Sustainable Oils, Inc: Revolutionizing Agricultural Operations with IoT and Cloud

Sustainable Oils leverages DeepIQ to integrate temporal and geospatial data from over 16 vendors and 70+ growers, driving a modern, data-driven approach to sustainable agriculture aimed at achieving goals such as reducing soil erosion by 70% and greenhouse gas emissions by 50%.

Executive Summary

Sustainable Oils is the world's leading camelina seed company, utilized in renewable diesel production. Sustainable Oils' camelina has become the crop feedstock of choice for renewable diesel. This high-demand drop-in fuel meets all the specifications for modern engines and performs on par with petroleum-based diesel. Notably, Sustainable Oils' camelina varieties are the only ones approved fo

the California Low Carbon Fuel Standard (LCFS), underscoring their significance in advancing sustainable fuel solutions. Sustainable Oils embarked on an ambitious mission to adopt innovative agricultural practices, including implementing intermediate crops, no-till farming, soil quality enhancement, on-site carbon storage, and nutrient management. These innovative methods are estimated to yield significant results:

- **1,400 lbs./acre** of harvest, translating to an additional revenue stream of **$420/acre** through no-till practices on previously idle land.
- **70 gallons/acre** of renewable diesel production.
- **70% reduction** in land erosion.
- **20% reduction** in nutrient loss.
- **50% reduction** in greenhouse gas emissions.
- **2 tons/acre/year** increase in carbon capture, totaling **35,000 tons** over five years.
- **5 tons/acre** increase in soil biomass, equating to **87,500 tons** over five years.

The foundation of this initiative is a cutting-edge data analytics capability that integrates various data streams from Sustainable Oil's fields, using sophisticated models to monitor performance metrics. This integration was particularly challenging due to the dispersed nature of Sustainable Oil's USDA, spanning over 70+ growers across five agroclimatic regions, with data provided by 16 different vendors.

Conventional data integration technology could not scale to meet the geospatial and temporal demands or the required latency and volume. To address this, Sustainable Oils partnered with DeepIQ to deploy the DataStudio platform on AWS. This advanced data integration system centralized and structured data collection, facilitating comprehensive analysis and enhancing decision-making processes. The outcome was improved efficiency, reduced operational costs, and data-driven decision-making.

DeepIQ's DataStudio platform allowed Sustainable Oils to unify disparate data types into a multimodal data lake, ensuring seamless information flow across all operational levels. Key features of the platform include:

- Efficient management of high-frequency sensor data.
- Consolidation of diverse geospatial data formats.
- Standardization of incoming data.

DeepIQ also implements its intuitive natural language interface, enabling agronomists and operational managers to query data easily. This feature accelerates insights and facilitates real-time decision-making.

Implementing DeepIQ DataStudio has significantly enhanced Sustainable Oils' return on investment by aligning with sustainability objectives, improving regulatory compliance, and supporting advanced analytics to transform data into actionable insights. Through these practices, Sustainable Oils is helping growers adapt to varying climatic conditions while contributing to broader environmental objectives. As the initiative progresses, it continues to advance sustainability in the agricultural sector, with ongoing efforts to refine practices and maximize positive impacts on the environment and agricultural productivity. The project remains a work in progress, with further improvements anticipated as additional data is gathered and analyzed, driving continuous enhancement and long-term success in sustainable farming

Introduction

Sustainable Oils Inc., founded in 2013, is a pioneering company specializing in developing camelina, a non-food-based ultra-low carbon biofuel feedstock. The company boasts an industry-leading portfolio of technologies dedicated to producing proprietary camelina varieties. Sustainable Oils innovative approach places it at the forefront of the biofuel sector, focusing on sustainability and the efficient production of biofuel feedstocks that contribute to reducing carbon emissions.

Sustainable Oils partnered with DeepIQ to address the challenges of integrating and analyzing data from diverse business and IoT sources for its operational needs. Sustainable Oils needed a sophisticated data platform to unify data from weather stations, soil probes, and satellite imagery, among other sources. The goal was to create a centralized, structured data system to streamline data collection, facilitate comprehensive analysis, and enhance decision-making processes. By leveraging DeepIQ's advanced data integration capabilities, Sustainable Oils aimed to improve operational efficiency, reduce costs, and support data-driven decisions for future growth and sustainability.

Challenges Faced by Sustainable Oils

Sustainable Oils faced several significant challenges:

- **Data Integration:** Sustainable Oils needed to integrate data from various sources, including weather stations, soil probes, satellite imagery, and other multimodal data. This data was supplied by and 16 different vendor systems and 3rd party sources, making integration complex and cumbersome.
- **Data Centralization**: The lack of a centralized data system led to fragmented data collection and analysis processes. Sustainable Oils required a unified platform to streamline data collection and ensure consistency across all operational levels.
- **Comprehensive Analysis**: The diversity of data formats, including high-frequency sensor data and various geospatial data formats, necessitated time series and machine learning methods to convert this data into actionable insights.
- **Operational Efficiency**: Inefficiencies in data handling and analysis processes hamper operational decision-making and increase costs. Sustainable Oils needed a solution that could enhance efficiency and reduce operational expenses.

- **Scalability and Maintenance**: The existing systems were not scalable and required significant IT maintenance. Sustainable Oils needed a solution to scale seamlessly with increased data loads without performance loss and minimal IT overhead.
- **Compliance and Reporting**: Meeting agricultural regulations and generating accurate reports on farming activities and resource usage were challenging with the current data management practices.

By addressing these challenges, Sustainable Oils aimed to improve efficiency, support data-driven decision-making, and align with sustainability goals.

DeepIQ's Solution

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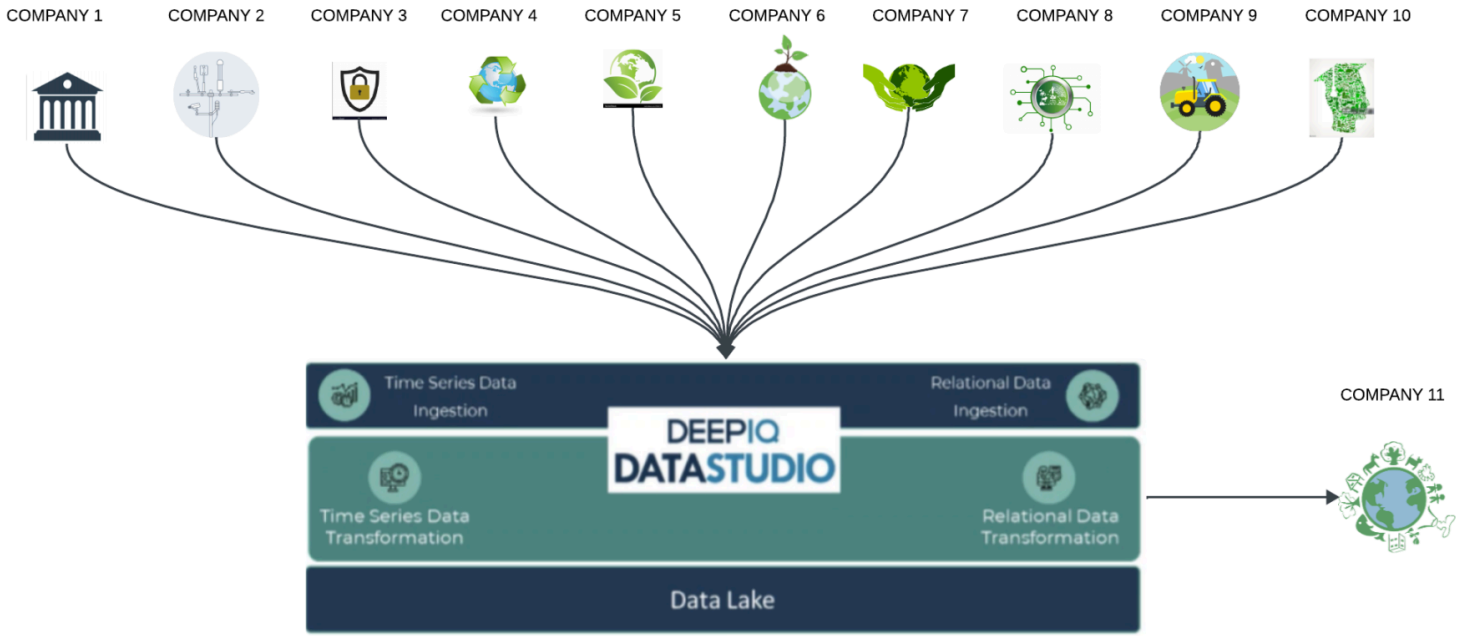


Here are the critical components of DeepIQ's solution:

1. **Unified Data Lake**: DeepIQ created a multimodal data lake on AWS that unified spatial and temporal data from various sources, including weather stations, soil probes, satellite imagery, and more. This centralized repository ensured seamless data flow and accessibility across all operational levels.
2. **Advanced-Data Ingestion**:
    1. Time Series Data: Efficient handling of high-frequency data from sensors and IoT devices for real-time monitoring of agricultural environments.

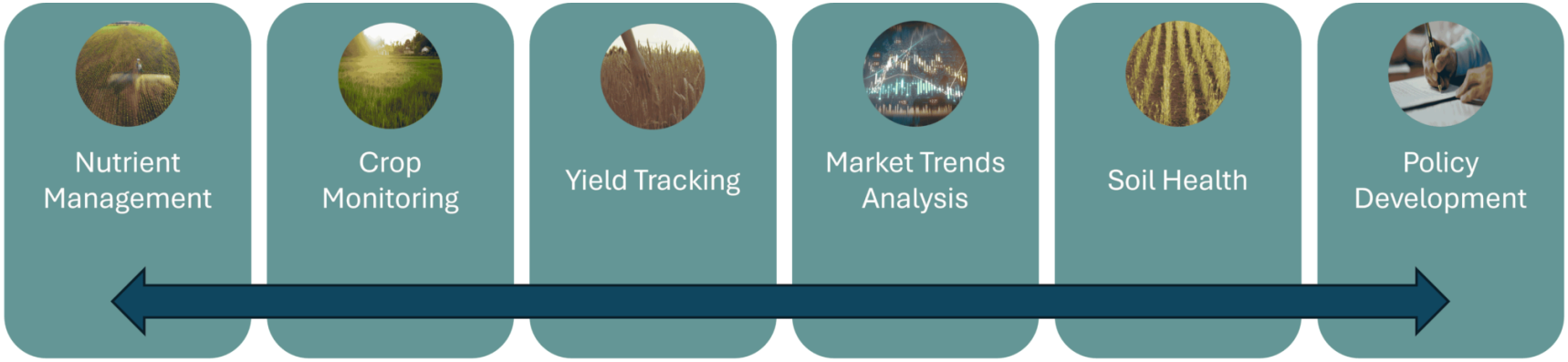
    2. Geospatial Data: Consolidate various geospatial data formats (e.g., Tiff raster, GeoJSON, shapefiles) for monitoring and optimizing critical locations and travel paths.
    3. Data Standardization: Standardization of incoming data from diverse sources, including unstructured data like images, to ensure consistency and readiness for comprehensive analysis.

3. **Natural Language Interface**: DeepIQ's platform featured an intuitive interface that allowed agronomists and operational managers to query the data lake effortlessly, enabling faster insights and real-time decision-making.
4. **IT-OT Integration**: Data Studio was utilized to integrate diverse data sources in a structured and consistent manner. These were combined with available IT data to create a suite of data assets, enabling further analysis and utilization. All of this is securely hosted within Susoil's infrastructure, ensuring seamless integration and supporting their operational requirements.
5. **Advanced Analytics**: The platform supported advanced analytics to document carbon intensity and develop models for converting soil carbon sequestration into tangible balance sheet assets for growers. This aligned with Sustainable Oils sustainability goals and financial reporting requirements.
6. **Efficiency and Scalability**: DeepIQ guarantees minimal IT maintenance, significant savings in cloud expenses, and seamless scalability to handle increased data loads without performance loss.
7. **Compliance and Reporting**: The solution simplified compliance with agricultural regulations by precisely tracking and reporting farming activities and resource usage.

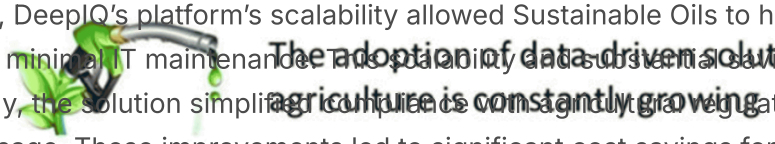
By leveraging these features, DeepIQ's DataStudio platform enables Sustainable Oils to streamline data collection, enhance operational efficiency, reduce costs, and support informed, data-driven decision-making.

Outcomes & Benefits

Implementing DeepIQ's DataStudio platform resulted in significantly enhanced data integration for Sustainable Oils. By unifying data from OT, IT and 3rd party data sources into a centralized data lake, Sustainable Oils achieved seamless information flow and accessibility across all operational levels. The platform's intuitive natural language interface and advanced analytics have the potential to provide agronomists and operational managers with real-time insights, enabling faster and more informed decision-making. This integration also improved operational processes by efficiently handling high-frequency sensor data and various geospatial data formats, reducing inefficiencies.



In terms of operational efficiency, DeepIQ's platform's scalability allowed Sustainable Oils to handle increased data loads without performance loss while requiring minimal IT maintenance. This scalability and substantial savings in cloud expenses enhanced overall operational efficiency. Additionally, the solution simplified compliance with agricultural regulations by precisely tracking and reporting farming activities and resource usage. These improvements led to significant cost savings for Sustainable Oils by reducing operational expenses (OPEX) and enhancing productivity across their operations.



The advanced analytics capabilities of DeepIQ's platform enabled Sustainable Oils to document carbon intensity and soil carbon sequestration, aligning with the company's sustainability goals. This comprehensive analysis supported data-driven decisions, contributing to Sustainable Oils future growth and success. Implementing DeepIQ's DataStudio platform significantly enhanced Sustainable Oils return on investment by improving efficiency, supporting sustainability, driving informed decision-making processes, and effectively positioning the company to manage future technological advancements and business needs.

Conclusion

Implementing DeepIQ DataStudio within an agribusiness framework like Sustainable Oils delivered numerous operational and strategic benefits, significantly enhancing the return on investment (ROI). Sustainable Oils Kevin Monk, Vice President of Ag Information, highlighted, "*The implementation of DeepIQ's DataStudio has significantly improved our data management capabilities, allowing us to integrate and analyze vast amounts of data more efficiently. This has streamlined our operations and empowered our team to make more informed, timely decisions that align with our sustainability goals and regulatory requirements.*"

For more information, please get in touch with info@deepiq.com or visit https://deepiq.com.

DeepIQ is on a mission to transform industrial processes by digitizing industrial expertise. Our vision is to drive end-to-end automation, enabling systems such as self-running power plants or drilling rigs using generative AI as the higher order reasoning layer operating over existing industrial automation technology stack.

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