

IOGP Geomatics Data Models Overview - Introduction

In response to the growing need for standardized geospatial data management in the oil and gas industry, the International Association of Oil & Gas Producers (IOGP) has developed three comprehensive data models: the [Seabed Survey Data Model \(SSDM\)](#), the [Land Survey Data Model \(LSDM\)](#), and the [Offshore Infrastructure Survey Data Model \(OISDM\)](#). These models provide structured frameworks for consistent delivery, storage, exchange, visualization, and integration of survey data across onshore and offshore environments.

Each data model is designed to address specific survey domains while promoting interoperability, reducing data duplication, and enhancing data quality across projects and organizations. The SSDM focuses on marine and seabed surveys, supporting bathymetric, geohazard, environmental, and geotechnical surveys, in support of site and route ground modelling and analysis. The LSDM supports onshore survey activities, including topographic mapping, infrastructure layout, and geodetic control networks. The OISDM addresses offshore infrastructure, such as platforms, pipelines, and subsea structures, enabling standardized data exchange during engineering, construction, and asset maintenance. The OISDM is designed to allow standardized acquisition and exchange of offshore infrastructure data for subsequent input into the relevant corporate data store or model.

These GIS (Geographic Information System) data models are delivered using ESRI geodatabase format templates and include symbology standards, layer files, metadata conventions, and CAD templates to ensure consistency. They also support extensibility, allowing organizations to add custom features, whilst maintaining core data model integrity.

By adopting these standardized models, oil and gas operators, contractors, and regulatory agencies can streamline data workflows, improve collaboration, and reduce the risks associated with data misinterpretation and integration challenges. These models represent a significant step toward industry-wide data harmonization, supporting more efficient project execution and better-informed asset management decisions throughout the Exploration and Production (E&P) asset lifecycle. They are also potentially highly applicable to related energy industries, such as renewables (for example, wind farm development), carbon capture and storage, and the utilities and offshore cable industries.

This document provides an overview of the three data models at the key points users focus on.

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	SSDM**	OISDM*	LSDM*
Survey domain	Offshore	Offshore	Onshore
Survey type	<p>Seabed surveys:</p> <ul style="list-style-type: none"> • seabed clearance and bathymetric • platform and drilling hazard site • pipeline route and pre-lay¹ • environmental/benthic and geotechnical <p>Data typically collected by:</p> <ul style="list-style-type: none"> • vessel-mounted and towed sensors • high and ultra high resolution seismic surveys • autonomous underwater vehicles • uncrewed surface vehicles • Remotely Operated Vehicles (ROV) • environmental and geotechnical sampling systems <p>¹ SSDM version 2 guidance states that the SSDM can be used for pipeline span/surveillance/inspection 'as-found' surveys (excluding ROV/AUV based pipeline inspection surveys). Use of the OISDM is now recommended for these types of surveys.</p>	<p>Subsea, mid-water, surface and aerial engineering, construction and Inspection, Maintenance & Repair (IMR) infrastructure surveys:</p> <ul style="list-style-type: none"> • pre-lay¹ • as-laid • as-trenched/as-buried • as-built • as-found • out-of-straightness • embedment • subsea-structure • Risk-Based Inspection (RBI) <p>Data typically collected by:</p> <ul style="list-style-type: none"> • Remotely Operated Vehicles (ROV) • autonomous underwater vehicles • uncrewed surface vehicles • uncrewed aerial vehicles • static/mobile laser scanners 	<p>Land surveys:</p> <ul style="list-style-type: none"> • design, engineering and construction (including proposed route, as-found, as-left, as-installed, and as-built) • land and topographic, including Explosive Remnants of War (ERW), archaeological, and underground services • geodetic and survey control network • vegetation and land use • Right of Way (ROW) • geophysical/seismic, exploration and reconnaissance, geohazard, shallow, and intermediate geology • geotechnical soil investigation • environmental baseline and monitoring • infrastructure condition and subsidence monitoring <p>Data typically collected by:</p> <ul style="list-style-type: none"> • satellite and aerial remote sensing and photogrammetry • uncrewed aerial vehicles (drones) • land survey systems (GNSS, Total Station, etc.) • seismic surveys • static and mobile laser scanners

	SSDM**	OISDM*	LSDM*
Implementation format(s)	<ul style="list-style-type: none"> • ESRI Geodatabase • GML (SeabedML) • (Autodesk AutoCAD) 	<ul style="list-style-type: none"> • ESRI Geodatabase • (Autodesk AutoCAD and Bentley Microstation CAD) 	<ul style="list-style-type: none"> • ESRI Geodatabase
Is extensible	Yes	Yes	Yes
GIS software compatability	<ul style="list-style-type: none"> • ArcGIS Desktop 9.2+ 	<ul style="list-style-type: none"> • ESRI ArcGIS Desktop 10.5+ • ESRI ArcGIS Pro 2.5+” 	<ul style="list-style-type: none"> • ESRI ArcGIS Desktop 10.5+ • ESRI ArcGIS Pro 2.5+
Symbology	<ul style="list-style-type: none"> • ESRI ArcGIS Desktop style file • Autodesk AutoCAD <p>Implemented using IOGP symbology codes.</p>	<ul style="list-style-type: none"> • ESRI ArcGIS Desktop style and layer files • ESRI ArcGIS Pro style and layer files • Autodesk AutoCAD and Bentley Microstation CAD <p>Implemented using IOGP symbology codes.</p> <p>Feature classes and tables include a custom symbology code attribute field for user-implemented symbology implementation.</p>	<ul style="list-style-type: none"> • ESRI ArcGIS Desktop style and layer files • ESRI ArcGIS Pro style and layer files <p>Implemented using IOGP symbology codes</p>
Includes template data delivery folder structure	Yes	Yes	Yes
Enhanced CRS support*	No	Yes	Yes

* Includes support for dynamic CRS (coordinate epoch) and recording CRS(s) and coordinate epoch(s) to which coordinates within the dataset were previously referenced, if applicable.

** A SSDM revision is planned in 2027 to add ArcGIS Pro style and layer files, enhanced CRS support, and updated documentation.