

EBOOK

SURFING THE DATA

Why Upstream Oil & Gas
Needs Logical Data
Management





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CHAPTER 1

THE UPSTREAM DATA EXPLOSION

The upstream oil & gas sector generates vast amounts of data from exploration, drilling, and production activities. Add ESG regulations and GenAI use cases to the mix, and the scale and variety of data becomes staggering. Expecting this flow to slow down is futile—like trying to hold back the tide.

As subsurface models grow more complex, as telemetry gets more granular, and as reporting requirements expand, upstream organizations need a new way to manage data: real-time, governed, and AI-ready.



FIVE HIGH-VALUE UPSTREAM USE CASES

1. Subsurface Data Integration

Enables geoscientists to unify seismic, well log, geological, and GIS data across Petrel, OpenWorks, and other tools, to accelerate exploration and reduce risk

2. Real-Time Drilling Optimization

Supports drilling engineers and operations teams with integrated SCADA, WITSML, and well log data for real-time decision-making and predictive maintenance

3. Production Surveillance and Optimization

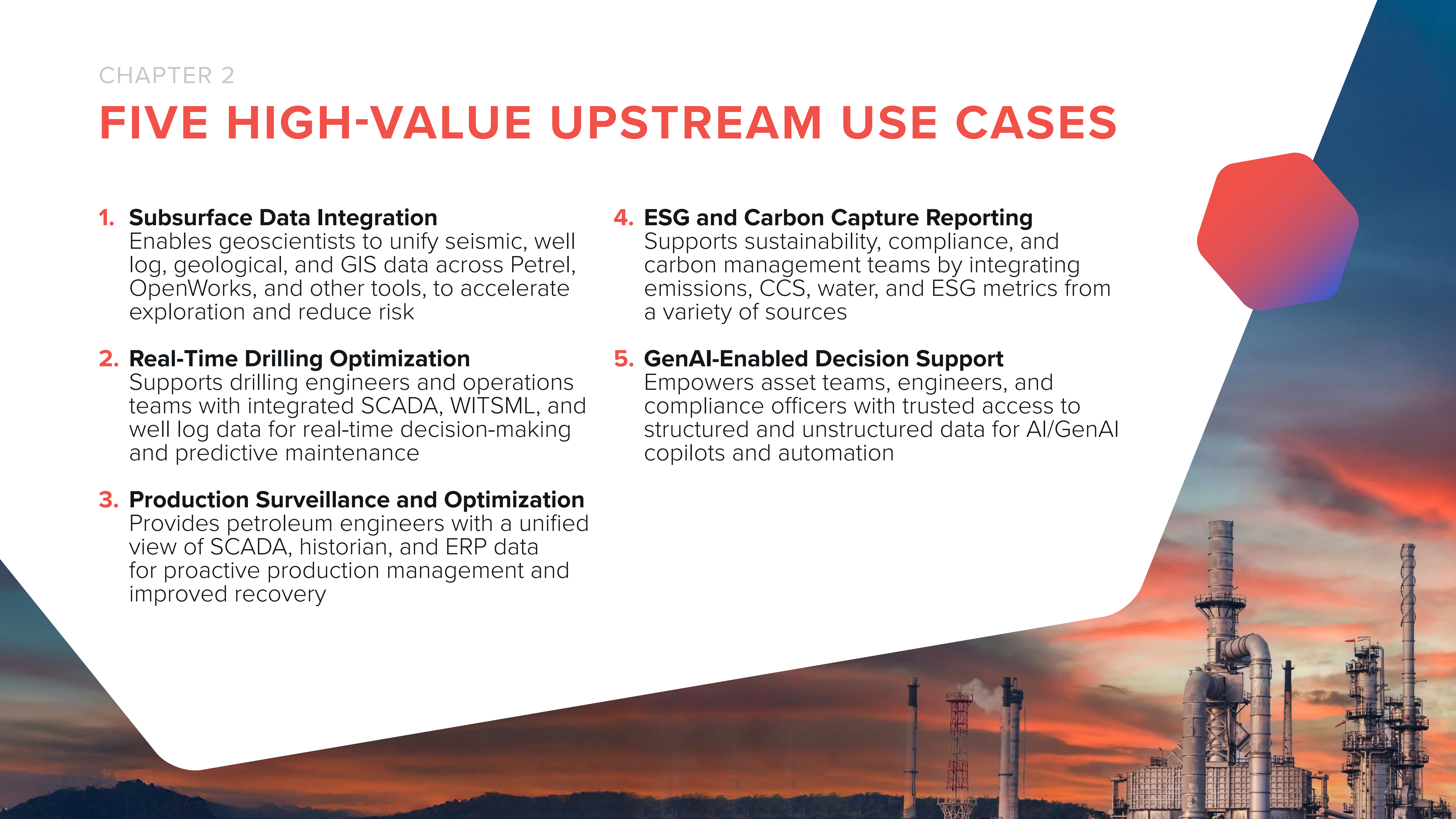
Provides petroleum engineers with a unified view of SCADA, historian, and ERP data for proactive production management and improved recovery

4. ESG and Carbon Capture Reporting

Supports sustainability, compliance, and carbon management teams by integrating emissions, CCS, water, and ESG metrics from a variety of sources

5. GenAI-Enabled Decision Support

Empowers asset teams, engineers, and compliance officers with trusted access to structured and unstructured data for AI/GenAI copilots and automation



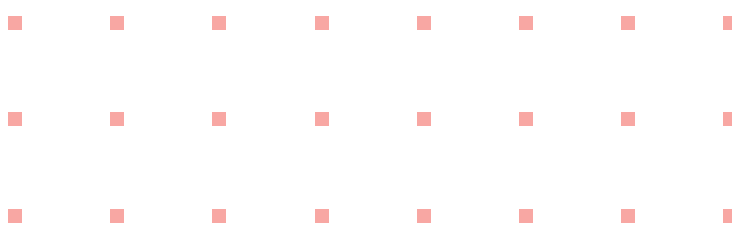
PREDICTIVE MAINTENANCE AS AN ADDITIONAL, YET OVERARCHING USE CASE

WHY IT MATTERS:

- **In drilling**, predictive maintenance ensures wellbore integrity and equipment uptime by analyzing telemetry in real time.
- **In production**, it helps detect anomalies in pumps, separators, and pipelines before breakdowns occur.
- **In ESG**, it reduces the likelihood of methane leaks and flaring incidents caused by equipment malfunction.

THE DATA CHALLENGE:

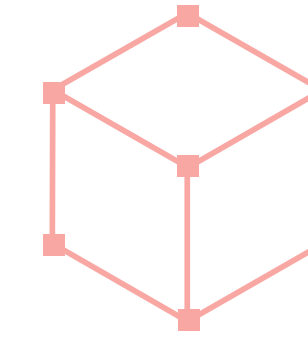
- Real-time and historical sensor data (SCADA, PI) is scattered.
- Maintenance records (SAP PM, Maximo) are siloed.
- AI models require integrated, trusted, and timely access to detect patterns and trigger alerts.



HOW LOGICAL DATA MANAGEMENT HELPS:

- It creates a single, virtual view of all relevant operational and asset health data.
- It powers predictive algorithms with reliable, governed inputs.
- It enables cross-functional teams to collaborate on maintenance strategies without moving or replicating data.

With a logical data management platform, predictive maintenance becomes a proactive, insight-driven process that protects productivity, safety, and environmental performance across upstream operations.



CHAPTER 4

THE EXECUTION GAP

These use cases are powerful—but execution is hard. Oil & Gas companies face:

- Siloed systems and proprietary formats
- Lack of real-time access across disciplines
- Challenges integrating structured and unstructured data
- Difficulty curating trusted data for AI and GenAI

Even the best data lakehouse architectures struggle to support low-latency, multi-domain access with governance.



CHAPTER 5

LOGICAL DATA MANAGEMENT TO THE RESCUE

Logical data management bridges the gap by creating a unified, virtual data layer across all data sources. With the Denodo Platform, a leading logical data management solution:

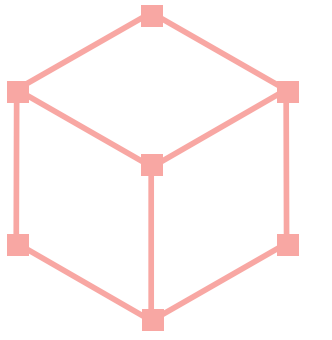
- Data remains in place—no replication is needed (though replication is always an option)
- All users access a consistent, governed view of the truth
- AI and GenAI get instant access to curated, context-rich data

Logical data management platforms do not replace your lakehouse or your SCADA systems. They complement these systems, enhancing agility, governance, and performance across upstream operations.



CHAPTER 6

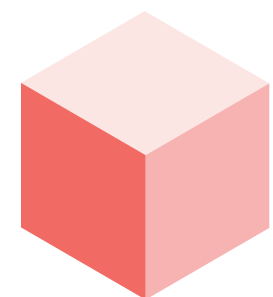
A FUTURE-PROOF DATA STRATEGY



As upstream companies continue to digitize, decarbonize, and automate, success will depend on their ability to:

- Scale AI and GenAI safely
- Deliver real-time insights across geoscience and engineering
- Automate ESG reporting and regulatory compliance

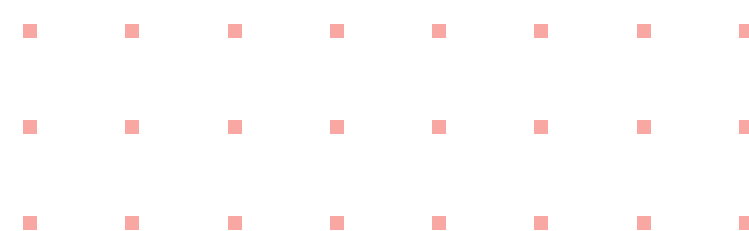
Logical data management is the key to making this vision a reality. Don't let the data tide wash over you. With Denodo, you can ride it—confidently, securely, and intelligently.

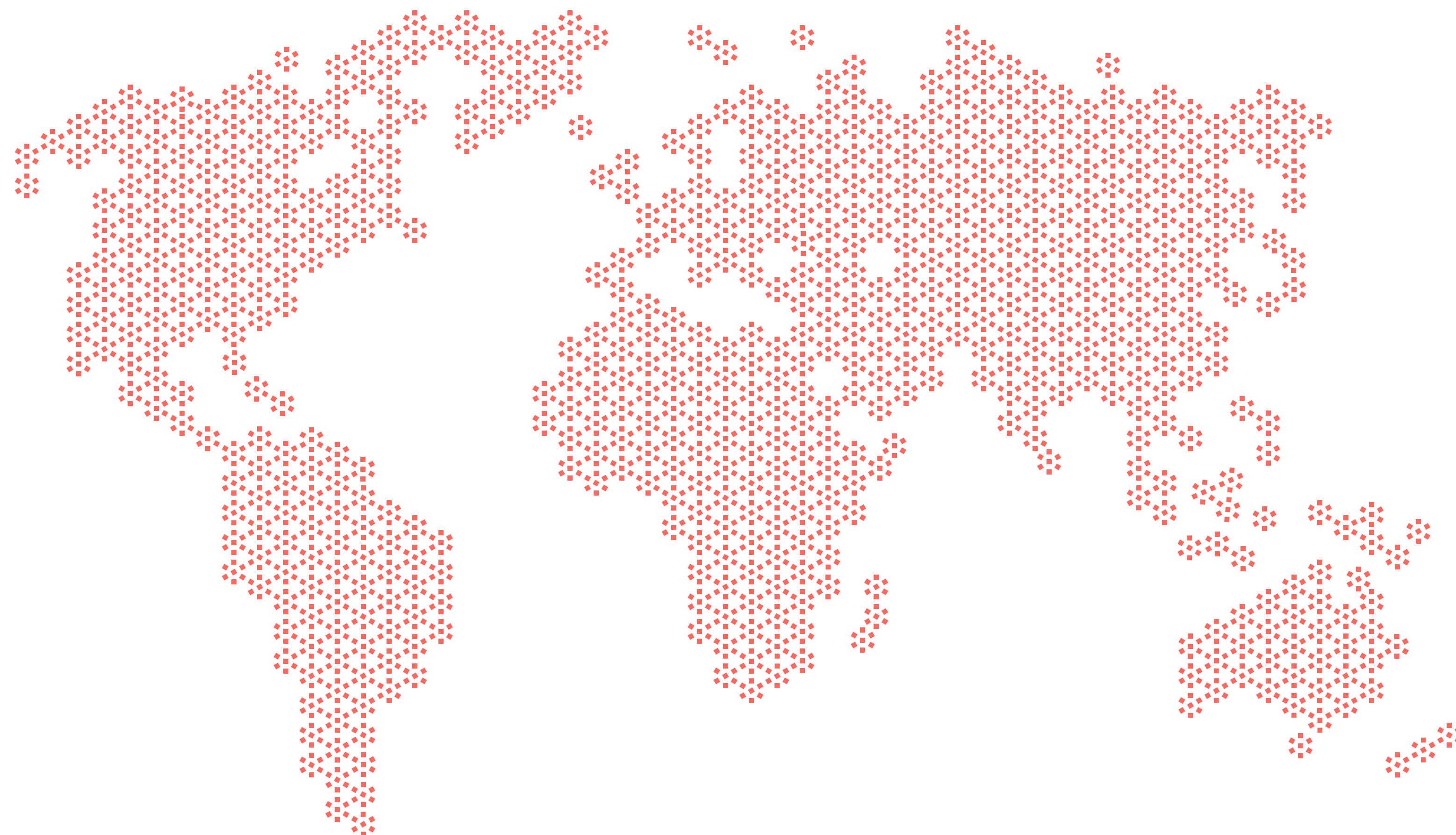


ABOUT DENODO

Denodo is a leader in data management. The award-winning Denodo Platform is the leading logical data management platform for transforming data into trustworthy insights and outcomes for all data-related initiatives across the enterprise, including AI and self-service. It powers trusted, AI-ready data across exploration, drilling, production, and ESG initiatives.

Learn more at www.denodo.com.





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