Annex C
(informative)

Hierarchical diagrams for SRM concepts

C.1 Introduction

This annex presents several diagrams that illustrate SRM concepts and their relationships. An overview of SRM concepts and their relationships is presented in C.2. The hierarchy of reference datum categories is presented in C.3. In C.4, examples of the use of ORM templates to define ORMs are presented.

C.2 SRM concepts

Figure C.1 illustrates the relationships among many of the key SRM concepts as a class diagram. This diagram augments the overview of SRM concepts provided in 4.1. The shaded elements are those concepts that appear in the SRM API (Clause 11), and that can be registered (Clause 13). In the connectors, unfilled (white) diamonds denote aggregation while filled (black) diamonds denote composition, which only applies to the members of Spatial Reference Frame sets. The remaining connectors denote associations, with arrowheads indicating the direction of navigability when the association is not bi-directional.
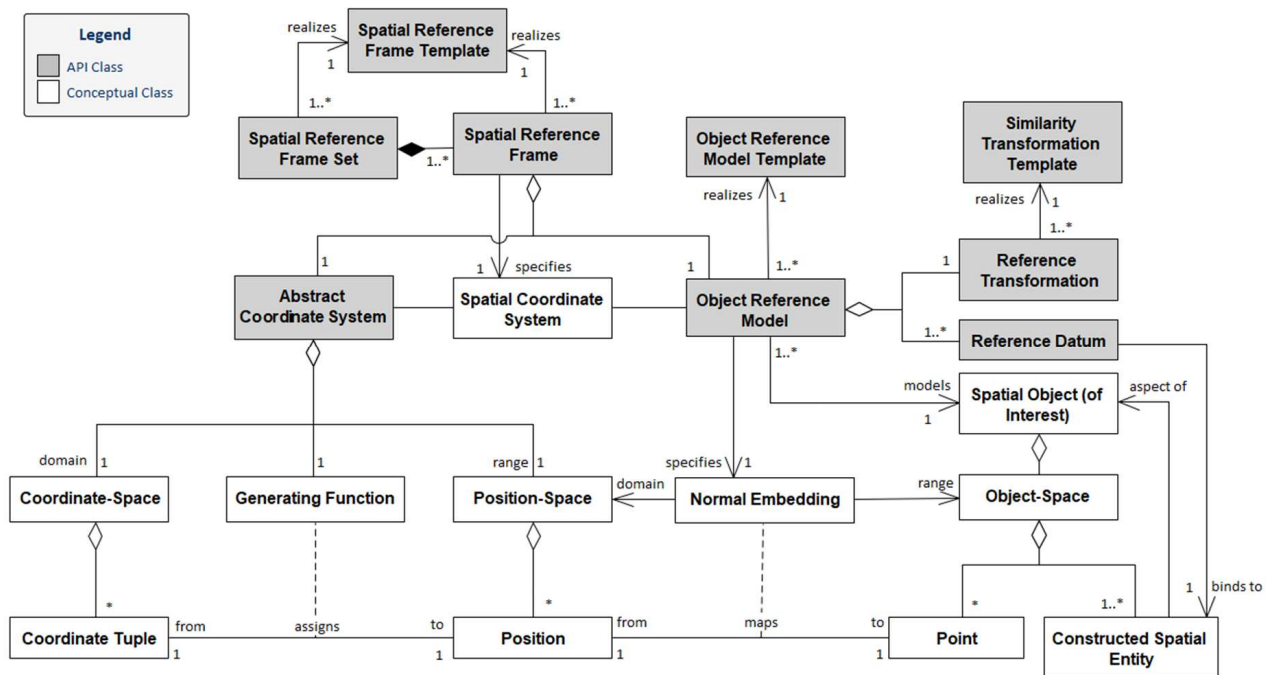

Figure C.1 — SRM concepts and their relationships

C.3 Reference datum hierarchy

Figure C.2 illustrates the hierarchical structure of reference datum (RD) categories and instances. This diagram augments the content of 7.2. The shaded elements are RD categories. RDs are organized into zero-dimensional points in 2D and 3D that represent the origin and axis unit points of orthonormal frames, one-dimensional directed curves in 2D and 3D that represent axes, and three-dimensional oriented surfaces that represent planes, spheres, and oblate, prolate, and tri-axial ellipsoids. A few examples of the sphere and ellipsoid RDs defined in Annex D are shown.
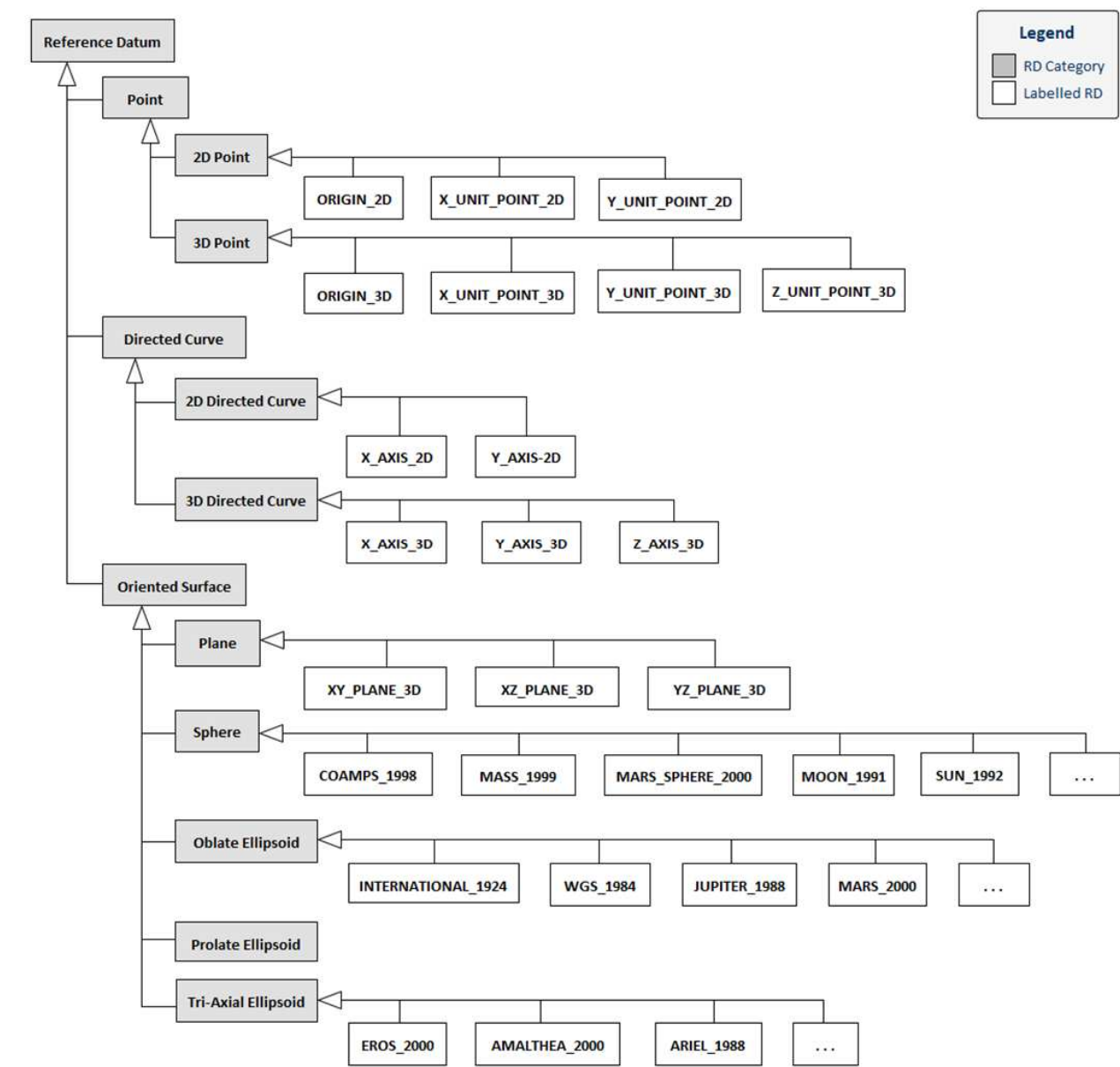
Figure C.2 — Reference datum hierarchy

C.4 ORM template realisation examples

Figures C.3 through C.5 show three examples of ORMs that realise ORM templates (ORMTs). These examples augment the content of 7.4.4. The shaded elements are RD categories.

Example 1   In Figure C.3, the SPHERE ORMT requires three RDs: a sphere RD, a Z_AXIS_3D RD that defines the rotational axis of the sphere, and an XZ_PLANE_3D RD that defines the prime meridian of the sphere. These three RDs determine the origin and basis vectors of the normal embedding that maps abstract coordinate systems to a sphere based ORM. The MARS_2000 ORM realises this template by filling its Sphere RD slot with the MARS_SPHERE_2000 RD, and combining it with the Z_AXIS_3D and XY_PLANE_3D RDs according to the binding constraints of the SPHERE ORMT.
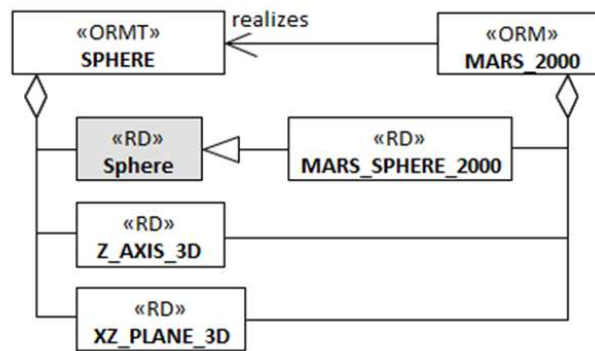
Figure C.3 — Sphere-based ORM template realisation example

Example 2   In Figure C.4, the OBLATE_ELLIPSOID ORMT similarly requires three RDs: an oblate ellipsoid RD, a Z_AXIS_3D RD that defines the rotational axis of the ellipsoid, and an XZ_PLANE_3D RD that defines the prime meridian of the ellipsoid. These three RDs determine the origin and basis vectors of the normal embedding that maps abstract coordinate systems to an oblate ellipsoid-based ORM. The EUROPE_1950 ORM realises this template by filling its Oblate Ellipsoid RD slot with the INTERNATIONAL_1924 RD, and combining it with the Z_AXIS_3D and XY_PLANE_3D RDs according to the binding constraints of the OBLATE_ELLIPSOID ORMT.

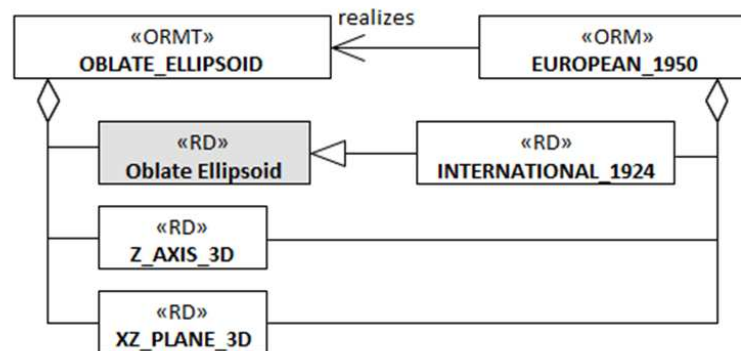**Figure C.4 — Oblate ellipsoid-based ORM template realisation example**

Example 3   In Figure C.5, the BI_AXIS_ORIGIN_3D ORMT requires three RDs: an ORIGIN_3D RD, a Z_AXIS_3D RD, and an X_AXIS_3D RD. These three RDs determine the origin and basis vectors of the normal embedding that maps abstract coordinate systems to a 3D ORM. The object-dynamic EARTH_INERTIAL_J2000r0 ORM realises this template by mapping the ORIGIN_3D RD to the centre of mass of the Earth, aligning the XZ_AXIS_3D with the direction of the Sun at the vernal equinox, and aligning the Z_AXIS_3D RD parallel with the north rotational pole, in accordance with the EQUATORIAL_INERTIAL object binding rule set (OBRS).
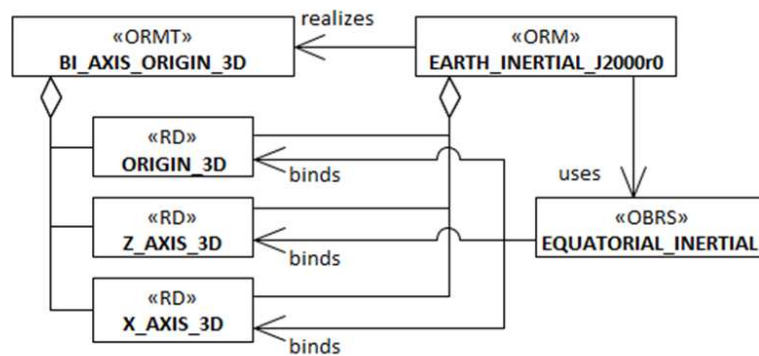
Figure C.5 — Object-dynamic ORM template realisation example

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