

Geographic information — Data description — Metadata

ICS 07.040; 35.240.70

National foreword

This Draft for Development is the English language version of ENV 12657:1998.

This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature due to the limited duration of the European Prestandard. It should be applied on this provisional basis, so that information and experience of its practical application may be obtained.

Comments arising from the use of this Draft for Development are requested so that UK experience can be reported to the European organization responsible for its conversion into a European Standard. A review of this publication will be initiated 2 years after its publication by the European organization so that a decision can be taken on its status at the end of its three-year life. The commencement of the review period will be notified by an announcement in *Update Standards*.

According to the replies received by the end of the review period, the responsible BSI Committee will decide whether to support the conversion into a European Standard, to extend the life of the prestandard or to withdraw it. Comments should be sent in writing to the Secretary of BSI Technical Committee IST/36, Geographic information, at 389 Chiswick High Road, London W4 4AL, giving the document reference and clause number and proposing, where possible, an appropriate revision of the text.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

Summary of pages

This document comprises a front cover, an inside front cover, the ENV title page, pages 2 to 65 and a back cover.

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Information géographique - Description des données -
Métadonnées

Geoinformation - Datenbeschreibung - Metadata

This European Prestandard (ENV) was approved by CEN on 9 October 1998 as a prospective standard for provisional application.

The period of validity of this ENV is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard.

CEN members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

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Foreword

This European Prestandard has been prepared by Technical Committee CEN/TC 287 "Geographic Information", the secretariat of which is held by AFNOR.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this European Prestandard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European prestandard establishes a conceptual schema for metadata.

Metadata can be defined at its simplest as 'data about datasets'. This European prestandard specifies those data which shall be used to describe a geographic dataset. This includes data about the content, representation, extent (both geometric and temporal), spatial reference, quality and administration of a geographic dataset.

This European prestandard also identifies those data which are mandatory for describing geographic datasets, the minimum set of metadata.

This European prestandard gives examples of how the standard may be applied but does not provide instructions or techniques for its implementation and accordingly does not concern itself with the construction of databases for holding metadata.

This European prestandard is designed primarily for use with digital geographic datasets but the principles can also be used to describe geographic datasets in other forms, such as paper maps or lists.

This European prestandard is applicable for a range of uses. It allows the geographic dataset to be described in a consistent way which makes it easy to maintain a metadata catalogue service even from remote location. This European prestandard allows metadata to be described for a number of purposes such as documentation and inclusion in a transfer file and for comparing and exploring geographic datasets.

2 Normative references

This European prestandard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European prestandard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 28601:1992, *Data elements and interchange formats - Information interchange - Representation of dates and times (ISO 8601, 1st edition 1988 and technical corrigendum 1:1991)*

ENV 12009:1997, *Geographic Information - Reference Model*

ENV 12160:1997, *Geographic Information - Data Description – Spatial schema*

ENV 12656:1998, *Geographic Information - Data Description – Quality.*

ENV 12658:1998, *Geographic Information - Data Description – Transfer.*

ENV 12661:1998, *Geographic information- Referencing – Geographic identifiers.*

prENV 12762:1998, *Geographic Information - Referencing – Direct position.*

ENV ISO 10303-11:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 11 : Description methods : The EXPRESS language reference manual (ISO 10303-11:1994)*

ENV ISO 10303-41:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 41 : Integrated generic resources : Fundamentals of product description and support (ISO 10303-41:1994)*

ISO 639:1988, *Codes for the representation of names of languages.*

ISO 2788:1988, *Documentation - Guidelines for the establishment and development of monolingual thesauri*.

3 Definitions

For the purposes of this European prestandard, the following definitions apply :

3.1

application schema

conceptual schema, for a specific field of interest within the field of geographic information

[ENV 12009]

3.2

channel

attribute of a raster-band, defined as a matrix of registered intensities of electromagnetic radiation within a specific range of wavelength

NOTE Usually, each channel is identified by a number.

3.3

completeness

quality parameter describing the presence and absence of entity instances, relationship instances and attribute instances

[ENV 12656]

3.4

coordinate system

rule for designating each point in space by an ordered set of numbers

[ENV 12762]

3.5

datum

set of fundamental parameters which collectively serve as a reference for defining other parameters

[ENV 12762]

3.6

extent

space covered by a geographic dataset

NOTE Space is meant here as Euclidean space but also as a period in time.

3.7

geodetic ellipsoid

flattened ellipsoid of rotation, usually chosen to fit the geoid as closely as possible, either locally or globally

[ENV 12762]

3.8

geographic data

computer treatable form of geographic information

[ENV 12009]

3.9

geographic dataset

identifiable collection of geographic data

[ENV 12656]

3.10

geographic information

information concerning phenomena directly or indirectly associated with a location relative to the Earth

[ENV 12009]

3.11

geometric primitive

description, partial or total, of the spatial aspects of an object by means of coordinates and mathematical functions

[ENV 12160]

3.12

grid

point distribution defining a regular pattern, derived from the corners of the tessellation of a specific frame or a limited part of it

[ENV 12160]

3.13

location

identifiable part of the real world

[ENV 12661]

3.14

logical consistency

degree of conformance of a geographic dataset with respect to the internal structure given in its specification

[ENV 12656]

3.15

map projection

mathematical mapping of a geodetic ellipsoid, or part of a geodetic ellipsoid, to a plane

[ENV 12762]

3.16

metadata

data about a geographic dataset or geographic datasets

3.17

nominal ground

view of the real world implied by the specification of the geographic dataset

[ENV 12656]

3.18

object

single phenomenon existing in the real world

[ENV 12160]

3.19

pixel

2-dimensional geometric primitive which is the unit in a specific 2-dimensional frame

[ENV 12160]

3.20

positional accuracy

quality parameter describing accuracy of geographic position within a geographic dataset

[ENV 12656]

3.21

quality

totality of characteristics of a product that bear on its ability to satisfy stated and implied needs

[ENV 12656]

3.22

quality parameter

quantifiable quality element describing the performance of a geographic dataset compared with its nominal ground

[ENV 12656]

3.23

semantic accuracy

quality parameter describing the accuracy of the semantic aspects of a geographic dataset

[ENV 12656]

3.24

spatial schema

a spatial schema is a conceptual schema for the spatial (geometrical and topological) aspects of geographic data

[ENV 12009]

3.25

temporal accuracy

quality parameter describing the accuracy of temporal aspects of a geographic dataset

[ENV 12656]

3.26

topological primitive

description, partial or total, of the topological aspects of an object

[ENV 12160]

3.27

vertical datum (1-dimensional datum, unidimensional datum)

datum which serves as a reference for defining heights

[ENV 12762]

4 Metadata for describing geographic datasets

4.1 General

Clause 4 identifies mandatory and optional data to be used for describing geographic datasets. This textual description is supported by :

- elements of metadata - full listing (see annex C) ;
- EXPRESS definition of the metadata schema (see annex A) ;
- EXPRESS-G definition of the metadata schema (see annex B).

NOTE EXPRESS and EXPRESS-G are defined in ENV ISO 10303-11.

- two examples of how the standard may be used to describe geographic datasets (see annex D).

4.2 Geographic datasets and levels of metadata

A geographic dataset contains one or more geographic objects described by their attributes and relationships (see ENV 12009 clause 4.2.2). Data shall be given to describe the geographic dataset itself and may be given at the more detailed level to describe the object by using the object type, and attribute type, and the relationship type which occur in the geographic dataset.

4.3 Conformance requirements

A metadata set conforming to this European prestandard shall be based on a metadata schema which includes all mandatory type declarations, entity declarations and attribute declarations defined in the metadata schema, the extent_metadata schema, the data_definiton_metadata schema, the classification_metadata schema and the administrative_metadata schema in Annex A.

4.4 Dates

All references to dates as plain text shall be recorded using EN 28601. For example, December, 31, 1995 would be given as 1995-12-31.

In some circumstances dates may be open, where something has happened and not been terminated, or where the start or end date is not known additional expressions shall be added.

EXAMPLE 1 "before 1994-12-31".

EXAMPLE 2 "1990-06 to 1994-08-15".

EXAMPLE 3 "after 1990".

EXAMPLE 4 "end date not known".

4.5 Metadata language

The languages for textual statements in the description of geographic datasets shall be identified by codes defined in ISO 639.

Where appropriate, statements may be repeated in several languages.

4.6 Elements of metadata for describing geographic datasets

4.6.1 General

This clause describes the main elements of metadata. The text is supported by informative EXPRESS-G schemas. Each element of metadata described in this clause shall be applied according to its formal EXPRESS specification (see Annex A).

The description is divided into five EXPRESS schemas :

- metadata (see 4.6.2 to 4.6.3.6) ;
- extent_metadata (see 4.6.3.7) ;
- data_definition_metadata (see 4.6.3.8) ;
- classification_metadata (see 4.6.3.9) ;
- administrative_metadata (see 4.6.3.10).

4.6.2 Metadata schema identifier and external references

The following EXPRESS declarations begins the metadata schema and identifies the necessary external references.

For the computerised structuring of dates the definition of date in ENV ISO 10303-41 is referenced.

For the description of dataset extent the definition of dataset_extent in the schema extent_metadata is used.

For the description of data definitions the definition of dataset_data_definition in the schema data_definition_metadata is used.

For the description of classification the definition of dataset_classification in the schema classification_metadata is used.

For the description of administrative_metadata the definition of dataset_administrative_metadata in the schema geographic_dataset_administrative_metadata is used.

For the lineage description of the geographic dataset, the definition of lineage in the quality schema in ENV 12656 is used.

For quality data given at the total dataset level, the definition of quality_parameter in the quality schema in ENV 12656 is used.

For the usage description of the geographic dataset the definition of usage in the quality schema in ENV 12656 is used.

EXPRESS specification

```
*)  
SCHEMA metadata;  
  
REFERENCE FROM date_time_schema (date) ;  
USE FROM extent_metadata  
    (extent);  
USE FROM data_definition_metadata  
    (data_definition);  
USE FROM classification_metadata  
    (thesaurus);  
USE FROM administrative_metadata  
    (administrative_metadata);  
  
USE FROM quality_schema  
    (lineage,  
     quality_parameter,  
     usage);
```

For the description of the updatedness of quality elements, the type updatedness being a list of strings is defined.

A possible external graphics file for a sample from the geographic dataset is given using the type external_graphic_file, being a SELECT data type with the possible select types : raster file, vector file.

A sample external graphics file in raster format is given using the type raster_file, being a STRING.

A sample external graphics file in vector format is given using the type vector_file, being a STRING.

For the description of the language used in the textual statements, the type metadata_language is defined.

EXPRESS specification

```
*)  
TYPE updatedness = LIST [1:?] OF STRING;  
END_TYPE;  
TYPE external_graphic_file = SELECT(raster_file, vector_file);  
END_TYPE;  
TYPE raster_file = STRING;  
END_TYPE;  
TYPE vector_file = STRING;  
END_TYPE;  
TYPE metadata_language = STRING;  
END_TYPE;  
(*
```

The EXPRESS specifications given in clause 4.6.3 define the entities.

4.6.3 Dataset description

4.6.3.1 General

For each dataset the following information shall be given :

- identification : each dataset has an unique identification ; see 4.6.3.2 ;
- overview : see 4.6.3.3 ;
- quality elements : see 4.6.3.4 ;
- metadata reference : see 4.6.3.5 ;
- extent : see 4.6.3.7.

The following data may be given :

- spatial reference system : see 4.6.3.6 ;
- data definition : see 4.6.3.8 ;
- classification : see 4.6.3.9 ;
- administrative metadata : see 4.6.3.10.

EXPRESS specification

```
*)
ENTITY dataset_description;
    has_identification          : dataset_identification;
    has_overview                : dataset_overview;
    has_quality_element         : dataset_quality_elements;
    has_metadata_reference      : dataset_metadata_reference;
    has_spatial_reference_system : OPTIONAL SET [0:?] OF
                                spatial_reference_system;
    has_extent                  : SET [1:?] OF extent;
    has_data_definition         : OPTIONAL data_definition;
    has_classification           : OPTIONAL dataset_classification;
    has_administrative_metadata :
                                OPTIONAL administrative_metadata;
    has_metadata_language       : metadata_language;
END_ENTITY;
(*
```

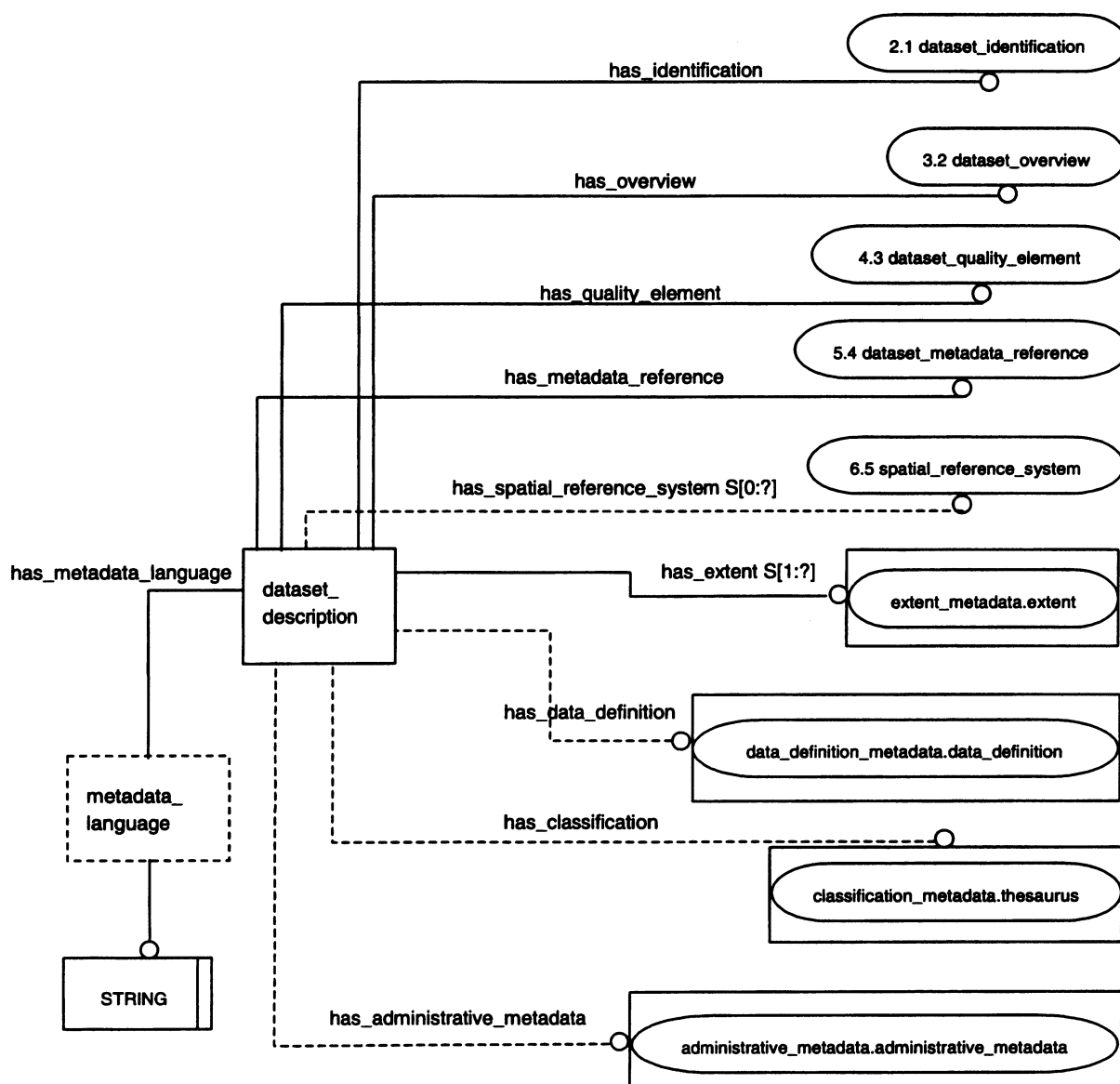


Figure 1 - Metadata schema page 1

4.6.3.2 Dataset Identification

Sufficient data shall be provided to clearly identify the geographic dataset.

The following data shall be given :

- the geographic dataset title ; this shall be the explicit name of the geographic dataset, to sufficiently identify it by the users.

The following data may be given :

- alternative title : a geographic dataset may have one or more alternative title(s). These may be given in a different language from the title ; the alternative title or titles shall be unique within the owning organisation(s) ;
- abbreviated title : a geographic dataset name may be shortened ; the abbreviated title(s) shall be unique within the owning organisation(s) ;
- version : the version number or other description of the version of the geographic dataset.

- version : the version number or other description of the version of the geographic dataset.

EXPRESS specification

*)

```
ENTITY dataset_identification;
    dataset_title      : STRING;
    alternative_title  : OPTIONAL SET [1:?] OF STRING;
    abbreviated_title  : OPTIONAL SET [1:?] STRING;
    version            : OPTIONAL STRING;
END_ENTITY;
(*
```

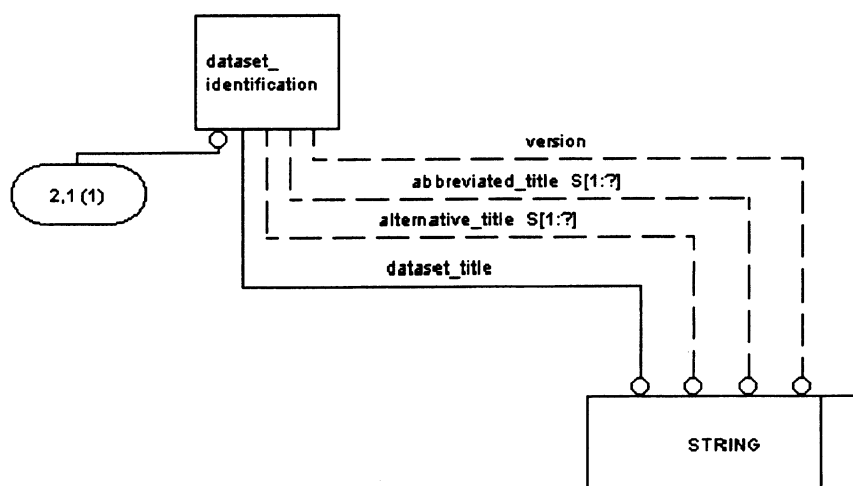


Figure 2 - Metadata schema page 2, dataset identification

4.6.3.3 Dataset overview

Sufficient data shall be provided to give an overall description of the geographic dataset. This shall include :

- summary : a brief textual description of the geographic dataset which summarises the content of the geographic dataset ;
- producer organisation name.

If a producer is unknown then this shall be recorded as “Unknown” in the name of the organisation and all contact details are omitted in the administrative metadata.

If a producer is not confirmed then the words “Thought to be” are inserted before the name of the organisation.

NOTE The organisation responsible for commissioning production may be different from an organisation actually carrying out the work.

- spatial schema type : the type of the spatial schema(s) of the geographic dataset shall be given according to ENV 12160. For this purpose the type spatial_schema_type is defined. It is an enumeration with the following possible values :
 - spatialG0 ;
 - spatialG1 ;
 - spatialG2 ;
 - spatialG3

- spatialG4 ;
- spatialG5 ;
- spatialG6 ;
- spatialG7 ;
- spatialG8 ;
- user_defined ;
- no_spatial_schema.

If any spatial schema type is user-defined, then the value of spatial schema type shall be "user_defined" and a description shall be provided.

If the geographic dataset contains only textual information for which no spatial schema is applicable, then the value of spatial schema type shall be "no_spatial_schema";

- user-defined spatial schema description : information about main components and general characteristics of the schema, if the spatial schema is not one of the spatial schema predefined in ENV 12160 ;
- dataset language : the language(s) used for textual statements within the geographic dataset identified by codes defined in ISO 639 ;
- dataset character set : the character set encoding (for example, ISO 8859-10) used within the geographic dataset.

The following additional data may be given to describe the geographic dataset :

- purpose of production : the purpose for which a geographic dataset was produced by the producer organisation may be given as descriptive text (see ENV 12656 , 6.2.1.2) ;
- intended application scale : description of the intended application scale of the model of the real world described by the geographic dataset ;
- potential usage : list (expressed in a text) of one or more application(s) for which the geographic dataset can be used ;
- document reference(s) : reference(s) to relevant already published or publicly available additional documentation about the geographic dataset may be provided, including documentation language(s) ;
- sample : one or more examples taken from the geographic dataset being representative for the whole geographic dataset e.g. as a browse graphic, either in vector or raster format, may be provided by file name contents, format and location. For this purpose the type external graphic file is defined, being a SELECT data type with the possible select types : raster file, vector file, both of them strings ;
- related datasets : the title and owner organisation(s) and other supplementary data for any other dataset of possible interest for a user may be described. A geographic dataset may have more than one related datasets ;

Other details of the organisation responsible for commissioning production may be given, consisting of :

- a description of the organisation (together with a statement of status if appropriate),

EXAMPLE "Previously known as xxxxxx"
"no longer functioning since YYYY-MM-DD"

NOTE It is accepted that producing organisations may not be definitely known or may no longer operate.

For raster data, the overall description of the geographic dataset may include the following additional information :

- type of raster data, indicating e.g. if raster data is spacial data, aerial data, semantic data or grid data, etc ;
- description of the raster data, depending on the type of the data .

EXPRESS specification

```
*)
TYPE spatial_schema_type = ENUMERATION OF (
    spatialG0,
    spatialG1,
    spatialG2,
    spatialG3,
    spatialG4,
    spatialG5,
    spatialG6,
    spatialG7,
    spatialG8,
    user_defined,
    no_spatial_schema);
END_TYPE;
ENTITY dataset_overview;
    summary : LIST [1:?] OF STRING;
    producer_organisation_name : STRING;
    has_spatial_schema_type : SET [1:?] OF spatial_schema_type;

    dataset_language : SET [1:?] OF STRING;
    dataset_character_set : STRING;
    user_defined_spatial_schema_description :
        OPTIONAL LIST [1:?] OF STRING;
    has_purpose_of_production : OPTIONAL LIST [1:?] OF STRING;
    intended_application_scale : OPTIONAL STRING;
    has_potential_usage : OPTIONAL LIST [1:?] OF STRING;
    document_reference : OPTIONAL SET [1:?] OF STRING;
    sample : OPTIONAL SET [1:?] OF
        external_graphic_file;
    related_datasets : OPTIONAL SET [1:?] OF STRING;
    producer_organisation_description : OPTIONAL LIST [1:?] OF STRING;
    raster_data_type : OPTIONAL STRING;
    raster_data_description : OPTIONAL LIST [1:?] OF STRING;
END_ENTITY;
( *
```

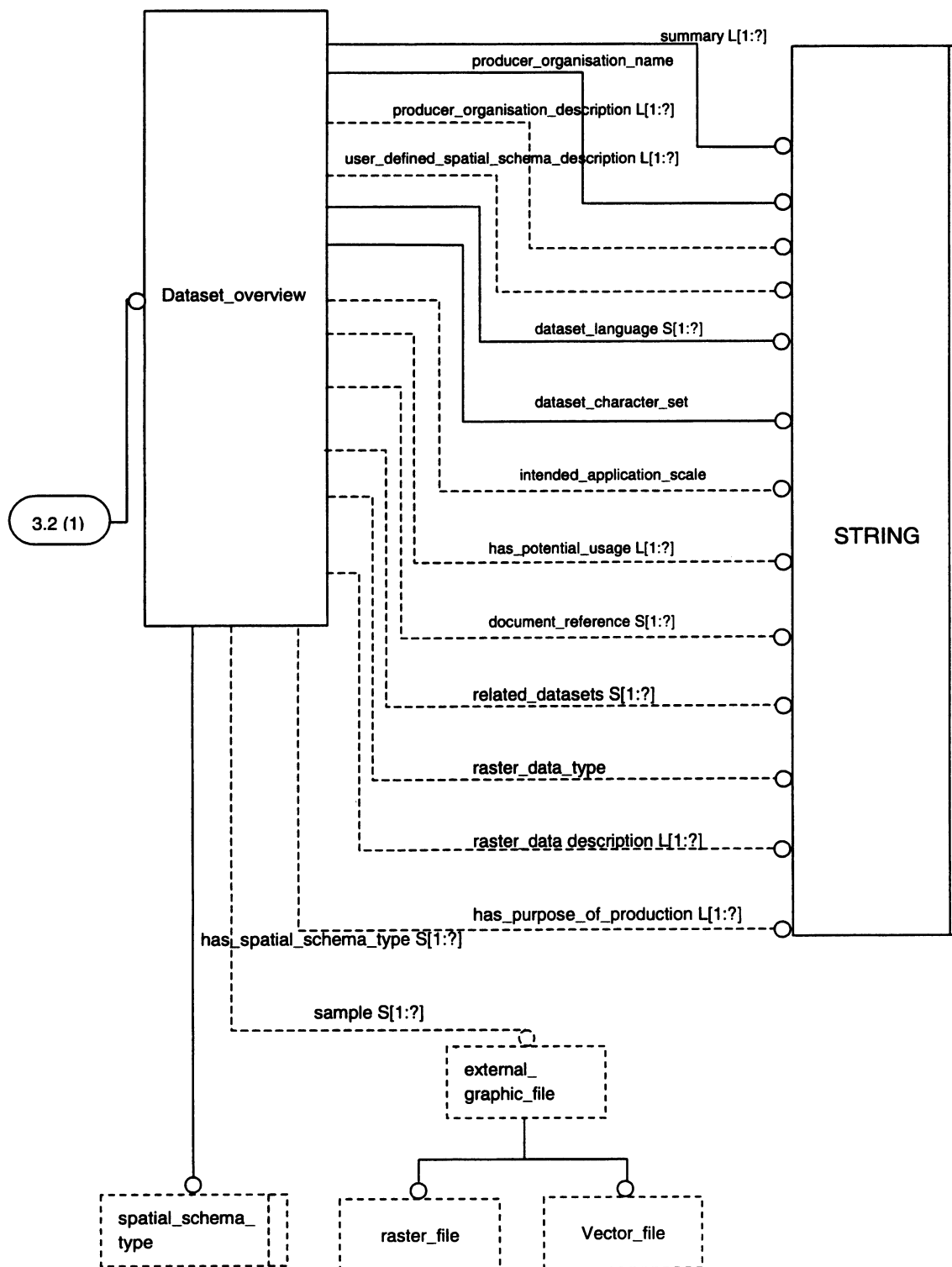


Figure 3 - Metadata schema page 3, dataset overview

4.6.3.4 Dataset quality elements

Quality data allows users and producers of data to define how well a geographic dataset as a whole meets its nominal ground. Much of the metadata described in this European prestandard concerns quality.

At least one of the following quality elements shall be given at the total dataset level to provide a general impression of the quality of the entire dataset by generalisation of the quality elements found in the geographic dataset :

- lineage : a description of the history of the geographic dataset : production, producer organisation, purpose of production, date of production, source and processes ;
- quality parameters : describes the performance of the geographic dataset ; at least one of positional accuracy, semantic accuracy, temporal accuracy, logical consistency, completeness and user defined quality parameters (see ENV 12656, 6.5) ;

NOTE Last update is an example of temporal accuracy. It indicates the date at which it is assumed that all the information contained in the geographic dataset is correct.

- usage : a description of applications for which the geographic dataset has previously been used ;
- homogeneity : a textual and qualitative description of the expected or tested uniformity of the quality parameters in the geographic dataset.

The description of these quality elements is given in ENV 12656.

The following data may be given :

- updatedness : date at which it is assumed that all the information contained in the geographic dataset is correct ;
- quality text : a textual description of the quality of the geographic dataset may be used when a parameterised description is not possible.

NOTE Where data is not available on quality, this is described as "no data available".

EXPRESS specification

```

*)
ENTITY dataset_quality_elements;
    has_lineage : OPTIONAL lineage;
    has_quality_parameters: OPTIONAL SET OF quality_parameter;
    has_usage : OPTIONAL usage;
    has_homogeneity : OPTIONAL STRING;
    has_updatedness : OPTIONAL updatedness;
    has_quality_text : OPTIONAL STRING;
END_ENTITY;
( *

```

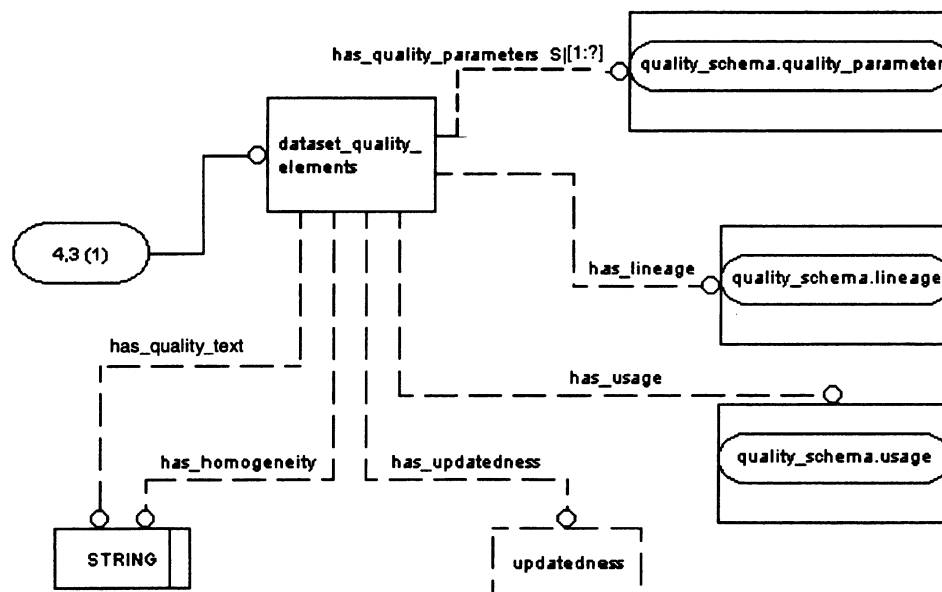


Figure 4 - Metadata schema page 4, dataset quality elements

4.6.3.5 Metadata reference

It is necessary to include data about the metadata themselves. This shall include the following :

- entry date : date of creation of the metadata ;
- last check date : date when the metadata was last validated. If the metadata has not been checked, then this date is omitted ;
- last update date : date when the metadata was last updated. If the metadata has not been updated, then this date is omitted.

The following data may be provided about metadata reference :

- future review date : date when the metadata is expected to be checked and/or updated ;
- spatial reference system of metadata : spatial reference system of the extent of the geographic dataset as described in the metadata (see clause 4.6.3.6).

NOTE The data about the author of metadata is given as point of contact and point of contact role, see clause 4.6.3.10.

EXPRESS specification

```

*)
ENTITY dataset_metadata_reference;
    entry_date          : date;
    last_check_date     : SET [0:1] OF date;
    last_update_date    : SET [0:1] OF date;
    future_review_date   : OPTIONAL date;
    metadata_spatial_reference_system :
                                OPTIONAL spatial_reference_system;
END_ENTITY;
( *

```

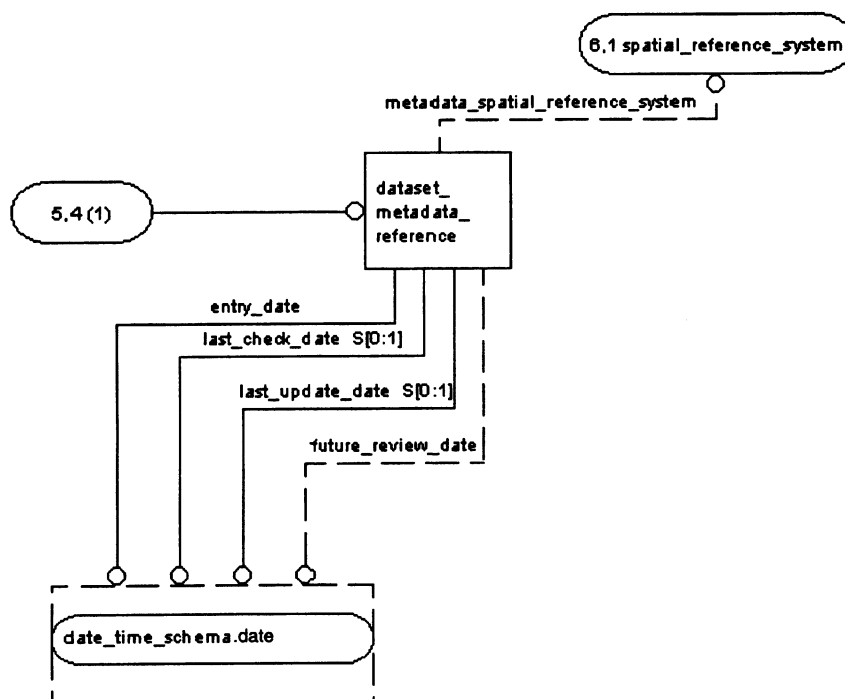


Figure 5 - Metadata schema page 5, metadata reference

4.6.3.6 Spatial reference system

4.6.3.6.1 General

Data about how geographic objects are positioned in space may be given by a description of the spatial reference system. The spatial reference system may be either a direct positioning system, based on use of coordinates, or an indirect positioning system, based on use of geographic identifiers. A geographic dataset may contain objects referenced by multiple direct and indirect positioning systems. The EXPRESS-G schema for the spatial reference system metadata is given in figure 6.

For the description of spatial reference systems the type `spatial_reference_system`, being either a `indirect_positioning_system` or a `direct_positioning_system`, is defined.