

### Contents

	Foreword
	Introduction
1	Scope
2	Normative references
3	Terms, definitions, symbols and abbreviated terms
3.1	Terms and definitions
3.2	Symbols
3.3	Abbreviated terms
4	Conformance requirements
5	Conventions
5.1	Unified Modeling Language notation
5.2	Attribute status
6	Referencing by coordinates — Data model overview
7	Coordinates package
7.1	Relationship between coordinates and coordinate reference system
7.2	Coordinate reference system identification
7.3	Requirements for coordinate metadata
7.3.1	Requirements class: Static CRS coordinate metadata
7.3.2	Requirements class: Dynamic CRS coordinate metadata
7.4	UML schema for the Coordinates package
7.5	UML schema for change of coordinates
8	Common Classes package
8.1	General attributes
8.1.1	Introduction
8.1.2	Name and alias
8.1.3	Identifier
8.1.4	Scope and Domain of Validity
8.2	UML schema for the Common Classes package
9	Coordinate Reference Systems package
9.1	Coordinate reference system
9.1.1	General
9.1.2	Principal subtypes of coordinate reference system
9.2	Derived coordinate reference system
9.2.1	General
9.2.2	Projected coordinate reference system
9.3	Compound coordinate reference system
9.3.1	General
9.3.2	Spatial compound coordinate reference system
9.3.3	Spatio-temporal compound coordinate reference system
9.3.4	Spatio-parametric compound coordinate reference system
9.3.5	Spatio-parametric-temporal compound coordinate reference system
9.4	UML schema for the Coordinate Reference Systems package
10	Coordinate Systems package

- 10.1 Coordinate system — General
- 10.2 Parametric coordinate system
- 10.3 Temporal coordinate system
- 10.4 Coordinate system axis
- 10.5 UML schema for the Coordinate Systems package
- 11 Datums (reference frames) package
  - 11.1 Types of datum and reference frame
  - 11.2 Geodetic reference frame
    - 11.2.1 Prime meridian
    - 11.2.2 Ellipsoid
  - 11.3 Dynamic reference frame
  - 11.4 Datum ensemble
  - 11.5 Temporal datum
  - 11.6 UML schema for the Datums package
- 12 Coordinate Operations package
  - 12.1 General characteristics of coordinate operations
  - 12.2 UML schema for the Coordinate Operations package
- Annex A (normative) Abstract test suite
  - A.1 Conformance — General
  - A.2 Conformance for coordinate metadata
  - A.3 Conformance of a CRS definition
  - A.4 Conformance of a coordinate operation definition
- Annex B (informative) Spatial referencing by coordinates — Geodetic concepts
  - B.1 Some geodetic concepts
  - B.2 Geodetic reference surfaces
  - B.3 Dynamic and static reference frames
  - B.4 Epoch
    - B.4.1 Introduction
    - B.4.2 Frame reference epoch
    - B.4.3 Coordinate epoch
    - B.4.4 Transformation reference epoch and parameter reference epoch
  - B.5 Map projections
- Annex C (informative) Spatial referencing by coordinates — Context for modelling
  - C.1 Coordinate metadata
    - C.1.1 Coordinates
      - C.1.2 Coordinates in a dynamic CRS
      - C.1.3 Change of coordinate epoch
      - C.1.4 Coordinate reference system identification
    - C.2 Coordinate reference system definition
      - C.2.1 Principal subtypes of coordinate reference system
      - C.2.2 Additional subtypes of coordinate reference system
        - C.2.2.1 Introduction
        - C.2.2.2 Derived coordinate reference system
        - C.2.2.3 Compound coordinate reference system
  - C.3 Coordinate system
    - C.3.1 General
    - C.3.2 Cartesian coordinate system
    - C.3.3 Coordinate system axis
  - C.4 Datum and Reference Frame
    - C.4.1 General
      - C.4.2 Geodetic reference frame
        - C.4.2.1 General
          - C.4.2.2 Prime meridian
          - C.4.2.3 Ellipsoid
        - C.4.3 Vertical reference frame
        - C.4.4 Dynamic reference frames
      - C.4.5 Parametric datum
      - C.4.6 Engineering datum
      - C.4.7 Datum ensemble

- C.5**      **Coordinate operation**
- C.5.1**    **General characteristics of coordinate operations**
- C.5.2**    **Coordinate operation method and parameters**
- C.5.3**    **Parameter groups**
- C.5.4**    **Concatenated coordinate operation**
- C.5.5**    **Pass-through coordinate operation**
- C.5.6**    **RegisterOperations**
- C.5.7**    **Implementation considerations**

**Annex D (informative) Temporal referencing by coordinates — Context for modelling**

- D.1**      **General**
- D.2**      **Temporal Units of Measure**
- D.3**      **Reduced Precision**
- D.4**      **Calendar Arithmetic**
- D.4.1**    **General**
- D.4.2**    **Definitive Calendar Arithmetic**
- D.4.3**    **Ambiguous Calendar Arithmetic**

**Annex E (informative) Examples**

- E.1**      **Identification of a coordinate reference system**
- E.2**      **Definition of spatial coordinate reference systems**
- E.3**      **Definition of parametric coordinate reference systems**
- E.4**      **Definition of temporal coordinate reference systems**
- E.5**      **Definition of coordinate operations**
- E.6**      **Change of coordinate epoch in a dynamic CRS**

**Annex F (informative) Recommended best practice for interfacing to ISO 19111**

**Annex G (informative) Backward compatibility with ISO 19111:2007**

**Page count: 143**