.1   Maintenance Information

Metadata element name	Maintenance information
Definition	Information about the scope and frequency of updating
ISO 19115 number and name	30. resourceMaintenance
ISO/TS 19139 path	identificationInfo/MD_Identification/resourceMaintenance
INSPIRE obligation / condition	optional

INSPIRE multiplicity	0..1
Data type(and ISO 19115 no.)	142. MD_MaintenanceInformation
Domain	This is a complex type (lines 143-148 from ISO 19115). At least the following elements should be used (the multiplicity according to ISO 19115 is shown in parentheses): − maintenanceAndUpdateFrequency [1]: frequency with which changes and additions are made to the resource after the initial resource is completed / domain value: MD_MaintenanceFrequencyCode: − updateScope [0..*]: scope of data to which maintenance is applied / domain value: MD_ScopeCode − maintenanceNote [0..*]: information regarding specific requirements for maintaining the resource / domain value: free text
Implementing instructions	
Example	
Example XML encoding	
Comments	

8.4 Guidelines on using metadata elements defined in Regulation 1205/2008/EC

8.4.1 Conformity

The *Conformity* metadata element defined in Regulation 1205/2008/EC allows to report the conformance with the Implementing Rule for interoperability of spatial data sets and services or another specification. The degree of conformity of the dataset can be *Conformant* (if the dataset is fully conformant with the cited specification), *Not Conformant* (if the dataset does not conform to the cited specification) or *Not evaluated* (if the conformance has not been evaluated).

Recommendation 18   The Conformity metadata element should be used to report conceptual consistency with this INSPIRE data specification. The value of Conformant should be used for the Degree element only if the dataset passes all the requirements described in the abstract test suite presented in Annex A. The Specification element should be given as follows:
- title: "INSPIRE Data Specification on <Theme Name> – Draft Guidelines"
- date:
   - dateType: publication
   - date: 2011-06-17

Open issue 9: Conformance testing is still an open issue under discussion.

Instructions on conformance testing and a common abstract test suite (including detailed instructions on how to test specific requirements) will be added at a later stage.

This may also lead to an update of the recommendations on how to fill the conformity metadata element.

8.4.2 Lineage

Recommendation 19   Following the ISO 19113 Quality principles, if a data provider has a procedure for quality validation of their spatial data sets then the data quality elements listed in the Chapters 7 and 8 should be used. If not, the *Lineage*

metadata element (defined in Regulation 1205/2008/EC) should be used to describe the overall quality of a spatial data set.

According to Regulation 1205/2008/EC, lineage "is a statement on process history and/or overall quality of the spatial data set. Where appropriate it may include a statement whether the data set has been validated or quality assured, whether it is the official version (if multiple versions exist), and whether it has legal validity. The value domain of this metadata element is free text".

The Metadata Technical Guidelines based on EN ISO 19115 and EN ISO 19119 specify that the statement sub-element of LI_Lineage (EN ISO 19115) should be used to implement the lineage metadata element.

Recommendation 20 To describe the transformation steps and related source data, it is recommended to use the following sub-elements of LI_Lineage:
- For the description of the transformation process of the local to the common INSPIRE data structures, the LI_ProcessStep sub-element should be used.
- For the description of the source data the LI_Source sub-element should be used.

NOTE 1 This recommendation is based on the conclusions of the INSPIRE Data Quality Working Group to avoid overloading of the overall lineage statement element with information on the transformation steps and related source data.

NOTE 2 In order to improve the interoperability, domain templates and instructions for filling these free text elements (descriptions) may be specified in an Annex of this data specification.

Open issue 10: The suggested use of the LI_Lineage sub-elements needs to be discussed as part of the maintenance of the INSPIRE metadata Technical Guidelines.

8.4.3 Temporal reference

According to Regulation 1205/2008/EC, at least one of the following temporal reference metadata elements shall be provided: temporal extent, date of publication, date of last revision, date of creation. If feasible, the date of the last revision of a spatial data set should be reported using the *Date of last revision* metadata element.

9 Delivery

9.1 Delivery medium

DS Requirement 2	Data conformant to this INSPIRE data specification shall be made available through an INSPIRE network service.

DS Requirement 3	All information that is required by a calling application to be able to retrieve the data through the used network service shall be made available in accordance with the requirements defined in the Implementing Rules on Network Services.

EXAMPLE 1 Through the Get Spatial Objects function, a download service can either download a pre-defined data set or pre-defined part of a data set (non-direct access download service), or give direct access to the spatial objects contained in the data set, and download selections of spatial objects based

upon a query (direct access download service). To execute such a request, some of the following information might be required:

− the list of spatial object types and/or predefined data sets that are offered by the download service (to be provided through the Get Download Service Metadata operation),

− and the query capabilities section advertising the types of predicates that may be used to form a query expression (to be provided through the Get Download Service Metadata operation, where applicable),

− a description of spatial object types offered by a download service instance (to be proviced through the Describe Spatial Object Types operation).

EXAMPLE 2 Through the Transform function, a transformation service carries out data content transformations from native data forms to the INSPIRE-compliant form and vice versa. If this operation is directly called by an application to transform source data (e.g. obtained through a download service) that is not yet conformant with this data specification, the following parameters are required:
Input data (mandatory). The data set to be transformed.

− Source model (mandatory, if cannot be determined from the input data). The model in which the input data is provided.

− Target model (mandatory). The model in which the results are expected.

− Model mapping (mandatory, unless a default exists). Detailed description of how the transformation is to be carried out.

9.1.1 Specific Delivery medium

"Administrative and social governmental services are commonly presented in governmental and municipal portals and map systems as "point of interest"-data …" [D2.3: Definition of Annex Themes and Scope]

The portrayal of a service as a symbol in a map won't be sufficient in many cases. Further information, e.g. contact data, is essential to use the service.

Recommendation 21	View services delivering governmental services data should provide queryable layers and the GetFeatureInfo operation [ISO 19128]

9.2 Encodings

9.2.1 Default Encoding(s)

DS Requirement 4	Data conformant to the application schema(s) defined in section 5.1.5 shall be encoded using the encoding(s) specified in this section.

9.2.1.1. Default encoding for application schema <application schema name>

Name: Format names: "Utility and Governmental Services", "Administrative and social Governmental Services", "Utility Networks – Abstract types", "Utility Networks – Application schemas", "Utility Networks – Common types", "Electricity Network", "Oil & Gas Network", Sewer Network", "Telecommunications Network", "Water Network" and "Waste Management" GML Application Schema
Version: version 2.0, GML, version 3.2.1
Specification: D2.8.III.6 Data Specification on *Utility and governmental services* – Draft Guidelines
Character set: UTF-8

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

10 Data Capture

For Utility networks

The data capture for utility networks refers a lot to any other network.
Then, please have a look to what has been written in *Transport Networks* data specification document, regarding network data capture, this will be relevant for our sub-theme too.

For Administrative and social governmental services

> **Recommendation 22**   All administrative and social governmental services data which are under the IN-SPIRE scope shall be published

Administrative and social governmental services data, due to their nature, may be captured and provided by different producers at different levels of (mainly) Public Administration, from local to European, depending on what is the level and the administrative scope of the correspondent responsible party.

Due to this fact, it is expected that data are provided at very different scales/resolutions, covering different sub-sets of service types and following different modelling approaches, depending on the concrete needs of their correspondent producers and target users. This way, it can not be expected that a single set of requirements may be established in order to harmonize this theme's data sets. In consequence, just the following recommendations are proposed:

> **Recommendation 23**   Given that it is not expected that all of the available administrative and social governmental services datasets are captured, produced and publicized by a single level of Public Administration Bodies and that it may happen that these bodies may be responsible for just one or several sub-sets of data, not necessarily comprising all of the services listed at ServiceTypeValue codelist, data should be captured in such conditions that they may be classified into one or several of the service types listed within the above named codelist.

> **Recommendation 24**   In order to fulfil the previous recommendation, datasets should be built by setting different sub-layers for each of the service types covered. Each of these sub-layers shall correspond to one of the service types included in, at least, level one of ServiceTypeValue codelist.

> **Recommendation 25**   In order to minimize the risk of geometrical and positional incoherence between different datasets regarding administrative and social governmental services, when data about an instance of this sub-theme is located by means of GM_Object, it is recommended to choose GM_Point as default.

> **Recommendation 26**   When data about an instance of administrative and social governmental services is located by means of a point or an address, these ones should correspond to the main access point to the space where the service is provided from.

In the case that different services are provided from a single building/facility, they may be located by different points/addresses by following the previous recommendation for each one of those points/addresses.

In example, a hospital may consist of different buildings. If hospital service is modelled as a whole, its location point or address should correspond to that of the main entrance to the hospital. In the opposite, if different services (e.g.: cardiology, emergency, general medicine, traumatology, etc.) within the hospital are modelled separately, their location references should correspond to the main access point to each of those services.

11 Portrayal

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

In section 11.1, the *types* of layers are defined that are to be used for the portrayal of the spatial object types defined in this specification. A view service may offer several layers of the same type, one for each dataset that it offers on a specific topic.

Section 11.2 specifies the styles that shall be supported by INSPIRE view services for each of these layer types.

In section 11.3, further styles can be specified that represent examples of styles typically used in a thematic domain. It is recommended that also these styles should be supported by INSPIRE view services, where applicable.

Where XML fragments are used in these sections, the following namespace prefixes apply:
- sld="http://www.opengis.net/sld" (WMS/SLD 1.1)
- se="http://www.opengis.net/se" (SE 1.1)
- ogc="http://www.opengis.net/ogc" (FE 1.1)

IR Requirement 12	If an INSPIRE view services supports the portrayal of data related to the theme *Utility and governmental services*, it shall provide layers of the types specified in this section.

DS Requirement 5	If an INSPIRE view network service supports the portrayal of spatial data sets corresponding to the spatial data theme *Utility and governmental services*, it shall support the styles specified in section 11.2. If no user-defined style is specified in a portrayal request for a specific layer to an INSPIRE view service, the default style specified in section 11.2 for that layer shall be used.

Recommendation 27	In addition to the styles defined in section 11.2, it is recommended that, where applicable, INSPIRE view services also support the styles defined in section 11.3.

11.1 Layers to be provided by INSPIRE view services

Layer Name	Layer Title	Spatial object type(s)	Keywords
UN.WaterNetwork.Link	Generic Water Network Link Default Style	Network Link	Generic Network Link, Water Network
UN.WaterNetwork.Node	Generic Water Network Node Default Style	Network Node	Generic Network Node, Water Network
UN.SewerNetwork.Link	Generic Sewer Network Link Default Style	Network Link	Generic Network Link, Sewer Network
UN.SewerNetwork.Node	Generic Sewer Network Node Default Style	Network Node	Generic Network Node, Sewer Network

UN.Oil&GasNetwork.Link	Generic Oil&Gas Network Link Default Style	Network Link	Generic Network Link, Oil&Gas Network
UN.Oil&GasNetwork.Node	Generic Oil&Gas Network Node Default Style	Network Node	Generic Network Node, Oil&Gas Network
UN.ElectricityNetwork.Link	Generic Electricity Network Link Default Style	Network Link	Generic Network Link, Electricity Network
UN.ElectricityNetwork.Node	Generic Electricity Network Node Default Style	Network Node	Generic Network Node, Electricity Network
UN.TelecommunicationsNetwork.Link	Generic Telecommunications Network Link Default Style	Network Link	Generic Network Link, Telecommunication Network
UN.TelecommunicationsNetwork.Node	Generic Telecommunications Network Node Default Style	Network Node	Generic Network Node, Telecommunication Network
US.AdministrativeAndSocialGovernmentalService[20]	*Administrative and social governmental service Style*	*GovernmentalService*	*Keywords accordant to the name of the corresponding serviceTypeValue code list item*
US.WasteManagementInstallation	Waste Management – Installation Style	WasteManagementInstallation	Waste, facility
US.WasteManagementSite	Waste Management – Site Style	WasteManagementSite	Waste, facility

11.1.1   Layers organisation

The layer "*Utility and governmental services*" could be comprised of three main layer:
- Utility networks;
- Administrative and social governmental services; and
- Waste management;

Concerning the first one (Utility networks), it could be comprised of 5 sub-layers:
- Water network
- Sewer network
- Electricity network
- Telecommunications network
- Oil & gas network

Best practices and specific recommendations for administrative and social governmental services:

Member states can provide layers for several service types given in the ServiceTypeValue list. Then layers should be organized in groups accordingly to the structure of the list.

Governmental services data, due to their nature, may be provided by different producers at different levels of (mainly) Public Administration, from local to European, depending on what is the level of the correspondent responsible party. Due to this fact, it is expected that data are provided at very different scales/resolutions and following different modelling approaches, depending on the concrete needs of their

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[20] *One layer for each service type accordant to the serviceTypeValue code list*

correspondent producers and target users. This way, it cannot be expected that a single set of recommendations may be set in order to harmonize this theme's data sets.

Even this may be seen as an obstacle to harmonization, it will not suppose any big problem if the POINT geometry is chosen, as point/icon representation does not suffer any resolution loose when depicted at different scales and it does perfectly fit the needs derived from the use cases and requirements that have been taken into consideration when developing the present specification, and which are listed in Annexes B & C.

As explained within document "*D 2.3: Definition of INSPIRE Annex Themes and Scope*" and reproduced at 2.2.2 and 5.4.1.1 back in this specification, due to their nature of "*types of information that are often published or mapped as "points-of-interest"-data (POI)*", it is highly recommendable that, whenever possible, governmental services data are modelled as point objects and portrayed by this same geometry of points, combined with a colour schema to differentiate each sub-layer corresponding to (at least) high level types of GS, or, alternatively, by asociating specific sub-layer icons to those same points.

The first and main reason to do so is that point is the geometry that better fits the mentioned nature of POI of these data.

Secondly, point geometry makes that identifying them, when portrayed upon/between several other thematic layers, becomes easier. This is so mainly because using other geometries may cause interpretation conflicts with data from other thematic layers that may be linked to the same spatial objects (be them buildings, cadastral parcels, facilities, etc) or even to neighbouring ones. I.e. if a given governmental service, which is provided from one given building, is represented through the geometry of that building, it may happen that, when overlapping US theme data with BU data, the geometries of the building and of the service do not fit properly due to having been captured at different scales/resolutions or under different positional accuracies. In which case, the lack of coherence between both data sources will produce confusion in their common users.

Finally, when dealing with different services being provided from the same site/building (multi-purpose ones), or (once again) from neighbour ones, the point representation will make it easier to understand this multiplicity of services, whilst the representation of several overlapped polygons may also cause confusion to the final user.

In the example below, the overlapping of different GS data sub-layers on a complex background consisting of a set of different base mapping and thematic layers could be rather difficult to understand if all of those services where portrayed as polygons, overlapping with building, street and hydrography ones.

Figure 19: Example of portrayal of a multiplicity of GS type data over a complex background (Source: webEIEL, from Diputación de A Coruña – Spain. http://www.dicoruna.es/webeiel)

As for layers, even Governmental Services are modelled as only one feature class (*GovernmentalService*) it is recommendable that different types of services are portrayed as different sub-layers in order to:

    a) Letting the user query and explore those exact services that are of her interest, letting her avoid all of the rest

    b) Clearly depicting different types of services by using a colour schema or by, as in Figure 20, associating given icons to each type. Even this could be done by means of generating query lead thematic views on GS layer, it is predictable that not all of the available viewing services (or geoportals) will be offering this kind of functionality.

In consequence, the recommended minimal set of sub-layers would be the one that corresponds with the elements in the main level of *ServiceTypeValue* codelist (see Annex D). But,

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Recommendation 28   In order to achieve the results commented in the previous paragraphs, it is recommended that the number of sub-layers is increased as to completely cover the first level of ServiceTypeValue codelist

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A second level of harmonization should be achieved by normalizing the names of the layers and sub-layers. And this normalization should be independent of the number of sub-layers that may contain a given dataset.

Recommendation 29   Recommendation RR+1: In order to harmonize the naming of the layers and sub-layers, these should be denominated by adding to the general acronym "GS_ " (for Governmental Service) the name of the main level type of service, followed by the name of the first level type of service and so on.

In example of what preceeds, the name for a sub-layer showing Hospitals would be:
GS_HealthHospitalservices

11.2 Styles to be supported by INSPIRE view services

11.2.1 Styles for the layer Administrative and social governmental services

Best practices and specific recommendations for administrative and social governmental services:
The spatial attribute, which can be used for portrayal of GovernmentalServices is serviceLocation . The location of the service shall be portrayed as point symbols. Depending on the chosen data type for serviceLocation, the position of the symbol can either taken directly from a point geometry or can be computed by GIS functionality (e.g. by functions like "centroid" or "pointOnSurface").

This specification doesn't provide default styles for the portrayal of spatial data sets corresponding to the sub-theme Administrative and social governmental services. This issue is discussed in Annex E.

To avoid misinterpretations by the users, it is proposed to have a fine-grained layer resolution (see clause 11.1) and layer structure (see clause 11.1.1). The GetFeatureInfo operation [ISO 19128] (see Recommendation 22) will additionally help users to interpret different symbols from different data providers

11.2.2 Styles for the layer Waste management

> **Recommendation 30**   If an INSPIRE view network service supports the portrayal of spatial data sets corresponding to the spatial data theme Waste Management, it shall support the default styles specified in the tables in this section. If no user-defined style is specified in a portrayal request for a specific layer to an INSPIRE view service, the default style specified in this section for that layer shall be used

Style Name	US.WasteManagementInstallation.Default
Default Style	yes
Style Title	Waste Management – Installation Style
Style Abstract	Point geometries are rendered as a triangle with a size of 5 pixels, with a 50% grey (#808080) fill and a black outline

Symbology	`<sld:NamedLayer>`
	`  <se:Name>US.WasteManagementInstallation</se:Name>`
	`  <sld:UserStyle>`
	`   <se:Name> US.WasteManagementInstallationDefault</se:Name>`
	`   <sld:IsDefault>1</sld:IsDefault>`
	`   <se:FeatureTypeStyle version="1.1.0" xmlns:PS="urn:xinspire:`
	`specification:WasteManagement:3.1">`
	`    <se:Description>`
	`     <se:Title>Waste Management – Installation Style</se:Title>`
	`     <se:Abstract>Point geometries are rendered as a triangle with a size of 5 pixels, with a 50%`
	`       grey (#808080) fill and a black outline.</se:Abstract>`
	`    </se:Description>`
	`    <se:FeatureTypeName>US:WasteManagementInstallation</se:FeatureTypeName>`
	`    <se:Rule>`
	`      <se:PointSymbolizer>`
	`        <se:Geometry>`
	`          <ogc:PropertyName>US:geometry</ogc:PropertyName>`
	`        </se:Geometry>`
	`      </se:PointSymbolizer>`
	`    </se:Rule>`
	`   </se:FeatureTypeStyle>`

	</sld:UserStyle> </sld:NamedLayer>
Minimum & maximum scales	1:50 000 – 1:20 000
Style Name	**US.WasteManagementSite.Default**
Default Style	yes
Style Title	Waste Management – Site Style
Style Abstract	Point geometries are rendered as a triangle with a size of 5 pixels, with a 50% grey (#808080) fill and a black outline. Line geometries are rendered as a solid black line with a stroke width of 1 pixel. Polygon geometries are rendered using a 50% grey (#808080) fill and a solid black outline with a stroke width of 1 pixel.

Symbology	<sld:NamedLayer>
	  <se:Name>US.WasteManagementSite</se:Name>
	  <sld:UserStyle>
	  <se:Name>US.WasteManagementSiteDefault</se:Name>
	  <sld:IsDefault>1</sld:IsDefault>
	  <se:FeatureTypeStyle version="1.1.0" xmlns:PS="urn:xinspire:
	specification:WasteManagement:3.1">
	   <se:Description>
	    <se:Title>Waste Management – Site Style</se:Title>
	    <se:Abstract>Point geometries are rendered as a circle with a size of 7 pixels, with a 50% grey (#808080) fill and a black outline. Line geometries are rendered as a solid black line with a stroke width of 1 pixel. Polygon geometries are rendered using a 50% grey (#808080) fill and a solid black outline with a stroke width of 1pixel.</se:Abstract>
	   </se:Description>
	   <se:FeatureTypeName>US:WasteManagementSite</se:FeatureTypeName>
	   <se:Rule>
	    <se:PolygonSymbolizer>
	     <se:Geometry>
	      <ogc:PropertyName>US:geometry</ogc:PropertyName>
	     </se:Geometry>
	    </se:PolygonSymbolizer>
	    <se:LineSymbolizer>
	     <se:Geometry>
	      <ogc:PropertyName>US:geometry</ogc:PropertyName>
	     </se:Geometry>
	    </se:LineSymbolizer>
	    <se:PointSymbolizer>
	     <se:Geometry>
	      <ogc:PropertyName>US:geometry</ogc:PropertyName>
	     </se:Geometry>
	    </se:PointSymbolizer>
	   </se:Rule>
	  </se:FeatureTypeStyle>
	  </sld:UserStyle>
	</sld:NamedLayer>

Minimum & maximum scales	1:50 000 – 1:20 000

11.3 Other recommended styles

No other well-defined styles are defined in this specification.

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[ISO 19107] EN ISO 19107:2005, Geographic information – Spatial schema (ISO 19107:2003)

[ISO 19108] EN ISO 19108:2005 Geographic information - Temporal schema (ISO 19108:2002)

[ISO 19111] EN ISO 19111:2007 Geographic information - Spatial referencing by coordinates (ISO 19111:2007)

[ISO 19115] EN ISO 19115:2005, Geographic information – Metadata (ISO 19115:2003)

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Annex A
(normative)

Abstract Test Suite

Any dataset conforming to this INSPIRE data specification shall meet all requirements specified in this document.

Open issue 11: Conformance testing is still an open issue under discussion.

Instructions on conformance testing and a common abstract test suite (including detailed instructions on how to test specific requirements) will be added at a later stage.

Annex B
(informative)
Use cases

As mentioned in Annex E of the ""Data Specifications" Methodology for the development of data specifications", the TWG-US identified several use cases for some sub-themes that are hereunder referenced, or detailed within the checklist framework presented in another Annex (i.e. Annex C Check Lists for Data Interoperability").

B.1 *Use case for "Utility networks"*

B.1.1 *Introduction*

This document provides a use case of the subtheme "Utility networks" within the INSPIRE theme "Utility and Government services" (US).

This subtheme is described in the INSPIRE Feature Concept Dictionary as follows:

"Utility services/networks: Physical construction for transport of defined products: These may include pipelines for transport of oil, gas, water, sewage or other pipelines. Transmission lines may include electrical, phone, cable-TV or other networks. Transmission lines for both land and at sea/water (bottom) is important. All kinds of transmission systems have nodes and are linked to facilities for production and treatment of different kinds of products. Despite being heavily interlinked, the themes in INSPIRE are treated separately – the production and treatment facilties are treated mainly in the theme production and industrial facilities. Transmission systems may be of different kinds;

- *Oil and gas pipelines: Major lines from oil and gas fields/extraction areas and storage sites. Important production and treatment facilities of such resources is linked to a such a transport network, such as nuclear power stations, power stations, transformer stations and oil tanks. GISCO, Energy/ industry authorities, Companies*

- *Water pipelines: Location of water pipelines – large and local network. Large transmission lines are of interest here. Linked to production facilities for water for consumption/processes. Irrigation lines treated separately under agricultural facilities. Water supply institutions, Utilities/ health*

- *Sewage pipelines: Sewage network, linked to sewerage facilities. Major lines of interest here. Utilities*

- *Transmission lines- electrical: Data set showing larger transmission lines for electricity, both at land and sea. The location of lines is important knowledge for the energy sector itself, land use planners, construction, fisheries for sea cables. Parts of the information important in low flight hindrance databases. Large: national energy/industry institutions. Local authorities, Companies*

- *Transmission lines-phone/ data/cable-TV: Location of phone/ data: Rough data needed in land planning. Important transmission nodes, e.g. antennas, may be seen as part of the network. The cables placement can conflict other natural resource utilization activities, e.g. fisheries. Technical data accuracy for local level Companies*

Rough pipeline and utility service databases exist at European level, e.g. GISCO database with scale 1:1.000.000. Data within countries is non-homogenous. There are examples of national portals warning on construction, distributing maps/data on location of pipelines. At local and regional level the responsibility of government offices or different operators/ firms. In some countries there are national portals for information about cables etc. in construction work."

B.1.2 *Use case description: Use case TWG_US_UN_KLIP*

Part 1: UML use case diagram
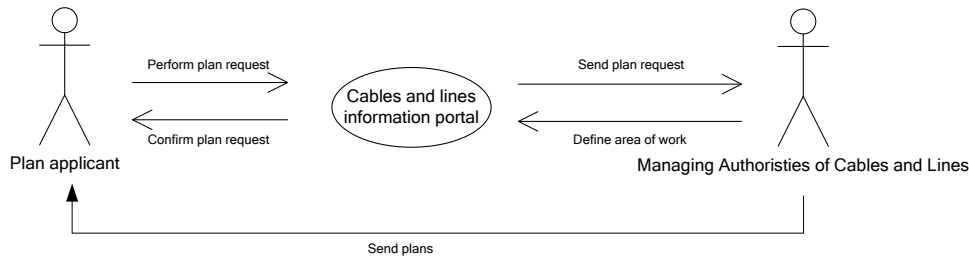
Part 2: Narrative explanation of the use case

The cables and lines information portal (called KLIP) has been designed to unlock the information concerning cables and lines. This information is available with the managing authorities of the cables and lines. The purpose of the information portal is to avoid excavation damage.

When a contractor plans excavation works he/she sends a plan request to the cables and lines information portal. The information portal checks which managing authorities of cables and lines are present in this area, and forwards the request to the managing authorities that are present in the area. This can be managing authorities of oil and gas pipelines, water pipelines, sewage pipelines, transmission lines – electrical, and transmission lines – phone/data/cable tv.

The cables and lines information portal sends a confirmation to the contractor who asked for the plans. The managing authority checks if they have indeed cables and/or lines in the defined area. The relevant plans in this area are selected. The managing authority sends the selected plans by mail. After the contractor has received the plans, he can start the works.

Part 3: Detailed, structured description of the use case

Use Case Description	
Name	Cables and lines information portal
Priority	<high/medium/low>
Description	This information portal has been designed to unlock the information concerning cables and lines. This information is available with the managing authorities of the cables and lines. The purpose of the information portal is to avoid excavation damage.
Pre-condition	The managing authorities of cables and lines indicate the zones where they manage cables and lines.
Flow of Events - Basic Path	
Step 1	The contractor goes to the information portal and defines the area of work.
Step 2	The information portal checks which managing authorities of cables and lines are present in this area and sends a request to these managing authorities.
Step 3	The information portal also sends a confirmation to the contractor.
Step 4	The managing authority checks if they have indeed cables and/or lines in the defined area. The relevant plans in this area are selected.
Step 5	The managing authority sends the selected plans by mail. After the contractor has received the plans, he can start the works.
Flow of Events - Alternative Paths	
Step 6	In future View Services will be provided instead of paper maps
Post-condition	The contractor can start working in the area of work.
Data source: Oil and gas pipelines	
Description	Location of oil and gas pipelines
Data provider	Municipalities, private bodies managing the oil and gas pipelines
Geographic scope	Europe

Thematic scope	See description
Scale, resolution	Local
Delivery	Map, View Services (map layer)
Documentation	http://klip.agiv.be/Support/Default.aspx
Data source: Water pipelines	
Description	Location of water pipelines
Data provider	Municipalities, private bodies managing the water pipelines
Geographic scope	Europe
Thematic scope	See description
Scale, resolution	Local
Delivery	Map, View Services (map layer)
Documentation	http://klip.agiv.be/Support/Default.aspx
Data source: Sewage pipelines	
Description	Location of sewage pipelines
Data provider	Municipalities, private bodies managing the sewage pipelines
Geographic scope	Europe
Thematic scope	See description
Scale, resolution	Local
Delivery	Map, View Services (map layer)
Documentation	http://klip.agiv.be/Support/Default.aspx
Data source: Electrical transmission lines	
Description	Location of electrical transmission lines
Data provider	Municipalities, private bodies managing the electrical transmission lines
Geographic scope	Europe
Thematic scope	See description
Scale, resolution	Local
Delivery	Map, View Services (map layer)
Documentation	http://klip.agiv.be/Support/Default.aspx
Data source: Phone/data/cable tv transmission lines	
Description	Location of phone/data/cable tv transmission lines
Data provider	Municipalities, private bodies managing the phone/data/cable tv transmission lines
Geographic scope	Europe
Thematic scope	See description
Scale, resolution	Local
Delivery	Map, View Services (map layer)
Documentation	http://klip.agiv.be/Support/Default.aspx

B.2 *Use case for "Administrative and social governmental services"*

B.2.1 *Introduction*

This documents provides two use cases of the subtheme "Government services" (GS) within the INSPIRE theme "Utility and Government services" (US).

According to (D 2.6, p. 79) the theme and the subtheme respectively is "A very broad INSPIRE theme including different kinds of objects …".

The subtheme is defined as follows (D 2.6, p. 81):

"Administrative and social governmental services such as public administrations, civil protection, sites, schools, hospitals. The kinds of sites are commonly presented in governmental and municipal portals and map system as "point of interest"-data, and may be point-based location of a variety of categories of municipal and governmental services and social infrastructure.

- police stations,
- fire fighter stations
- hospitals
- health care centres
- care centres for the elderly
- schools and kindergartens
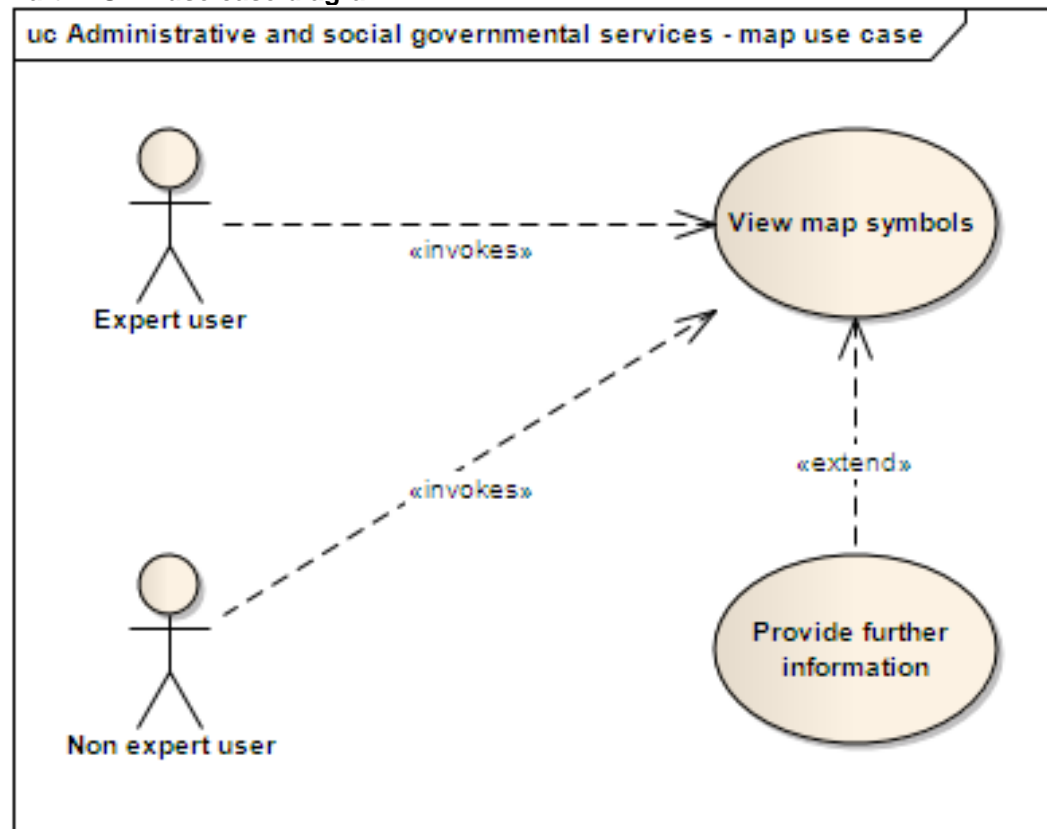- renovation/ waste delivery sites
- government and municipal offices"

The given scope and use examples are (D 2.6, p. 82):

"Administrative and governmental service information is being used by the citizen and public information systems, in government and municipal management actions and in planning. The navigation databases used in cars commonly include such information."

Accordingly to this presetting, the spread of possible use cases is very wide, too. To capture this scope and to gain a basement for the next steps, the subgroup has decided to define first two generic, high level use cases. This two use cases may be refined in further work to fulfill special requirements. It should be mentioned, that the previous requirement survey couldn't provide any use case for the subgroup.

B.2.2 *Use case TWG_US_GS_Map_case*

Part 1: UML use case diagram

uc Administrative and social governmental services - map use case

Expert user «invokes» → View map symbols

Non expert user «invokes» → View map symbols

«extend» Provide further information

Part 2: Narrative explanation of the use case

The data, which represent the scope, are usually used in governmental and municipal portals. The data are provided as map layers, optional supplemented by some thematic data (WMS GetFeatureInfo operation). The user (actor) searches for the layer using the functionality of a geoportal, selects the layer, navigates to

a location and views ("consumes") the map. POI's are displayed as symbols. The actor can click at a symbol and gets some information to the POI (in case the layer is queryable).

In contrast to the majority of INSPIRE themes, the group of actors is as inhomogeneous as the interfaces they use. It varies from a GI-expert (PAB officer, private planning office staff, …), who wants to add the layer in its GIS to a layman, who uses a map application on its mobile phone. This diversity is addressed by the functionality of the map clients mainly, but has some influence to the data, too:

- The symbols for the POI's should be easy to understand.
- The map layer metadata should provide a list of keywords, so that the clients are able to support search by laymen (in an emergency case search for "Doctor" should find "Hospital", too).
- A minimum of thematic information is necessary for a lot of use cases in detail (e.g. kind of service, short explanation, contact information, service/office hours, URL, …). This core attributes have to be defined; they shouldn't be voidable. Usually the map applications don't include rich WFS clients, so this information should be provided by the INSPIRE View Service. It has to be mentioned, that the GetFeatureInfo operation is optional in INSPIRE View Services.

The purposes of use are different, but the flows of events are comparable.

Part 3: Detailed, structured description of the use case

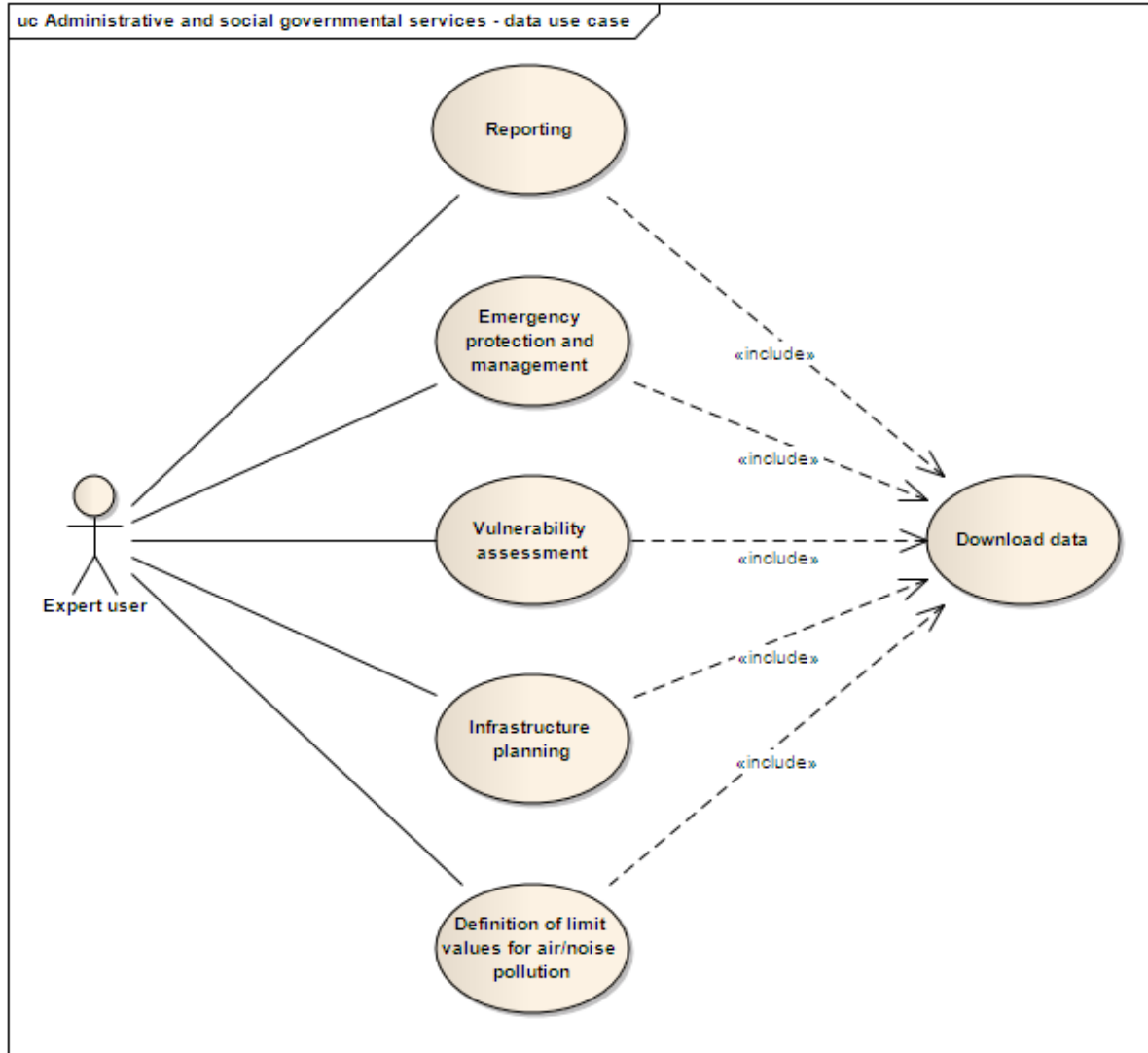| Use Case Description	
Name	TWG_US_GS_map_case
Priority	depending on the situation high, medium or low
Description	An actor is searching for a service (including government and municipal offices) for varying purposes and in different situations. The actor wants to get a map layer, wherein the location of the service is marked with a symbol. The actor wants to get some further information about the service.
Pre-condition	The data have to exist and have to be provided by an INSPIRE View Service, preferably with the GetFeatureInfo Interface. The actor uses a map client with a base map.
Flow of Events - Basic Path	
Step 1	The actor accesses to a geoportal.
Step 2	The actor opens a base map and selects a map window (by map navigation, by meaning of a gazetteer, with the built-in GPS, ...).
Step 3	The actor selects the map layer "Government services" and a subitem (e.g. "Hospitals").
Step 4	The desired layer is added to the map.
Flow of Events - Alternative Paths	
Step 5	By clicking at the symbol some further information about the service are displayed.

Post-condition	none
Data source: POI	
Description	Data about "a variety of categories of municipal and governmental services and social infrastructure." (D 2.3.) This overall use case requires the type/subtype of the POI, its location (given as GM_Point), the core attributes (see above) and some other attributes, depending on the specific use case. A portrayal rule is needed. To support thin GPS devices, the CRS "WGS 84 / plate carrée" should be available. Usually the POI's location originally is given as a reference to an address/building/cadastral parcel. In these cases the reference has to be mapped to coordinates.
Data provider	regions, communes, municipalities, private bodies
Geographic scope	Europe
Thematic scope	see description
Scale, resolution	local
Delivery	INSPIRE View Service (map layer), INSPIRE Download Service (for additional information)
Documentation	Partly in the documentation of the national base maps.

B.2.3 *Use case TWG_US_GS_Data_case*

Part 1: UML use case diagram

uc Administrative and social governmental services - data use case

Reporting

Emergency protection and management

Vulnerability assessment

Infrastructure planning

Definition of limit values for air/noise pollution

Expert user

Download data

«include»

«include»

«include»

«include»

«include»

Part 2: Narrative explanation of the use case

Unlike TWG_US_GD_map_case, the actor in this use case is a GIS user. He needs information about a service for varying purposes and in different situations and he wants to import the data into a GIS. Examples are:

- **planning** of governmental services (location allocation)
- **definition of limit values for air pollution**
  Some government services (kindergartens, schools and hospitals) can be protected by stricter limit values.
  (DIRECTIVE 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air (Article 4): "Whereas the limit values laid down in this Directive are minimum requirements; whereas, in accordance with Article 130t of the Treaty, Member States may maintain or introduce more stringent protective measures; whereas, in particular, stricter limit values may be introduced to protect the health of particularly vulnerable categories of the population, such as children and hospital patients;")
  (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31999L0030:EN:NOT)
- **emergency management**
  Use case: A hospital/kindergarten/home for the elderly has to be evacuated: Which other facility is adequate equipped to host the people?
- **reporting**
  Some governmental services (schools and hospitals) have to be part of noise maps. (Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise (Annex IV))
 (*http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0049:EN:NOT*)

Part 3: Detailed, structured description of the use case

Use Case Description	
Name	TWG_US_GS_data_case
Priority	depending on the situation high, medium or low
Description	An actor wants to import data about a governmental service into his GIS.
Pre-condition	The data have to exist and have to be provided by an INSPIRE Download Service. The actor uses a GIS.
Flow of Events - Basic Path	
Step 1	Using a Metadata Information System (Catalog), the actor searches, finds and evaluates the data and the corresponding INSPIRE Download Service.
Step 2	The actor uses the INSPIRE Downsload Service and imports the data in his GIS.
Flow of Events - Alternative Paths	
	none
Post-condition	The actor is able to process the data for his purpose.
Data source: POI	
Description	Data about "a variety of categories of municipal and governmental services and social infrastructure." (D 2.3.) The use case requires the POI as feature data. Although a spatial reference by coordinates is preferable, the reference can be given by a geographic identifier as well. In this case the actor has to use a gazetteer service first.
Data provider	regions, communes, municipalities, private bodies
Geographic scope	Europe
Thematic scope	see description
Scale, resolution	local
Delivery	INSPIRE Download Service
Documentation	Partly in the documentation of the national base maps.

B.2.4 *Use Case: SITMAP – Territorial Information System of Málaga Province (Spain)*

Part 1: UML use case diagram
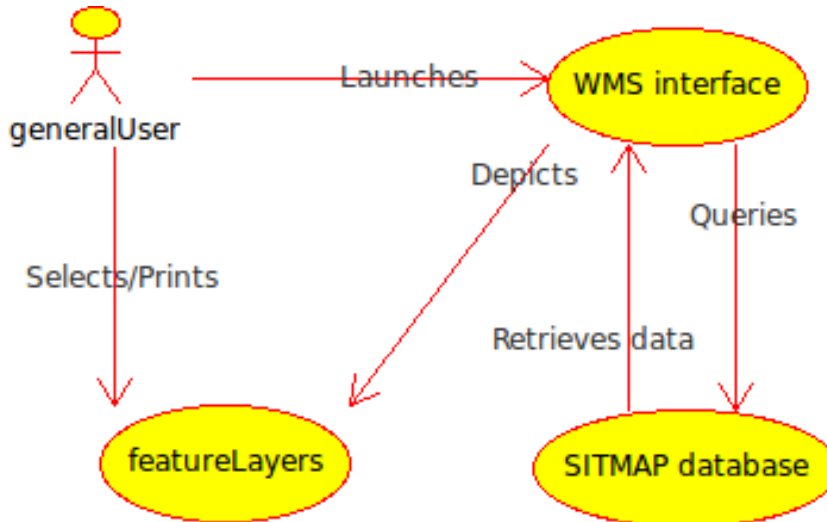
Part 2: Narrative explanation of the use case

SITMAP is the territorial information system that Diputación de Málaga (Málaga Province Council) has developed to both manage its territorial data, Málaga Province municipalities managing those same data and both of them, as well as general users, querying SITMAP database. This latter is the case that we are considering within this document, as it implies the use of web services and interfaces.

Moreover topological data, SITMAP database contains a broad set of data referring to utilities and public services. The contents of that set are basically structured accordingly to EIEL[21] requirements, as approved by the Spanish Ministry for Territorial Policies and Public Administrations (MPT). Nevertheless, SITMAP database contains also data regarding features which are currently not included within EIEL, but needed by Diputación de Málaga to manage different services. So SITMAP is broader in scope than EIEL.

Due to the above explained, this use case can be considered as a paradigmatic example between all of those that make use of EIEL database as support for local and provincial governments activities managing, namely "BDT-EIEL" from Diputación de A Coruña or "SITMUN" from Diputación de Barcelona.

Part 3: Detailed, structured description of the use case

Use Case Description	
Name	TWG_US_GS_SITMAP
Priority	depending on the situation high, medium or low
Description	An actor (be her a Local Level Public Sector one, a citizen or an employee from a company) is searching for territorial data about utilities and services (including government and municipal offices) for different purposes. The actor wants to access the database, select a feature type (or a given instance of a feature type) and, through the appropriate interface, being able of getting some information about the existence or characteristics of instances location of the features in the database, or about the relationships between given features in different classes (e.g.: distance from schools to main roads, schools in a municipality,

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[21]EIEL: Spanish acronym for "Enquiry on Local Infrastructures and Services"

	etc).
Pre-condition	The data have to exist and have to be provided by means of an OGC compliant Web Mapping Service. The data have to be referenced upon an standard System (WGS84, ED50, ETRS89) The actor uses a map client with a base map.
Flow of Events - Basic Path	
Step 1	The actor accesses to a geoportal.
Step 2	The actor opens a base map and selects a map window (by map navigation, by meaning of a gazetteer, with the built-in GPS, ...).
Step 3a	The actor selects one map layer (e.g. "Utilities") and a sub-item (e.g. "water supply networks").
Step 4	The desired layer is depicted on the map.
Step 5	The actor clicks on a part of the layer and queries it about its attributes
Step 6	The required attributes are shown in a data window
Step 7	The actor prints the so built map, the contents of the data window or both of them
Flow of Events - Alternative Paths	
Step 3b	The actor selects several map layers and sub-items. She may also select layers being provided by third parties (e.g.: Cadastral parcels or orthoimagery) to add them to the base map as reference information.
Step 4b	The desired set of layers are depicted on the map
Step 5b	The actor selects different objects from the active map layers and queries the database about their atributes
Step 6b	The required attributes and the relations between geographical objects are shown in a data window
Step 7	As above
Post-condition	none
Data source: Multi-geometry	
Description	Data about "a variety of categories of municipal and governmental services and social infrastructure." (D 2.3.) This use case, given that it refers to local scales/resolutions, requires different kinds of geometries to represent the different feature classes, as well as their location (by means of planar or geographic coordinates) and their descriptive attributes.
Data provider	Province Council, municipalities, third parties.
Geographic scope	Province
Thematic scope	see description
Scale, resolution	local
Delivery	INSPIRE View Service (map layer), INSPIRE Download Service (for additional information)
Documentation	TWG US/US_Check-list_UserRequirements_Template_MálagaProvinceCouncil.doc at CIRCA Library/Drafting Team Folders/Data Specifications/Thematic Working Groups/Utility an...ices (US)/TWG US Use cases

B.3 *Use case for "Waste Management"*

B.3.1 *Introduction*

Developing Use-Cases is a powerful method for creating information products, which has been adopted for INSPIRE data specification process. The INSPIRE Methodology for Data Specification Development (D2.6) foresees a user-driven specification method based on use-case development. This approach has

been followed during the development of the Annex I Data themes and is now followed by the Annex II and III Thematic Working Groups (TWGs).

Development of common Use-Cases would not only show possible inter-linkages and dependencies among INSPIRE Data themes, also serve as a real demonstrator of the interoperability of the INSPIRE data specifications.

This document is related with the development, monitoring and disclosure of waste plans developed by different Members States, directly or transferred to Regional Governments, following the requirements stablished by the Directive **2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste.** As resume, this establishes the legislative framework for the handling of waste in the Community and the obligation for the member states to draw up waste managements plans as part of it. A more general extract of the Directive and its potential implication

There are several initiatives already accessible that show Geo-referenced information, different thematic covertures linked, as result of the implementation of these plans. Geographical information is also attached to other kind of formats where this plans are described.

Some real examples can be acceded here:

http://www.sepa.org.uk/waste/waste_infrastructure_maps.aspx

http://www.wicklow.ie/Apps/WicklowBeta/Publications/Environment/WasteManPlan/Final%202006-2011%20Waste%20Management%20Plan%20Volume%203.pdf

*http://www.walesregionalwasteplans.gov.uk/south_west/regional_waste_plan_first_review.html*

http://www.legislation.gov.uk/uksi/2008/314/regulation/6/made

http://www.devon.gov.uk/index/environment/planning-system/planning_minerals_and_waste/waste_planning/waste_local_plan-2.htm

http://www.epa.ie/whatwedo/resource/hazardous/

There are different approaches to this Use Case (definition, management, publication). In each of them take relevance different thematic information as is explained.

B.3.2 *Use case description: Use case Waste Management Plans*

Part 1: UML use case diagram
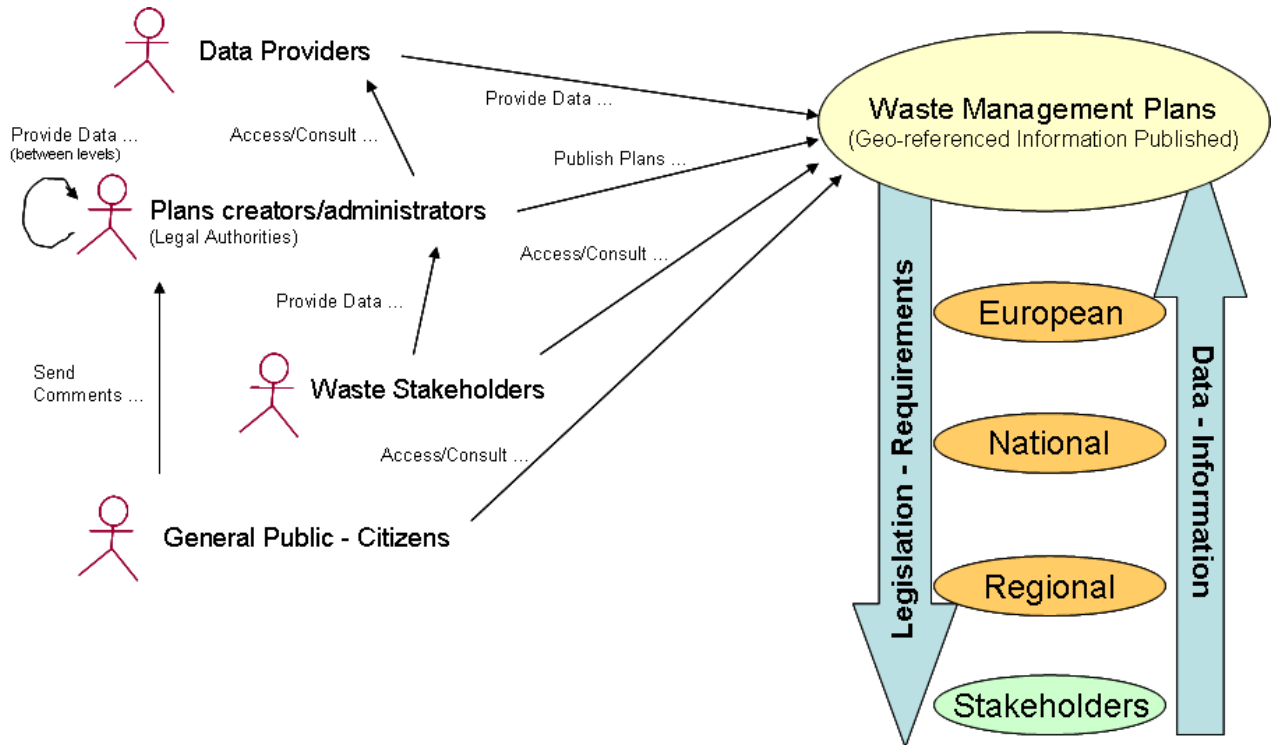
Part 2: Background Legislation

Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste

(1**)** Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste (OJ L 114, 27.4.2006, p. 9.) establishes the legislative framework for the handling of waste in the Community. It defines key concepts such as waste, recovery and disposal and puts in place the essential requirements for the management of waste, (…) and an obligation for the Member States to draw up waste management plans.

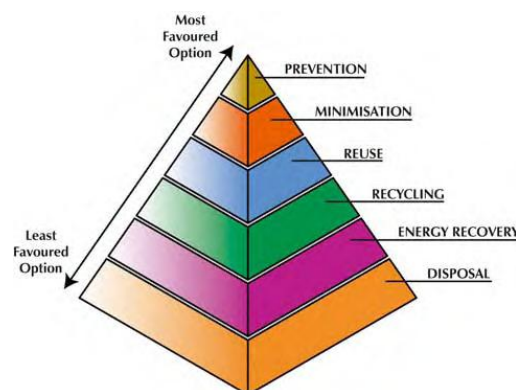It also establishes (…) an encouragement to apply the waste hierarchy, (…).

Figure.1 Graphical representation of the Waste Hierarchy (not included on the legal document)

(6) The first objective of any waste policy should be to minimize the negative effects of the generation and management of waste on human health and the environment. (…)

(15) It is necessary to distinguish between the preliminary storage of waste pending its collection, the collection of waste and the storage of waste pending treatment. ***Establishments or undertakings that produce waste*** *(*)* in the course of their activities should not be regarded as engaged in waste management and subject to authorization for the storage of their waste pending its collection.

(32) It is necessary, (…), to make provision for a network of cooperation as regards ***disposal installations and installations for the recovery*** of mixed municipal waste collected from private households, taking into account geographical circumstances and the need for ***specialized installations for certain types of waste*** *(*)*.

(37) It is necessary to specify further the scope and content of the waste management planning obligation, and to integrate into the process of developing or revising waste management plans **the need to take into account the environmental impacts** of the generation and management of waste. Account should also be taken, where appropriate, of the waste planning requirements laid down in Article 14 of Directive 94/62/EC and of the strategy for the reduction of biodegradable waste going to landfills, referred to in Article 5 of Directive 1999/31/EC.

(39) (…). It is recognized that certain Member States may not be able to provide **a network comprising the full range of final recovery facilities** *(*)* within their territory.

Article 4

Waste hierarchy

1. The following waste hierarchy shall apply as a priority order in waste prevention and management legislation and policy:
> (a) Prevention;
> (b) Preparing for re-use;
> (c) Recycling;
> (d) Other recovery, e.g. energy recovery; and
> (e) Disposal.

Article 16

Principles of self-sufficiency and proximity

1. Member States shall take appropriate measures, in cooperation with other Member States where this is necessary or advisable, to establish an integrated and **adequate network of waste disposal installations and of installations for the recovery** of mixed municipal waste collected from private households, including where such collection also covers such waste from other producers, **taking into account best available techniques**.

(…) Member States may also limit outgoing shipments of waste on environmental grounds as set out in Regulation (EC) No 1013/2006.

2. The network shall be designed to enable the Community as a whole to become self-sufficient in waste disposal as well as in the recovery of waste referred to in paragraph 1, and to enable Member States to move towards that aim individually, taking into account geographical circumstances or the need for specialized installations for certain types of waste.

3. The **network shall enable waste to be disposed of or** waste referred to in paragraph 1 to be **recovered in one of the nearest appropriate installations,** by means of the most appropriate methods and technologies, in order to ensure a high level of protection for the environment and public health.

4. The principles of proximity and self-sufficiency shall not mean that each Member State has to possess the **full range of final recovery facilities** within that Member State.

CHAPTER IV: PERMITS AND REGISTRATIONS

Article 23

Issue of permits

1. Member States shall require any **establishment or undertaking intending to carry out waste treatment to obtain a permit (***)** from the competent authority. Such permits shall specify at least the following:

(a) The types and quantities of waste that may be treated;
(b) For each type of operation permitted, the technical and any other requirements relevant to the site concerned;
(c) The safety and precautionary measures to be taken;
(d) The method to be used for each type of operation;
(e) Such monitoring and control operations as may be necessary;
(f) Such closure and after-care provisions as may be necessary.

2. Permits may be granted for a specified period and may be renewable.

3. Where the competent authority considers that the intended method of treatment is unacceptable from the point of view of environmental protection, (…), it shall refuse to issue the permit.

4. (…).

5. Provided that the requirements of this Article are complied with, any permit produced pursuant to other national or Community legislation may be combined with the permit required under paragraph 1 to form a single permit, where such a format obviates the unnecessary duplication of information and the repetition of work by the operator or the competent authority.

Article 26

Registration

(…). Member States shall ensure that the **competent authority keeps a register of**:

(a) **Establishments** or undertakings which **collect or transport waste** on a professional basis;
(b) **Dealers or brokers**; and
(c) **Establishments** or undertakings which are **subject to exemptions** from the permit requirements pursuant to Article 24.

Where possible, existing records held by the competent authority shall be used to obtain the relevant information for this registration process in order to reduce the administrative burden.

CHAPTER V: PLANS AND PROGRAMMES

Article 28

Waste management plans

1. Member States shall ensure that their **competent authorities establish**, in accordance with Articles 1, 4, 13 and 16, **one or more waste management plans**. **Those plans shall**, alone or in combination, **cover the entire geographical territory** of the Member State concerned.

2. The waste management plans shall set out **an analysis of the current waste management situation** in the geographical entity concerned, (…) **and an evaluation** of how the plan will support the implementation **of the objectives** and provisions of this Directive.

3. The waste management plans **shall contain**, as appropriate and taking into account **the geographical level and coverage of the planning area**, at least the following:

(a) The **type, quantity and source of waste** generated within the territory, (…);
(b) **Existing waste collection schemes** and **major disposal and recovery installations**, including any special arrangements for waste oils, hazardous waste or waste streams addressed by specific Community legislation;
(c) An assessment of the need for new collection schemes, the closure of existing waste installations, **additional waste installation infrastructure** in accordance with Article 16, (…);

(d) Sufficient information on the **location criteria for site identification and on the capacity of future disposal or major recovery installations**, if necessary;
(e) General waste management policies, including planned **waste management technologies and methods**, or policies for waste posing specific management problems.

4. The **waste management plan may contain**, taking into account the geographical level and coverage of the planning area, the following:

(a) **organizational aspects** related to waste management (…);
(b) an **evaluation** of the (…) the use of **economic** and other (…);
(c) the use of awareness **campaigns and information** provision (…);
(d) **historical contaminated waste disposal sites** and measures for their rehabilitation.

5. Waste management plans shall conform to the waste planning requirements laid down in Article 14 of Directive 94/62/EC and the strategy for the implementation of the reduction of biodegradable waste going to landfills, referred to in Article 5 of Directive 1999/31/EC.

Article 30

Evaluation and review of plans and programs.

1. Member States shall ensure that the waste management plans and waste prevention programs are **evaluated at least every sixth** year (..).

Article 31

Public participation

Member States shall ensure that relevant stakeholders and authorities and the general public have the opportunity to participate in the elaboration of the waste management plans and waste prevention programmes, and have access to them once elaborated, in accordance with Directive 2003/35/EC or, if relevant, Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programs on the environment (1). **They shall place the plans and programs on a publicly available website.**

CHAPTER VI: INSPECTIONS AND RECORDS

Article 34

Inspections

1. **Establishments** or undertakings **which carry out waste treatment operations**, establishments or undertakings which **collect or transport** waste on a professional basis, **brokers and dealers**, and **establishments or undertakings which produce hazardous waste** shall be subject to appropriate periodic inspections by the competent authorities.

2. **Inspections concerning collection and transport** operations shall cover **the origin, nature, quantity and destination of the waste** collected and transported.

3. Member States may take account of registrations obtained under the Community **Eco-Management and Audit Scheme (EMAS) (Annex.I)**, in particular regarding the frequency and intensity of inspections.

Article 35

Record keeping

1. The establishments or undertakings referred to in Article 23(1), the producers of hazardous waste and the establishments and undertakings which collect or transport hazardous waste on a professional basis,

or act as dealers and brokers of hazardous waste, **shall keep a chronological record of the quantity, nature and origin of the waste, and, where relevant, the destination, frequency of collection, mode of transport and treatment method foreseen in respect of the waste, and shall make that information available**, on request, to the competent authorities.

2. For hazardous waste, the records shall be preserved for at least three years except in the case of establishments and undertakings transporting hazardous waste which must keep such records for at least 12 months.

Documentary evidence that the management operations have been carried out shall be supplied at the request of the competent authorities or of a previous holder.

Every three years, **Member States shall inform the Commission** of the implementation of this Directive by submitting a sector report **in an electronic form**. This report shall also contain information on the management of waste oil and on the progress achieved in the implementation of the waste prevention programs and, as appropriate, information on measures as foreseen by Article 8 on extended producer responsibility.

The report shall be drawn up on the basis of a questionnaire or outline established by the Commission in accordance with the procedure referred to in Article 6 of Council Directive 91/692/EEC of 23 December 1991 standarding and rationalizing reports on the implementation of certain Directives relating to the environment (1). The report shall be submitted to the Commission within nine months of the end of the three year period covered by it.

Part 3: Main Geo-referenced Contents of Waste Plans

Based on the analysis preformed, **o**nly have been referred the potential chapters or parts in which geographic information could be included and in consequence described as part of the Use Cases**:**

The most common administrative level of applicability is at National and Regional. Usually the National level set the guidelines to the Regional and it provides aggregated information of them, following the request of the directive, to be sent to the Commission (Art.35.2)

1. **Regional Overview Description:** This is usually a common chapter for all the projects that take place over a delimited territory. In general is focus to describe the territory covered by the plan from different points of view (Environmental, Physical, Economic, demographic, …). This involves links with different INSPIRE TWGs in two main ways:

   a. As source of information for the definition of the plan (Art.1.37)
   b. As base reference information to identify the Network over the territory (Art.31)
   c. As reference for the publication of related indicators (Art.35.2)

Examples of information required and related with other TWG that could be included on this chapter is:

        Geology - Hydrogeology (Water Quality Management Plans)
- Groundwater Vulnerability
- Groundwater Protection Scheme
- Groundwater Usage

        Hydrography
        Mineral Resources
        Transport Networks Infrastructure
- Road Network
- Rail Network
- Ports

        Utilities and Governmental Services
- Water Supply
- Sewerage Treatment Plants
- Health Care Services

        Population and Settlement

- Population
- Household Numbers

Economic Structure and Activities
- Agriculture
- Commercial Activity
- Industrial Activity

Statistical Units
- Waste Production Indicators.
- Waste Processing Indicators.

Production and Industrial Facilities.
Agricultural and Aquaculture Facilities.
Land Use
Land Cover
Restriction Areas
Risk Zones.

2. **Waste Inventory**: This part of the Plan should be focus on the source's description and categories of waste that are managed on the areas included under the plan. Potentially should include at least:

Data Sources: following the legislation, information referred to producers of waste is not mandatory depending of the quantity and classification of the waste (Art. 1.15). Anyway some information about it could be provided at different levels of Geographical detail, from Installations (detailed geo-referenced information detailed by activities that generate waste) to Global (at regional level, agglomeration or NUT Region). Different TWG could be related as providers of information.

- Household and Commercial Waste
- Industrial Waste
- Mining Waste
- Agricultural Waste Arising
- Ash and other incineration waste
- Contaminated Soil
- Construction and Demolition Waste
- Healthcare Waste
- Waste Electrical and Electronic Equipment (WEEE)
- Batteries
- Waste Oil
- PCBs
- Tyres
- End of Life Vehicles (ELV's)

Waste Movements
- Inter-Regional Waste Movement
- Exports of waste

All this chapters and descriptions can be linked to geographical entities, from Facilities to Statistical or reporting Areas.

3. **Management Plan:** Chapter focus on the actions to be proposed by the plan in order to improve the related indicators, based on the hierarchy (Infrastructure to be developed, Actions, Improvements…). The definition of these indicators could be related with geographical information from the Statistical point of view.

- Prevention and Minimization
- Recovery/Recycling/Reuse
- Energy Recovery
- Waste Disposal
- Waste Collection

- Sludge Management
- Hazardous Waste
- Waste Planning and Data Collection

4. **Waste Management Arrangements (Network)**: Chapter focused on the Waste Collection Facilities and Existing Waste Management Facilities Inventory. It should include apart the geo-referenced location, detailed information about the specific indicators related with the operation and activities that take place on them.

- Bring Sites.
- Recycling Centres.
- Transfer Stations.
- Landfills
- Operational EPA Licensed Waste Management Facilities
- Waste Permitted Facilities
- Licensing of Unauthorised Waste Disposal Site
- Others.

Part 4: Detailed, structured description of the use case

Use-Case: Waste Infrastructure Mapping

Use Case Description	
Name	Generic Waste Infrastructure mapping could be accessible for any actor from the citizen to the European Commission. It could be required from reporting purposes to general consultancy information. Actually, this is information is provided by several Regional governments.
Priority	High / Medium
Description	A data provider or modeler will present waste infrastructures and their related information (operation, activities, ..) in a spatial context to the user.
Pre-condition	The representation of all main waste related elements, from the physical elements of the region to which the plan apply to the position of the Waste facilities included on the waste network is needed to provide a map background for orientation and to understand spatial relationships. Feature classification may be required as reference data or defined rules to choose reference elements (features, dimensions). Portrayal: Generalisation and symbol assignment rules for reference data and waste facilities related information Alternatively a set of pre-defined raster data.reference maps could be specified as context.
Flow of Events – Basic Path	
Step 1.	The data provider defines the purpose of the "Waste Infrastructure" map (Bring Sites, Recycling Facilities, Statistical Information, Landfill Locations, Waste Production, Statistical Information about Waste,…)
Step 2	The map creator asks for complementary maps (SDI/ view service …) and for Environmental, Physical and Human related information such as Agglomerations, Urban Planning, Statistical information, Protected Sites, Species Distribution, etc
Step 3	Several objects or coverages are requested by the map creator for reference data at specific resolutions (Name and position of the urban and environmental elements, Production Sites, GIS-layer with topographic elements etc.) and Waste Infrastructure related information
Step 4	Generalization and symbol assignment rules should be applied, suitability waste infrastructure related information for each purpose should be checked by a competent authority to avoid false statements with respect to conclusions.
Step 5	Data provider delivers requested layer
Step 6	When thematic layers containing the same information from different providers there may be a requirement to manipulate data before merging, analyzing etc. (e.g. recalculation of values, classes)

Use Case Description	
Flow of Events – Alternative Paths	
Step 3	Request, concurrent with delivery, a pre-defined target data model (e.g. features, values) to support merging, harmonization etc.
Step 4.	Pre-defined reference map selection
Step 5	Delivery of seamless and as far as possible harmonized requested layer
Post-condition	Layers coming from different thematic databases must be merged to produce the reference map: e. g. Waste Infraestructure Network level information and verified by a competent authority.
Data source: Thematic information for example relating to environmental aspects	
Description	For example Restricted Areas, Soil, Species Distribution, Land Use.
Data provider	Thematic Data Providers, geo-referenced information should be harmonized.
Geographic scope	Various (Pan-European, cross-border, national, regional, local)
Thematic scope	Useful to answer waste question (related for example with capacity or the nearest places to transfer the waste).
Scale, resolution	Various (depends on the purpose)
Delivery	GIS-Raster files, GIS-Vector-files, GML-files, WFS
Documentation	Metadata, Model description

Use Case: Waste Plan Definition

Name	Waste Plans as described in **Directive 2006/12/EC**. As an example required for a Waste Network Planning/Sizing.
	 The different aspects to be described or having into account during the process could be:
	 Geology - Hydrogeology (Water Quality Management Plans)
	         Groundwater Vulnerability
	         Groundwater Protection Scheme
	         Groundwater Usage
	 Hydrography
	 Mineral Resources
	 Transport Networks Infrastructure
	         Road Network
	         Rail Network
	         Ports
	 Utilities and Governmental Services
	         Water Supply
	         Sewerage Treatment Plants
	         Health Care Services
	 Population and Settlement
	         Population
	         Household Numbers
	 Economic Structure and Activities
	         Agriculture
	         Commercial Activity
	         Industrial Activity
	 Statistical Units
	         Waste Production Indicators.
	         Waste Processing Indicators.
	    Production and Industrial Facilities.
	    Agricultural and Aquaculture Facilities.
	 Land Use
	 Land Cover
	 Restriction Areas
	 Risk Zones.
	
	 Apart of the definition of all the Waste Infrastructures and the information related.:
	
	         Bring Sites.
	         Recycling Centres.
	         Transfer Stations.
	         Landfills
	         Operational EPA Licensed Waste Management Facilities
	         Waste Permitted Facilities
	         Licensing of Unauthorised Waste Disposal Site
	         Others.

Priority	High
Description	For the purposes of the Waste Directive, Waste Plans maps must show the geographic area monitored with the distribution of the Waste infrastructure (Pass, Actual and Projected) and the potential description of their impact on the environment. The rates of process capacity in relation with the amount of waste generated. Planning of future scenarios and improvements on the indicators. Background information for spatial orientation is needed. A land use planner may have to refer to these in the definition of an area for development of a certain type relating to Member State planning regulation.

Pre-condition	Collection and composition of basic data (hydrological, environmental data, population, land use, etc); determination of modeling-software (1D, 2D or couplings, 3D) Feature classification as reference data or defined rules to choose reference elements (features, dimensions). Portrayal: Generalisation and symbol assignment rules for reference data and waste infraestructures related information Another possibility could be to have a set of pre-defined reference maps as raster data.
Flow of Events – Basic Path	
Step 1.	Screen, check and analyze existing material (analog and digital information)
Step 2	Describe the Area from different points of view. General Description: Administrative and Geophysical.
Step 3	Preliminary Waste Facilities Network: identify databases of registers and unregistered activities that are related with the waste cycle of life. Geo-referenced or not. Identify the Waste Facilities by categories of Waste, Capacity of Process and Technical Installations or Treatments.
Step 4	Calculate the geographical area which could be covert under different scenarios of waste generation. Rates and Statistical information. Evaluation of improvements by different periods based on the Hierarchy established as waste best practices. For each scenario: Prepare alternatives (projection of new Waste Infrastructures, Waste trans-border Movements estimations)
Step 5	Define most appropriate map scale(s), definition of colors, symbols
Step 6	Combine relevant thematic information with topographic reference information to build-up Waste Infrastructures Maps.
Data sources: Legally Required information relating to Waste Plans	
Description	Carried out for different scenarios: 1. Authorized registration of actors related with Waste Treatment and transaction of movements derived from the legislation requirements. 2. Statistical Information related with the waste generation capacity in relation with the human activity (industrial, particular consumption, agricultural, …) 2. Described information in reference with potential entities damaged by the emplacement of this kind of activities.
Data provider	Competent authorities (e.g. Regional Goverments, Registered Establishments), Mapping agencies, meteorological services
Geographic scope	In terms of INSPIRE: Pan-European, cross-border, national, regional, local
Thematic scope	Spatial information supporting Waste Plans developments
Scale, resolution	Generally 1:2.500 – 1.10.000 for detailed maps provided by MS.
Delivery	GIS-Vector files or GML-files, WMS
Documentation	Metadata, Model Description (it is very important to describe precisely the specification that form the boundary of the simulation used for scenarios because in terms of locations, conditions in the treatment (installations) there are an infinite number of possibilities)
Data source: Topographic Reference Data	
Description	In the directive there is no specification for Member States, WISE will use Google earth and other free available data
Data provider	
Geographic scope	
Thematic scope	
Scale, resolution	
Delivery	

Documentation	

B.3.3 *Cross Thematic Data requirements*

TWG	Affected?	Datasets affected
Administrative Units (AU)	Yes	Boundaries of administrative units from the cities to regional and national borders, including toponyms. Competent Authorities for waste infrastructures permissions and inspections. Municipalities and Authorities affected by events
Addresses (AD)	Yes	Address of competent authorities. Address of Waste Infrastructures. Addresses of register producers.
Agricultural and aquacultural facilities (AF)	Yes	Producers registered. Manure Producers, Plastic, Oils, Nitratus, …
Area management/restriction/regulation zones and reporting units (AM)	Yes	River basin management Units of management, Landfills restrictions,
Atmospheric conditions+Meteorological geographical features (AC-MF)	Yes	The design of Waste Water treatment plants and Storm ponds are closely connected with weather forecast systems (severe weather warnings) Incineration Plants location depends of Atmospheric simulations. Landfills are quite susceptible of movements and lixiviation process.
Bio-geographical regions + Habitats and biotopes + Species distribution (BR-HB-SD)	Yes	with regards to adverse consequences for environment.
Buildings	Yes	Related/included on the Waste Treatment Facilities – Stablishments, Installations.
Cadastral Parcels (CP)	Yes	Identification of Sites related with Facilities/Stablishments/Installations.
Coordinate reference systems	Yes	No specific related requirements. Only as geographical requirement.
Energy Resources	Yes	Reservoirs used for energy generation. Landfill as gas producers.
Environmental Monitoring Facilities (EMF)	Yes	Noise pollution, Points of Discharges,
Geographical grid systems	?	Population density or similar coverage information
Geographical names (GN)	Yes	name of locations/regions included under the Waste Plan
Geology + Mineral resources (GE-MR)	Yes	Permeability Landforms (geomorphology), Applicability to landfill emplacement. Mining Activity: Waste producers.
Human Health and Safety (HH)	Yes	Location of potential detrimental health effects.

TWG	Affected?	Datasets affected
Hydrography (HY)	Yes	watercourses, river basins pipelines sewerage systems.
LandCover (LC)	Yes	Small-scale comprehensive land-cover
LandUse (LU)	Yes	residential areas / zones/districts // rural communities asset maps industrial areas asset maps agriculture asset maps
Natural Risk Zones	Yes	Prevention and Selection criteria for the establishment of infrastructures.
Production and industrial facilities (PF)	Yes	Register of Producers and Activities that handled Specific categories of waste. Very close related information because some activities related with the waste management and processing are included under their scope. (e.g. Reccycling).

TWG	Affected?	Datasets affected
Protected Sites (PS)	Yes	cultural heritage protected areas as defined under article 6 and article 7 2000/60/EC respectively article 6 2007/60/EC: - Bathing (= bodies of water designated as recreational waters, including areas designated as bathing waters under Directive 76/160/EEC) - Birds (= areas as designated for the protection of wild birds under Directive 2009/147/EC) - Fish (= waterbodies as designated under 2006/44/EC) - Shellfish (= areas as designated under Directive 2006/113/EC of the European Parliament and of the Council of 12 December 2006 on the quality required of shellfish waters (codified version)) - Habitats (= areas as designated for the protection of habitats under Directive 97/62/EC) - Nitrates (=areas as designated under Directive 91/676//EC) - UWWT (=sensitive areas which are subject to eutrophication as identified in Annex II.A(a) of 91/271/EEC) - WFD Art. 7 Abstraction for drinking water (- Other European - National - local
Soil (SO)	Yes	transmissibility, permeability, slack water, drainage. Quite important for Landfills.
Statistical Units + Population distribution, demography (SU-PD)	Yes	Publication of global indicator related with Waste treatment. From the production by categories to ratios of processing.
TransportNetwork (TN)	Yes	Transport network assets – road, railroad, . Valid in extension related with the waste transport.
Utility and governmental services (US)	Yes	Water supply Sewerage system Waste Infrastructures and Facilities Managed by goverments

Annex C
(informative)
Checklists for data interoperability

As mentioned in Annex F of the ""Data Specifications" Methodology for the development of data specifications", the TWG-US identified several user requirements for some sub-themes that are listed hereunder:

C.1   User requirements for "Utility Networks"
C.1.1 Checklist for Flemish (Belgium) Environment Agency

C.2   User requirements for "Administrative and social governmental services"
C.2.1 Checklist for the Use case TWG_US_GD_map_case (ref. Annex B.1.2)
C.2.2 Checklist for Spanish EIEL Database
C.2.3 Checklist for Málaga (Spain) Province Council
C.2.4 Checklist for French Statistical Environmental Observatory
C.2.5 Checklist for German State's Administrations and Organizations concerned with security issues

C.3   User requirements for "Waste Management"
C.3.1 Checklist for Austrian Environmental Data Management System EDM
C.3.2 Checklist for Piemonte (Italy) Regional Waste Information System

Several tables, based on Annex F of the ""Data Specifications" Methodology for the development of data specifications" framework, have been developed, but due to the size of the current document, such requirement information will not be provided directly within the data specification.
Anyway, interested persons can contact the TWG members to get it if wanted.

Annex D
(informative)
ServiceTypeValue codelist

Items in red are extracted from the COFOG listing

Notes: Abbreviations used in COFOG
  (CS) - collective services
  (IS) - individual services
  n.e.c. – not elsewhere classified

Main group	First level	Second level	Third level	Fourth level	COFOG	ID
public administration office						1
	general administration office					2
	specialized administration office					3
public order and safety					GF03	4
	administration for public order and safety					5
	police service				GF0301	6
	fire-protection service				GF0302	7
		fire fighting station				8
			professional fire brigade			9
			auxiliary fire brigade			10
		ancillary equipment				11
			equipment for fire brigade			12
			siren			13
			hydrant			14
			fire water			15
			fire detection camera			16
	law court				GF0303	17
	prison				GF0304	18
	rescue service					19
		rescue station				20
		helicopter landing site				21
		marine rescue station				22
	civil protection site					23
	emergency call point					24
economic affairs					GF04	25
	administration for economic affairs					26

Main group	First level	Second level	Third level	Fourth level	COFOG	ID
	transport				GF0405	27
		parking garage				28
		basement garage				29
		petrol station				30
		public transportation service point				31
		bicycle loaning point				32
		winter service				33
	distributive trades, storage and warehousing				GF040701	34
		shopping facility				35
			shopping centre			36
			shop			37
		financial and postal service				38
			bank office			39
			cashpoint			40
			money exchange office			41
			post office			42
		stock exchange				43
	hotel and restaurant				GF040702	44
		accommodation				45
			hotel			46
			camping/caravaning site			47
		gastronomy				48
	tourism				GF040703	49
		comfort station				50
		conference centre				51
		tourist board				52
		tourist information				53
environmental protection					GF05	54
	administration for environmental protection					55
	protection of biodiversity and landscape				GF0504	56

Main group	First level	Second level	Third level	Fourth level	COFOG	ID
		biodiversity monitoring facility				57
	environmental education centre					58
	weather monitoring facility					59
	anti-noise construction					60
		noise protection wall				61
		noise protection embankment				62
		roofing				63
	protection facility against natural hazards					64
		levee				65
		air-raid shelter				66
		protective wall				67
		flood wall				68
		protection forest				69
		drape net against rock fall				70
		rockfall catchment fence				71
health					GF07	72
	administration for health					73
	medical products, appliances and equipment				GF0701	74
		pharmaceutical products			GF070101	75
		optical glasses and other vision products				76
		hearing aids				77
		therapeutic appliances and equipment (other than optical glasses and hearing aids)			GF070103	78
		medical appliances				79
	outpatient service				GF0702	80
		general medical service			GF070201	81
			medical centre			82
		specialized medical services			GF070202	83
			family planning centre			84

Main group	First level	Second level	Third level	Fourth level	COFOG	ID
			out-patient mental health and substance abuse centre			85
			free-standing ambulatory surgery centre			86
			dialysis care centre			87
			heart defibrillator			88
			medical practice			89
				dental medicine		90
				sports medicine		91
				psychotherapy		92
				anaesthesiology		93
				ophthalmology		94
				surgery		95
				orthopaedics		96
				radiology		97
				urology		98
				internal medicine		99
				gynaecology		100
				general practice		101
				dermatology		102
				otorhinolaryngology		103
				paediatrics		104
				neurology		105
			blood and organ bank			106
		dental laboratory				107
		paramedical service			GF070204	108
		veterinary medicine				109
	hospital service				GF0703	110
		general hospital				111
		specialized hospital				112

Main group	First level	Second level	Third level	Fourth level	COFOG	ID
			mental health and substance abuse hospital			113
		maternity centre service				114
		nursing and convalescent home service			GF070304	115
			nursing care facility			116
			residential mental retardation, mental health and substance abuse facility			117
			community care facility for the elderly			118
		animal hospital				119
	medical and diagnostic laboratory					120
	provider of home health care service					121
	establishment as provider of occupational health care service					122
	private household as provider of home care					123
recreation, culture and religion					GF08	124
	administration for recreation, culture and religion					125
	recreational and sporting service				GF0801	126
		leisure				127
			fountain			128
			playground			129
			amusement park			130
			picnic site			131
			lookout			132
			zoo/safari park			133
			recreational pier			134

Main group	First level	Second level	Third level	Fourth level	COFOG	ID
			spa			135
		sport				136
			indoor sport			137
			outdoor sport			138
		green area and beach				139
			park			140
			green space			141
			garden plot			142
			beach			143
			cemetery			144
	cultural service				GF0802	145
		museum				146
		theatre				147
		amphitheatre				148
		venue				149
		castle/palace				150
		cinema				151
		drive-in theatre				152
		outdoor theatre screen				153
		library				154
		concert hall				155
		fair and exhibition centre				156
		gallery				157
		point of touristic interest				158
	broadcasting and publishing service					159
	religious and other community service					160
		religious service				161
		other community service				162
education					GF09	163
	administration for education					164
	pre-primary and primary education				GF0901	165

Main group	First level	Second level	Third level	Fourth level	COFOG	ID
		pre-primary education			GF090101	166
		primary education			GF090102	167
	secondary education				GF0902	168
		lower-secondary education			GF090201	169
		upper-secondary education			GF090202	170
	post-secondary non-tertiary education				GF0903	171
	tertiary education				GF0904	172
		first stage of tertiary education			GF090401	173
		second stage of tertiary education			GF090402	174
	education not definable by level				GF0905	175
	subsidiary services to education				GF0906	176
social protection					GF10	177
	administration for social protection					178
	specialized service for the disabled					179
		sheltered workshop				180
		education				181
	specialized service of social protection					182
		transport service				183
		non-medical home care service				184
		day-care/holiday-care service				185
	service for families and children					186
		family violence shelter				187
		single-parent agency				188
		family advisory service				189
		kindergarten				190
		crèche				191
		orphanage				192
		play school				193
		day-care centre and other child-minding facilities				194
		youth club				195

Main group	First level	Second level	Third level	Fourth level	COFOG	ID
	unemployment				GF1005	196
		job centre				197
	housing				GF1006	198
		home for the elderly				199
		residence for people with disabilities				200
		rehabilitation centre				201
		youth centre				202
	charity					203
		welfare centre				204
		shelter				205
	counselling					206
	social security fund					207

Annex E
(informative)
Portrayal analysis

Unfortunately no European-wide accepted standard for map symbolisation exists, which could be applied for the approximately 200 different service types of the administrative and social governmental services application schema.

In a bachelor thesis [Kaden 2011[22]] the great diversity of existing symbols in European geoportals and printed maps are shown. Figure X contains some symbols, which are used for the portrayal of police stations:
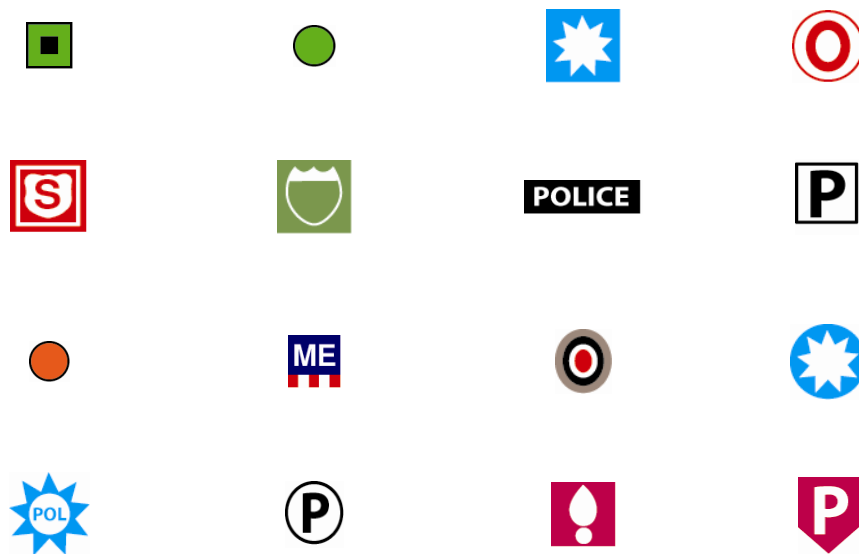

Figure X: Map symbols for police stations used in European geoportals and maps (sources see [Kaden 2011])

Based on that survey, suggestions for symbols for some of the service types including the corresponding SLD code have been made. Figure Y shows the proposal for police stations:
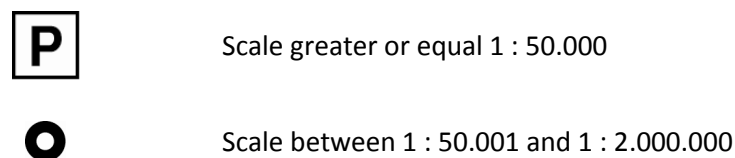
   Scale greater or equal 1 : 50.000

   Scale between 1 : 50.001 and 1 : 2.000.000

Figure 1: Harmonized symbols for police stations [Kaden 2011]

An alternative approach will be subject of further work: The items of the service type code list can be summarised to group layers with a unique symbolization.

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[22] [Kaden 2011]

Nancy Kaden: "Spezifikation von Darstellungsregeln für das INSPIRE-Thema "Versorgungswirtschaft und staatliche Dienste" (Bachelor Thesis)
http://www2.htw-dresden.de/~fegis/DA/DA_KADEN_2011/Bachelorarbeit.pdf