Designing Next Generation Seismic Intelligence Platforms

SeisSense™

Seismic Intelligence Reimagined

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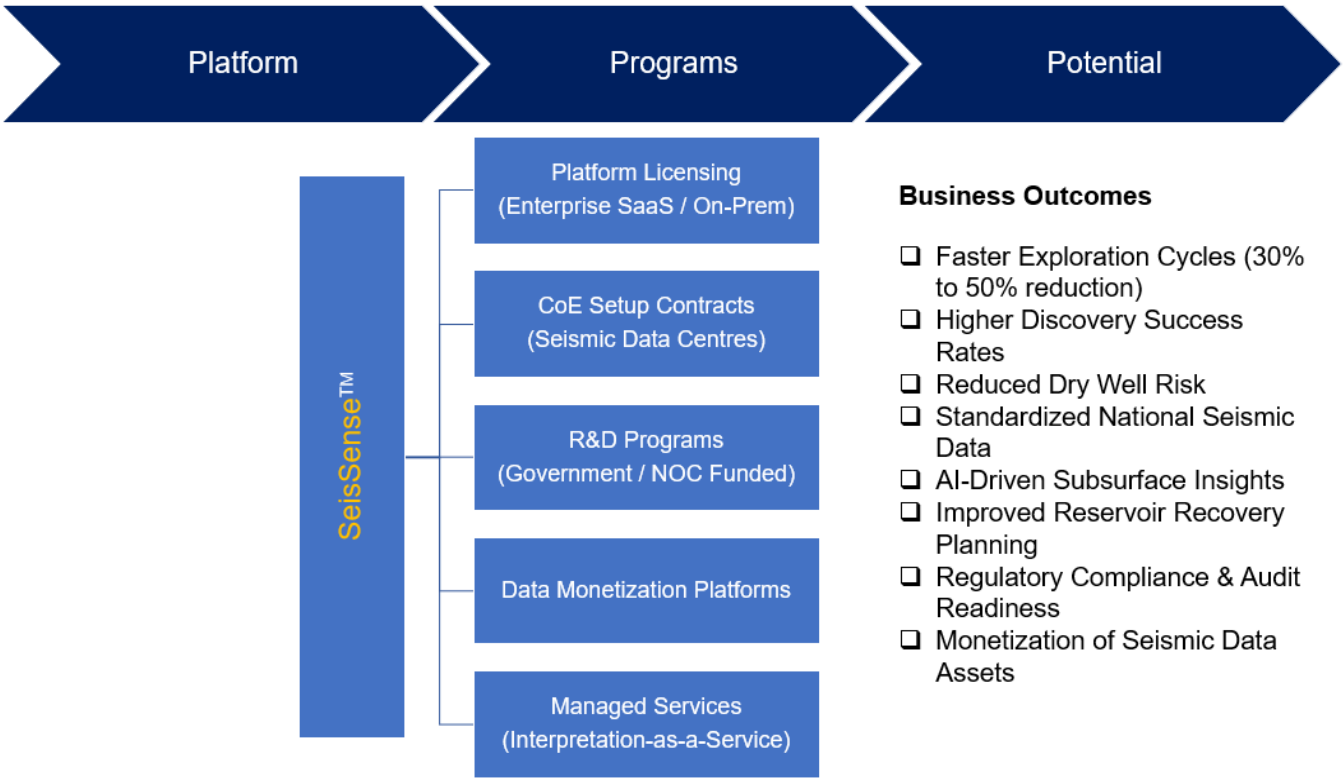
SeisSense™ Platform Ecosystem

SeisSense™ is designed and deployed as an *integrated seismic data to insights platform* (includes processing, interpretation, modelling, and decision support) to support the complete lifecycle of subsurface analysis. It brings together multiple specialized platforms within a unified environment, allowing seismic data to be handled consistently from initial ingestion through advanced interpretation, reservoir evaluation, and modelling.

The ecosystem supports a wide range of seismic workflows, including data merging, quality control, dimensional transformation, interpolation, structural and stratigraphic interpretation, reservoir analysis, prospect evaluation, and simulation-based modelling. Each platform within SeisSense™ is developed to address specific stages of seismic and reservoir workflows while maintaining compatibility with other components in the system.

The modular structure of SeisSense™ allows Oil & Gas firms to **adopt & customize individual platforms based on project needs or implement the full ecosystem as an integrated workflow environment**. By consolidating seismic and subsurface workflows into a connected framework, SeisSense™ enables teams to manage complex datasets, refine geological understanding, and support technical decision-making within a single operational ecosystem.



Executive Insights

The global energy industry is entering a new phase where subsurface intelligence, AI driven interpretation, and data monetization are becoming core strategic capabilities for National Oil Companies (NOCs) and energy majors.

We propose partnership with Oil & Gas operators, regulators and service providers to customize and operationalize the SeisSense™ Platform Ecosystem, enabling their enterprise to:

- Establish Seismic Data Centres (Centres of Excellence)
- Accelerate exploration using AI enhanced seismic analytics
- Monetize seismic data assets
- Build future-ready capabilities including 5D/6D and quantum enabled workflows

SeisSense™ is a modular, end to end seismic platform ecosystem covering the full lifecycle of subsurface analysis - from data ingestion and QC to interpretation, risk evaluation, and simulation.

Industry Context & Opportunity

Industry Shift

Energy companies are transitioning towards:

- Integrated seismic platforms (vs fragmented tools)
- AI-driven interpretation (vs manual workflows)
- Data monetization (vs passive archives)
- Sovereign digital capabilities (vs vendor dependency)

Market Opportunity

This creates a large opportunity across:

- Seismic platform modernization
- National data repositories
- AI-driven exploration systems
- Seismic data commercialization platforms

SeisSense™ Platform Ecosystem Overview

Layer	Platform	Role
Data Foundation	Fabric (OSDU)	Data ingestion, governance & standardization
Governance	QC Analyzer	Data quality, validation & compliance
Foundation	2D Merging	Multi-survey data standardization
Transformation	2D to 3D	Volumetric conversion
Intelligence	5D Interpolation	AI-driven seismic enhancement

Acquisition Intelligence	Flow	Acquisition optimization & QC readiness
Interpretation	Studio	Subsurface interpretation & planning
Exploration	Risk	Prospect evaluation & decision intelligence
Simulation	Modeller	Validation, inversion & modelling
AI Layer	GenAI	AI co-pilot, automation & insights across lifecycle

Program Models to Deploy SeisSense™

Model 1: Platform Licensing (Enterprise SaaS / On-Prem)

Objective: Provide clients with a fully integrated seismic platform for internal operations.

Platform Coverage: QC Analyzer, 2D Merging, 2D to 3D, 5D Interpolation, Studio (core)

Optional: Risk, Modeller

Client Value:

- Full control over seismic workflows
- Reduced dependency on external vendors
- Integrated interpretation environment

Commercials:

- Recurring software revenue
- High margin licensing model
- Scalable across geographies

Model 2: CoE Setup Contracts (Seismic Data Centres)

Objective: Design and deploy national-scale seismic platforms.

Platform Coverage: All SeisSense™ modules

Scope Includes:

- Data ingestion and repository
- Processing and interpretation pipelines
- AI analytics integration
- Visualization and collaboration environments

Client Value:

- National seismic intelligence platform
- Standardized workflows across assets
- Strategic digital sovereignty

Commercials:

- Large deal sizes ($10M to $30M)
- Long term contracts (3 to 5 years)
- Strong client lock-in

Model 3: R&D Programs (Government / NOC Funded)

Objective: Establish advanced seismic innovation labs.

Focus Areas:

- AI-driven interpretation
- 5D/6D seismic analytics
- Rock physics and inversion
- Quantum-enabled simulation (future roadmap)

Platform Coverage: 5D Interpolation, Modeller, Risk

Client Value:

- Internal innovation capability
- Proprietary IP development
- Future-ready exploration technologies

Commercials:

- Funded innovation programs
- IP co-ownership
- Strategic differentiation

Model 4: Data Monetization Platforms

Objective: Enable clients to generate revenue from seismic data assets.

Platform Coverage: QC Analyzer, 2D Merging, 5D Interpolation, Studio

Capabilities:

- Data certification and QC
- Dataset enhancement and packaging
- Data catalogue and marketplace
- Licensing and access control

Client Value:

- New revenue streams from seismic data
- Increased investor/operator engagement
- Improved data utilization

Commercials:

- Revenue sharing models
- Marketplace ownership
- Recurring income streams

Model 5: Managed Services (Interpretation-as-a-Service)

Objective: Provide ongoing seismic interpretation and analytics services.

Platform Coverage: Studio, Risk, Modeller, 5D

Capabilities:

- Seismic interpretation
- Prospect evaluation
- Simulation and validation
- Continuous analytics support

Client Value:

- Access to expert capabilities without internal hiring
- Faster project execution
- Reduced operational costs

Commercials:

- Recurring service revenue
- Long-term engagement model
- High-margin service + platform combination

SeisSense™ Customization & Integrations

SeisSense™ is a **client specific seismic intelligence platform** built by leveraging the proven frameworks, models, and domain insights of the SeisSense™ ecosystem, and tailored to each client's data, workflows, and operational environment.

Dimension	SeisSense™ (Foundation Layer)	SeisSense™ (Client-Specific Layer)	Client Impact	Commercial Impact
Frameworks & Architecture	Pre-built seismic processing, QC, interpretation, and modelling frameworks	Customized architecture aligned to client IT landscape (cloud/on-prem/hybrid)	Faster deployment with proven foundation	Reduced build cost, faster scaling
Models & Algorithms	Pre-developed models (5D interpolation, fault detection, lithology, inversion)	Fine-tuned models using client datasets and regional geology	Higher accuracy in interpretation	Reusable IP across clients
Domain Insights	Embedded geophysical workflows and best practices	Customized workflows based on basin, asset type, and operator practices	Better decision alignment with field realities	Strong domain differentiation
Datasets	Generic framework supporting seismic,	Fully adapted to client-provided	Seamless integration with existing data	No dependency on standardized data formats

	well, and reservoir data	datasets (SEGY, LAS, DLIS, etc.)		
Deployment Strategy	Flexible deployment patterns supported	Tailored deployment (On-Prem for NOCs, Cloud for others, Hybrid for scale)	Compliance with data sovereignty requirements	Multi-market adaptability
User Experience (UX/UI)	Base visualization and interaction templates	Fully customized UI aligned to client workflows and roles	Higher user adoption and productivity	Differentiated product per client
Workflow Orchestration	Standard seismic lifecycle workflows	Configurable workflows aligned to client processes and governance	Operational efficiency and consistency	Platform adaptability across clients
Integration Ecosystem	APIs and connectors available	Integrated with client systems (Petrel, OpenWorks, OSDU, ERP, etc.)	Unified digital ecosystem	Higher switching cost (lock-in)
Scalability	Designed for large seismic datasets	Scaled per client (national data centres, CoEs)	Handles enterprise-scale workloads	Enables large deal sizes
Security & Compliance	Standard governance models	Customized security, access control, and regulatory compliance	Meets national regulatory requirements	Enables government/NOC deals

Appendix A - SeisSense™ Integrated Platform

SeisSense™ QC Analyzer: Seismic QC Workflow & Lifecycle

Requirement	Seismic QC Workflow & Lifecycle
Requirement Name	SeisSense™ QC Analyzer - Workflow & Lifecycle Management
Objective	Establish an automated, auditable, and governed seismic QC workflow ensuring data integrity, compliance, and lifecycle readiness
Scope	End-to-end QC orchestration across ingestion, processing, validation, approval, and delivery
Functional Capabilities	• End-to-end QC workflow management • Rule-based + AI-assisted QC checks • multi-stage lifecycle (review, approve, reject, re-QC) • Exception handling & escalation • Human-in-loop validation • QC monitoring dashboards
Technical Characteristics	• Central QC orchestration engine • Configurable QC rules & thresholds • Persistent audit logs • Role-based access controls • Regulatory dashboards
Key Outputs	• QC pass/fail certification • QC reports & findings • Audit-ready lifecycle logs • Approved datasets
Business Value	• Trusted seismic data for interpretation • Reduced manual QC effort • Regulatory compliance readiness • Increased confidence in data usage
Commercial Value	• Mandatory module in every deal • Enables QC-as-a-Service revenue • Strong regulatory positioning • High platform stickiness

SeisSense™ 2D Seismic Merging

Requirement	Seismic Data Foundation & Standardization
Requirement Name	SeisSense™ 2D Seismic Merging Platform
Objective	Create a unified, standardized seismic dataset across multi-survey environments
Scope	Integration, normalization, and preparation of multi-vintage 2D seismic datasets

Functional Capabilities	• Multi-survey ingestion • Spatial normalization • Line alignment & stitching • Cross-survey continuity • Visualization of merged datasets
Technical Characteristics	• Coordinate harmonization engine • Trace alignment algorithms • Metadata-driven dataset control • Visualization tools
Key Outputs	• Unified 2D seismic dataset • Standardized survey framework
Business Value	• Eliminates fragmented seismic datasets • Ensures consistent interpretation • Faster project initiation • Improved geological continuity
Commercial Value	• Entry-point contracts (data consolidation) • Locks data layer ownership • High upsells into full platform • Repeatable national-scale deals

SeisSense™ 2D to 3D Conversion

Requirement	Seismic Data Transformation (2D to 3D)
Requirement Name	SeisSense™ 2D to 3D Conversion Platform
Objective	Convert 2D seismic into structured 3D volumes for advanced interpretation
Scope	Volumetric transformation and validation of seismic datasets
Functional Capabilities	• 3D cube generation • Spatial interpolation • Volume structuring • Data validation tools
Technical Characteristics	• Grid generation engine • Interpolation algorithms • Cube structuring framework • QC validation
Key Outputs	• 3D seismic cubes • Interpretation-ready volumes
Business Value	• Unlocks legacy seismic value • Enables 3D interpretation without new surveys • Significant cost savings
Commercial Value	• Strong ROI narrative • High-volume transformation deals

	• Scalable across regions • Gateway to advanced modules

SeisSense™ 5D Interpolation

Requirement	Advanced Seismic Enhancement & Analytics
Requirement Name	SeisSense™ 5D Interpolation Platform
Objective	Enhance seismic data quality using multi-dimensional interpolation and AI analytics
Scope	Data densification, resolution enhancement, and predictive analytics
Functional Capabilities	• Multi-dimensional interpolation • Fault detection • Lithology & facies prediction • Velocity modelling • Time-lapse analysis • Comparative analytics
Technical Characteristics	• AI/ML interpolation engine • Attribute computation framework • Well data integration • GPU processing
Key Outputs	• Enhanced seismic volumes • Attribute datasets • Analytical insights
Business Value	• Improved subsurface clarity • Higher exploration success rates • Identification of hidden reservoirs
Commercial Value	• Core IP ownership • Premium pricing capability • AI-driven recurring revenue • Strong competitive differentiation

SeisSense™ Studio

Requirement	Seismic Interpretation & Development Planning
Requirement Name	SeisSense™ Studio Platform
Objective	Enable integrated interpretation and development planning workflows
Scope	Structural modelling, reservoir evaluation, and well planning
Functional Capabilities	• Horizon & fault modelling • Volumetric analysis • Well trajectory design • Scenario comparison

	• Visualization dashboards
Technical Characteristics	• Integrated modelling engine • Visualization framework • Planning tools • Collaborative environment
Key Outputs	• Structural models • Reservoir maps • Well plans
Business Value	• Better drilling decisions • Improved reservoir targeting • Faster development planning
Commercial Value	• Daily-use system to high stickiness • Premium licensing model • Core platform dependency

SeisSense™ Risk

Requirement	Exploration Risk & Prospect Evaluation
Requirement Name	SeisSense™ Risk Platform
Objective	Enable structured evaluation of exploration prospects and uncertainty
Scope	Hydrocarbon probability analysis and prospect ranking
Functional Capabilities	• DHI analysis • Attribute interpretation • Trap evaluation • Prospect ranking
Technical Characteristics	• Probabilistic modelling engine • Attribute analytics • Decision dashboards
Key Outputs	• Risk scores • Prospect rankings • Evaluation reports
Business Value	• Reduced dry well risk • Better capital allocation • Improved exploration success
Commercial Value	• Direct ROI linkage • High-value decision pricing • Strong differentiation

SeisSense™ Modeller

Requirement	Seismic Simulation & Validation
Requirement Name	SeisSense™ Modeller Platform
Objective	Validate seismic interpretation through simulation-driven workflows
Scope	Geological modelling, simulation, and inversion workflows
Functional Capabilities	• Forward modelling • Synthetic seismic generation • Scenario testing • Rock physics integration
Technical Characteristics	• Wave simulation engine • Inversion models • HPC/GPU compute
Key Outputs	• Synthetic datasets • Validated models • Scenario results
Business Value	• Improved confidence before drilling • Reduced uncertainty • Better reservoir models
Commercial Value	• Entry into advanced R&D markets • HPC-based revenue streams • Premium positioning

SeisSense™ Fabric (OSDU Compliant Data Platform)

Requirement	OSDU-Compliant Data Foundation & Ingestion Fabric
Requirement Name	SeisSense™ Fabric Platform
Objective	Establish a scalable, governed, and OSDU-compliant data fabric to manage ingestion, QC, metadata, and delivery of seismic and subsurface datasets
Scope	End-to-end data lifecycle management including ingestion, QC validation, metadata enrichment, orchestration, and delivery to Azure / OSDU
Functional Capabilities	• Source intake orchestration (batch, streaming, event-driven) • Chunking & throttling for large seismic datasets (SEG-Y, etc.) • Retry & failure isolation • Format validation (SEG-Y, LAS, PRODML) • Domain QC rules & reconciliation • Metadata extraction & enrichment • OSDU schema alignment • Workflow orchestration (ingest → QC → enrich → publish)

	• Monitoring, alerts, SLA tracking • Governance (audit logs, approvals, access control) • Secure handoff to Azure Energy Data Manager / OSDU
Technical Characteristics	• Centralized ingestion & orchestration engine • Configurable QC and validation rules • Metadata mapping to OSDU schemas • Persistent audit trails and lineage tracking • Role-based access and entitlement propagation • API-driven integration with enterprise systems • Cloud-native + scalable data pipelines
Key Outputs	• OSDU-compliant datasets • QC-certified and enriched seismic data • Searchable metadata catalogue • Audit-ready ingestion and lifecycle logs • Analytics-ready datasets for AI/BI
Business Value	• Establishes single source of truth for seismic data • Ensures regulatory compliance and governance • Reduces ingestion and QC cycle time • Enables seamless integration into analytics and AI workflows
Commercial Value	• Foundation layer for all platform deployments • Mandatory component in CoE deals • Enables Data Monetization platforms • High lock-in via data governance and storage

SeisSense™ Flow (Acquisition → Processing Readiness Intelligence)

Requirement	Seismic Flow Optimization & Platform Readiness
Requirement Name	SeisSense™ Flow Platform
Objective	Enable real-time and pre-processing intelligence to optimize seismic acquisition, QC readiness, and processing workflows
Scope	Covers acquisition intelligence, near-surface modelling, QC readiness, interpretation acceleration, and inversion preparation
Functional Capabilities	• Passive seismic intelligence (noise vs signal classification, confidence scoring) • DAS-based near-surface modelling (velocity proxy, QC scoring) • Acquisition optimization (roll-off timing, shot design optimization) • Shot redundancy and cost-efficiency analysis • FWI readiness gating and cost estimation • AI-assisted interpretation (faults, horizons) • Well correlation and picking • Automated 1D inversion workflows

Technical Characteristics	• Signal processing (RMS energy, bandpass filtering, noise classification) • Deterministic + ML based advisory engines • AI/ML models for interpretation and inversion • GPU-aware scheduling and compute optimization • Integration with acquisition systems (OBN, DAS, vessel telemetry) • Scenario simulation and optimization engines
Key Outputs	• QC readiness scores • Acquisition optimization recommendations • Cost and time savings KPIs • Interpreted faults and horizons • Well ties and inversion outputs • FWI-ready datasets
Business Value	• Reduces acquisition and processing cost significantly • Improves data quality before processing • Accelerates interpretation timelines • Enhances imaging accuracy and confidence
Commercial Value	• Differentiates platform at pre-processing stage (rare capability) • Enables cost-saving-driven sales pitch • Strong value for offshore and high-cost surveys • Supports R&D and advanced analytics programs

SeisSense™ GenAI (AI Co Pilot for Subsurface Intelligence)

Requirement	Generative AI for Seismic Interpretation & Decision Support
Requirement Name	SeisSense™ GenAI Platform
Objective	Provide an AI-powered co-pilot for geoscientists to accelerate interpretation, analysis, and decision-making across the seismic lifecycle
Scope	Covers natural language interaction, automated interpretation assistance, report generation, and knowledge discovery
Functional Capabilities	• Natural language querying of seismic datasets and metadata • AI-assisted interpretation (faults, horizons, attributes) • Automated report generation (technical + investor reports) • Knowledge retrieval from seismic + well + documents (RAG-based) • Scenario analysis and recommendations • Workflow automation (QC, interpretation, risk evaluation) • Conversational analytics across OSDU and platform data
Technical Characteristics	• LLM-based architecture (domain-tuned models) • Retrieval-Augmented Generation (RAG) over seismic data • Integration with SeisSense Fabric (data layer) • Integration with Studio, Risk, Modeller • Prompt orchestration and workflow chaining • Secure enterprise deployment (on-prem / private cloud)

Key Outputs	• AI-generated insights and interpretations • Automated reports and summaries • Query responses across datasets • Decision recommendations • Knowledge graphs and contextual insights
Business Value	• Reduces interpretation time significantly (30–60%) • Democratizes access to seismic insights • Enhances decision-making speed and accuracy • Bridges gap between data and business users
Commercial Value	• Premium AI layer (high-margin offering) • Subscription-based revenue model • Strong differentiation vs traditional platforms • Future-ready (Agentic AI, autonomous workflows)

Appendix B - Seismic Insights Lifecycle Coverage

Layer	Platform	Primary Role	Key Capabilities	Lifecycle Stage Covered
Data Foundation	SeisSense™ Fabric (OSDU)	Data ingestion, governance & standardization	Ingestion orchestration, QC validation, metadata enrichment, OSDU compliance, data cataloguing	Data ingestion & management
Data Governance	SeisSense™ QC Analyzer	Data quality validation & certification	Automated QC checks, anomaly detection, audit trails, approval workflows	Pre-processing validation
Data Preparation	SeisSense™ 2D Merging	Multi-survey data consolidation	Line alignment, spatial normalization, dataset unification	Data preparation
Data Transformation	SeisSense™ 2D ➔ 3D	Volumetric structuring	Cube generation, interpolation, volume validation	Data structuring
Data Enhancement	SeisSense™ 5D Interpolation	AI-driven data enhancement	Multi-dimensional interpolation, fault detection, lithology prediction, attribute generation	Data enhancement

Acquisition Intelligence	SeisSense™ Flow	Pre-processing & acquisition optimization	Passive seismic analysis, DAS modelling, shot optimization, FWI readiness, AI-assisted interpretation	Acquisition ➔ Pre-processing
Interpretation Layer	SeisSense™ Studio	Subsurface interpretation & planning	Fault/horizon modelling, volumetrics, well planning, visualization	Interpretation
Decision Intelligence	SeisSense™ Risk	Exploration risk evaluation	DHI analysis, probabilistic modelling, prospect ranking	Exploration decision-making
Simulation & Validation	SeisSense™ Modeller	Physics-based validation & simulation	Forward modelling, inversion, scenario testing, synthetic seismic	Pre-drilling validation
AI Layer	SeisSense™ GenAI	AI co-pilot across lifecycle	Natural language queries, automated interpretation, report generation, RAG-based insights	Across all stages

About Nergyflux

Nergyflux is an AI-first industrial intelligence platform focused on transforming how asset-intensive industries operate. By embedding predictive, generative, and agentic intelligence into core workflows, Nergyflux enables organizations to move from reactive operations to autonomous, self-optimizing systems.

Why Choose Nergyflux for Reliable Seismic Intelligence?

End-to-End Seismic Intelligence: Covers the complete lifecycle from data ingestion and QC to advanced interpretation and decision support (eliminating fragmentation across tools and teams).

Hybrid AI + Physics Models: Combines machine learning with physics-based modelling to deliver faster insights with higher accuracy and trust (avoiding black-box uncertainty).

Unified SeisSense™ Ecosystem: An integrated platform spanning QC, processing, AI, workflows, and GenAI - providing a single, scalable foundation for seismic intelligence.

Automation at Scale: Significantly reduces manual effort through automated QC, processing, and reporting - ensuring consistency, speed, and operational efficiency.

Enterprise & Regulatory Ready: Built on PPDM-compliant and OSDU-aligned architecture to support operators, regulators, and national data repositories with strong governance and compliance.

Flexible & Future-Ready Architecture: Deployable across cloud, on-premise, and hybrid environments with open integrations - ready for 5D/6D seismic and next-generation compute.

Faster Decisions, Lower Risk: Empowers teams with high-confidence insights, reducing exploration risk and improving asset performance and investment outcomes.

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