CloudGeometry

Enterprise SaaS Platform for Asset Management and Remote Operations

Case Study

splunk>

aws partner network

SaaS Architecture Competency

High-value asset monitoring platform leverages AI & ML in SaaS platform

Discover how CloudGeometry helped Krypton Cloud implement a scalable cloud-native architecture on AWS, enabling real-time asset intelligence and remote operations for improved maintenance and cost reduction.

splunk>

INDUSTRY

Energy

SOLUTION

Dataflow Integration, continuous data science pipeline management, real-time analytics

CLIENT

Krypton Cloud
Acq. by Splunk

CloudGeometry

Splunk

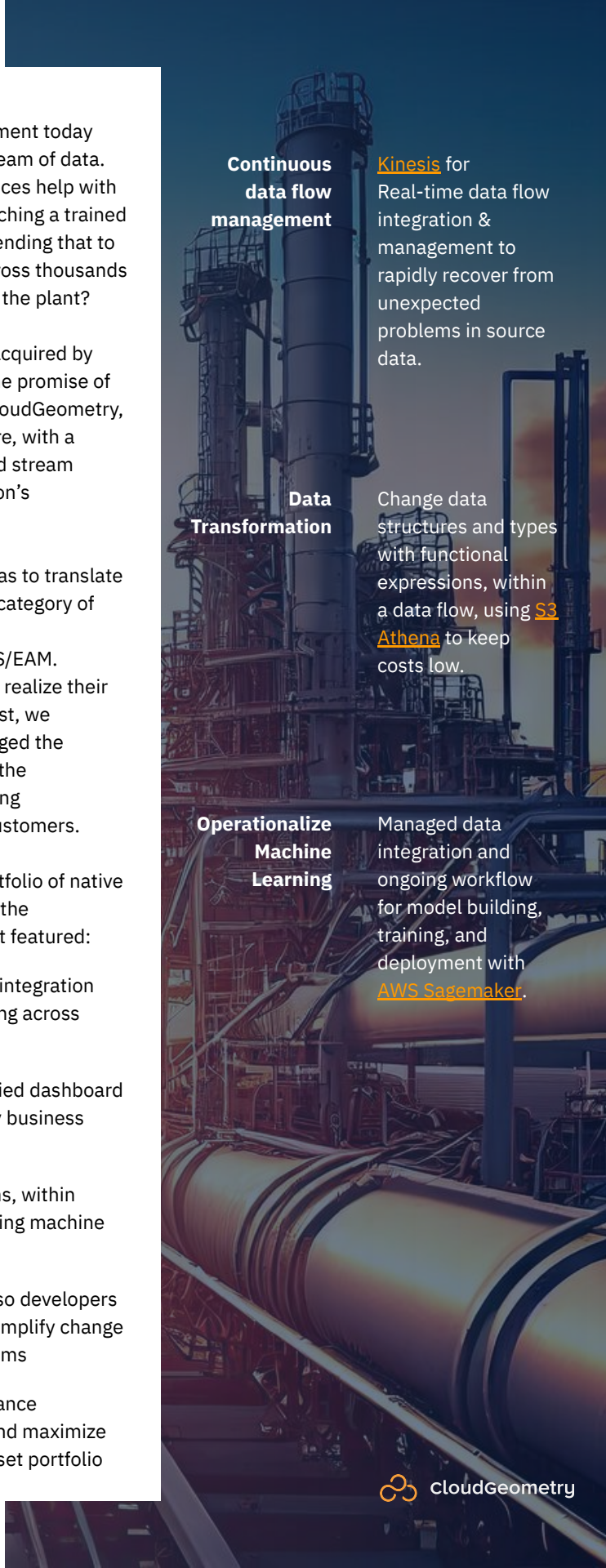
Almost any piece of industrial equipment today produces its own rich and steady stream of data. Digital diagnostics embedded in devices help with on-site troubleshooting when dispatching a trained local technician. But what about extending that to the modern industrial enterprise, across thousands of such machines inside and outside the plant?

That's what startup Krypton Cloud (acquired by Splunk) set out to solve. To unlock the promise of industrial IoT, they partnered with CloudGeometry, to create a cloud-native infrastructure, with a dynamic data pipeline to harness and stream essential operating signals for Krypton's customers.

Krypton's disruptive breakthrough was to translate the staid industrial IT infrastructure category of Enterprise Asset management into a Software-as-a-Service solution, SaaS/EAM. Krypton turned to CloudGeometry to realize their innovative thinking on two fronts. First, we architected, implemented and managed the platform. Second, we also delivered the implementation as a client engineering engagements directly to krypton's customers.

Developed and deployed using a portfolio of native Amazon Web Services technologies, the CloudGeometry Krypton engagement featured:

- Geographically distributed data integration with real-time streams processing across multiple availability zones
- Cloud-based integration for unified dashboard intelligence that included legacy business process systems
- Model-driven analysis of patterns, within systems and across systems, using machine learning algorithms
- DevOps lifecycle management, so developers can add new functionality and simplify change management with existing systems
- Optimized utilization & maintenance schedules, to avoid downtime and maximize the efficiency of the machine asset portfolio



Continuous data flow management

Kinesis for Real-time data flow integration & management to rapidly recover from unexpected problems in source data.

Data Transformation

Change data structures and types with functional expressions, within a data flow, using S3 Athena to keep costs low.

Operationalize Machine Learning

Managed data integration and ongoing workflow for model building, training, and deployment with AWS Sagemaker.

CloudGeometry

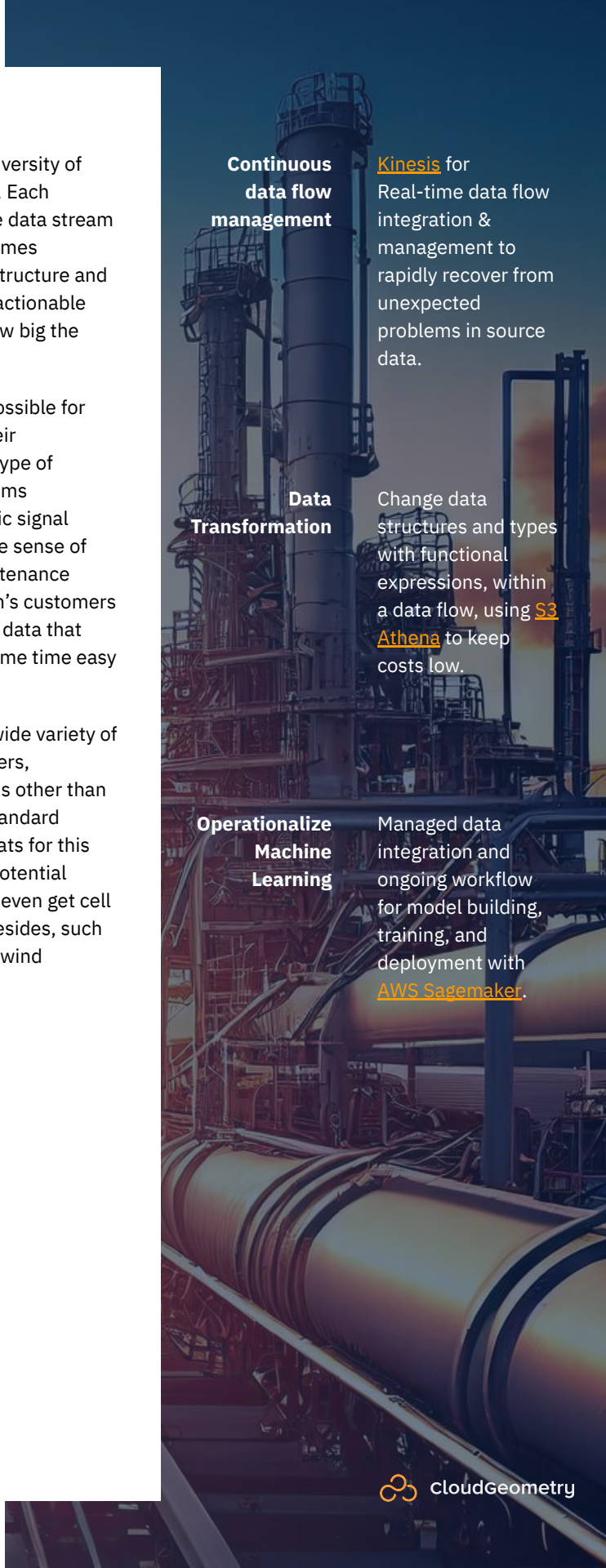
Splunk

The Challenge

At the heart of the challenge is the diversity of data sources and operating patterns. Each different machine has its own unique data stream and operational logic. It rapidly becomes impossible for conventional IT infrastructure and analytics applications to synthesize actionable information and insight no matter how big the data lake where it gets collected.

A secondary problem is that it's impossible for everyone, whether technicians or their management, to specialize in every type of equipment. But the diversity of systems compounds the diversity of diagnostic signal patterns, making it too broad to make sense of consistently. The Operations & Maintenance (O&M) organizations that are Krypton's customers just can't be effective without timely data that both broad and deep — and at the same time easy to act upon (or not).

Industrial infrastructure relies on a wide variety of machines from different manufacturers, often-purpose built to solve problems other than computing. There are few modern standard interfaces or native digital data formats for this equipment (OPC-UA emerging as a potential exception). What's more, often can't even get cell data service where this equipment resides, such as at remote locations like solar and wind turbines installations.



Continuous data flow management

Kinesis for Real-time data flow integration & management to rapidly recover from unexpected problems in source data.

Data Transformation

Change data structures and types with functional expressions, within a data flow, using S3 Athena to keep costs low.

Operationalize Machine Learning

Managed data integration and ongoing workflow for model building, training, and deployment with AWS Sagemaker.

CloudGeometry

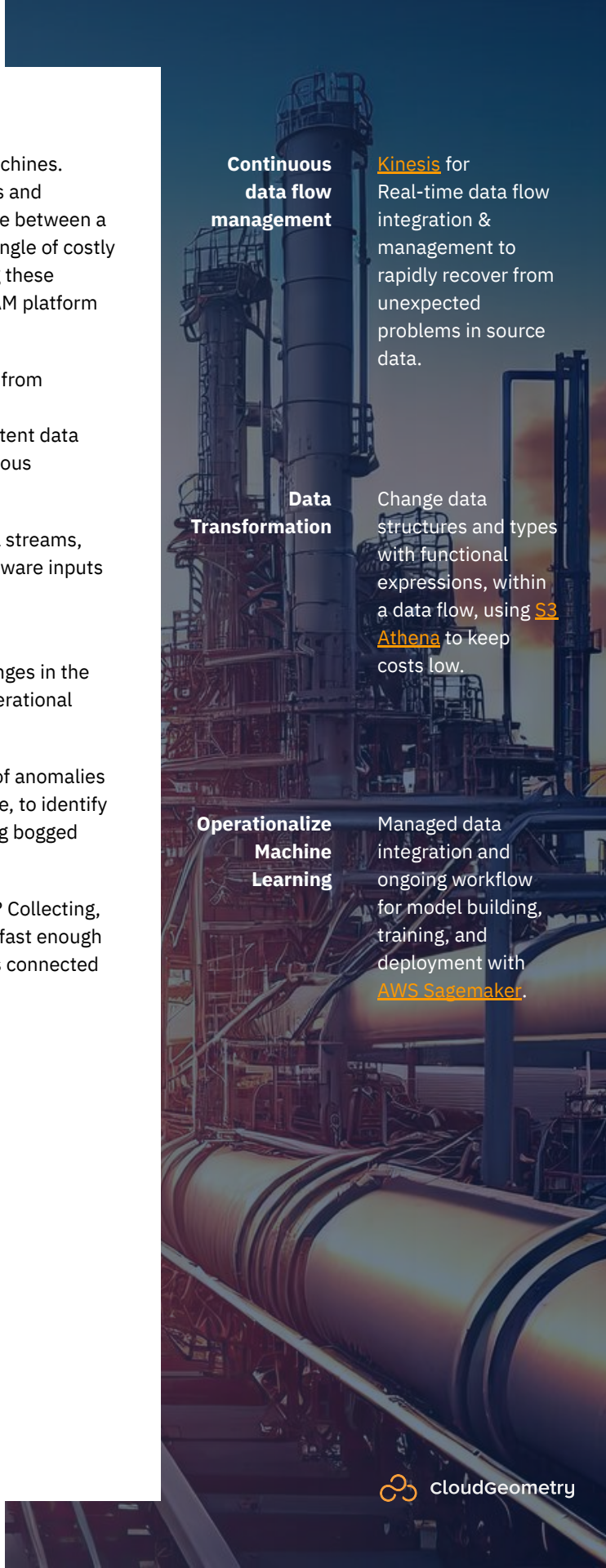
Splunk

The Challenge

Don't forget, these are expensive machines. Getting a global picture of operations and maintenance can make the difference between a network of profitable assets and a tangle of costly logistics plagued by outages. Solving these problems using the Krypton SaaS/EAM platform means:

- Collecting and analyzing signals from equipment from many different manufacturers, despite inconsistent data connectivity and gaps in continuous feedback
- Large-scale heterogeneous data streams, translating between remote software inputs and consolidated analysis and decision-making
- Constant updates to reflect changes in the equipment environment and operational processes
- New algorithms to make sense of anomalies across the operational landscape, to identify problem patterns without getting bogged down by false alarms

Key to achieving the potential of IoT? Collecting, transforming and analyzing the data fast enough to make the investment in the assets connected to IoT pay off.



Continuous data flow management

Kinesis for Real-time data flow integration & management to rapidly recover from unexpected problems in source data.

Data Transformation

Change data structures and types with functional expressions, within a data flow, using S3 Athena to keep costs low.

Operationalize Machine Learning

Managed data integration and ongoing workflow for model building, training, and deployment with AWS Sagemaker.

CloudGeometry

The Solution

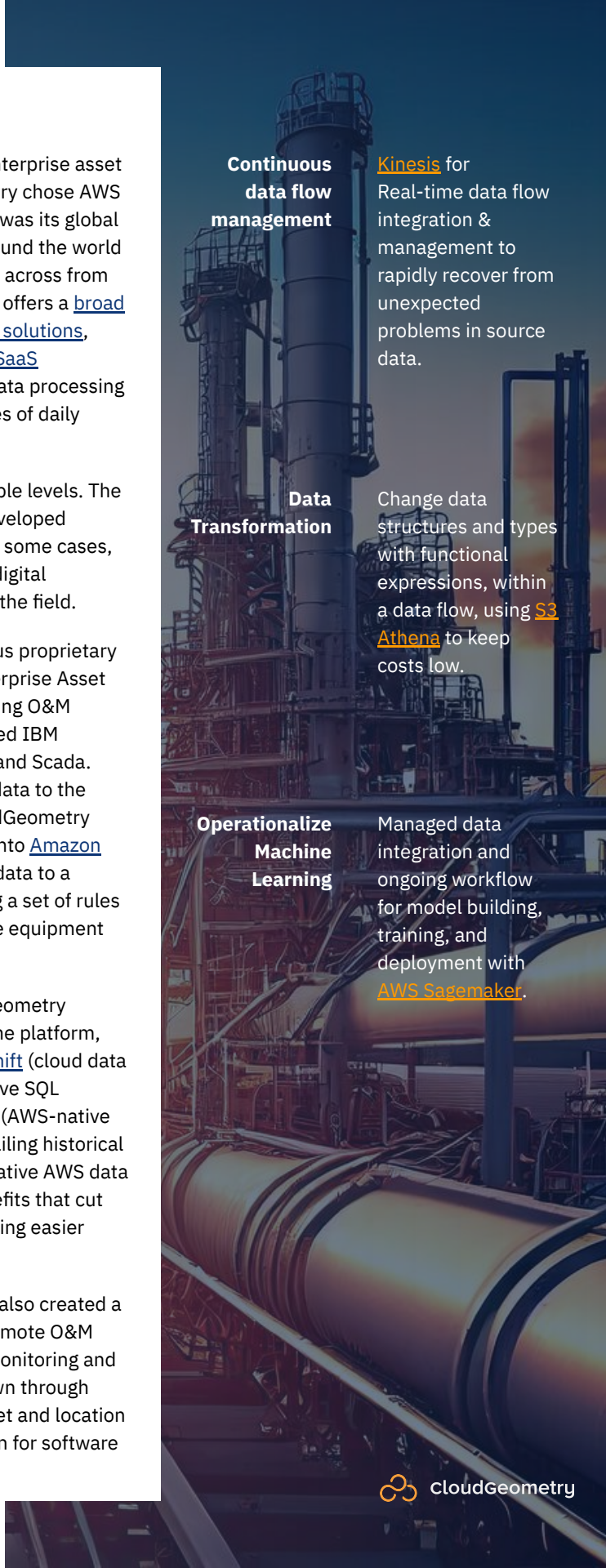
To unlock the potential of modern enterprise asset management with IoT, CloudGeometry chose AWS as a cloud platform. The first reason was its global reach, thanks to multiple regions around the world that lets us receive and process data across from the US and East-Asia locations. AWS offers a broad portfolio of technology products and solutions, making it ideal for building scalable SaaS platforms. It combined agility with data processing power to ingest and analyze terabytes of daily input.

Centralizing data took place at multiple levels. The CloudGeometry application team developed lightweight agents to collect data. In some cases, data came directly from embedded digital diagnostics on remote equipment in the field.

There was also a ton of data in various proprietary data formats, running on legacy Enterprise Asset Management systems by many existing O&M centers. Such legacy systems included IBM Maximo, Data Historian, OSIsoft PI, and Scada. Smart agents were created to relay data to the nearest AWS region, which the CloudGeometry implementation streamed together into Amazon Kinesis. Amazon Kinesis flowed the data to a SaaS-based decision engine, running a set of rules in real-time, which detected possible equipment performance issues.

Once processed via Kinesis, CloudGeometry designed secure multitenancy into the platform, storing data on one or more of RedShift (cloud data warehouse), Amazon RDS (AWS-native SQL relational database) and DynamoDB (AWS-native NoSQL database) to support both trailing historical analytics and archiving. These two native AWS data engines also provide significant benefits that cut the cost of data management, including easier scaling to accommodate growth.

CloudGeometry's applications team also created a centralized dashboard console for remote O&M centers. Designed to simplify both monitoring and decision making, it let users drill down through interactive graphs: to track each asset and location health; schedule remote checks; plan for software maintenance; and the like.



Continuous data flow management

Kinesis for Real-time data flow integration & management to rapidly recover from unexpected problems in source data.

Data Transformation

Change data structures and types with functional expressions, within a data flow, using S3 Athena to keep costs low.

Operationalize Machine Learning

Managed data integration and ongoing workflow for model building, training, and deployment with AWS Sagemaker.

CloudGeometry

The Solution

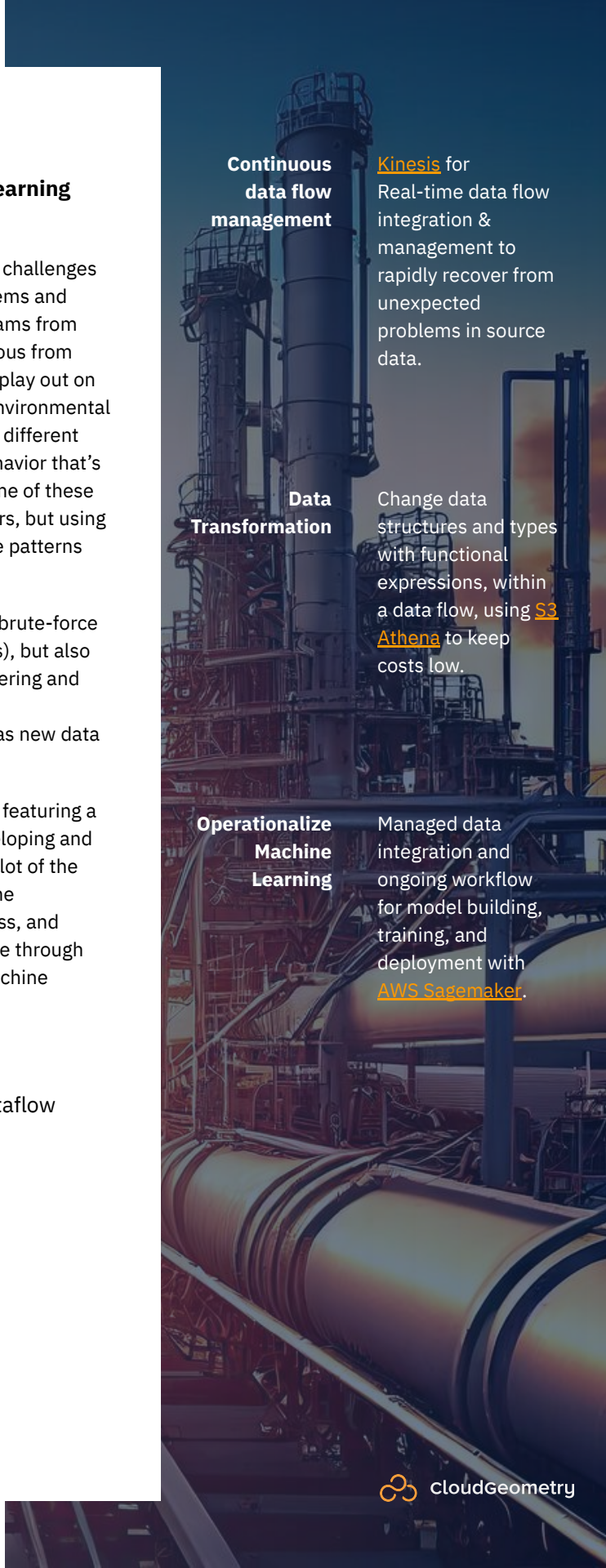
Continuous input for machine learning models

Volume and velocity are not the only challenges in analyzing data from different systems and processes. Patterns within data streams from specific machines are often not obvious from looking at diagnostics. Patterns that play out on separate systems, or as a result of environmental conditions and interactions between different pieces of gear, can also mask misbehavior that's obvious only in retrospect. While some of these patterns are recognizable to operators, but using Machine Learning (ML) can flag these patterns much faster and more accurately.

What makes ML effective is not only brute-force mining of the data (though that helps), but also selecting the data for training the filtering and sorting algorithms. That tees up new opportunities for improved learning as new data (and the patterns it reveals) adds up.

Sagemaker is an AWS-native service featuring a well-organized environment for developing and running ML algorithms. It removes a lot of the friction between steps, simplifying the development and deployment process, and making it quicker and easier to iterate through new models at every stage of the machine learning lifecycle.

Learn more about continuous dataflow integration.



Continuous data flow management

Kinesis for Real-time data flow integration & management to rapidly recover from unexpected problems in source data.

Data Transformation

Change data structures and types with functional expressions, within a data flow, using S3 Athena to keep costs low.

Operationalize Machine Learning

Managed data integration and ongoing workflow for model building, training, and deployment with AWS Sagemaker.

CloudGeometry

The Solution

Continuous Integration

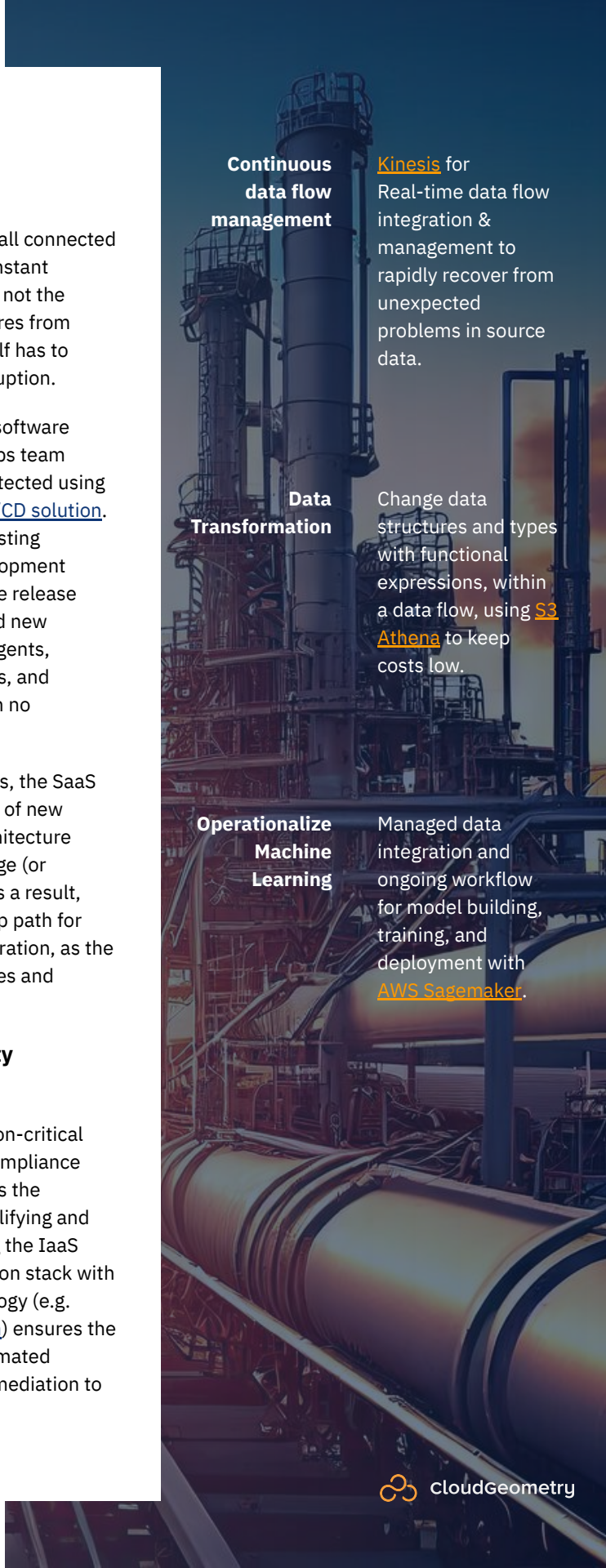
Keeping up with the changes across all connected systems is critical for SaaS/EAM. Constant software improvements are the rule, not the exception. But integrating new features from outside means that the platform itself has to absorb those changes with zero disruption.

To address the need for continuous software upgrades, the CloudGeometry DevOps team implemented a CI/CD pipeline, architected using the based on the CloudGeometry CI/CD solution. It eliminated delays in coding and testing improvements by the platform development team. With a transparent, predictable release process, developers readily deployed new software to remote data collection agents, interconnected business applications, and internal platform components — with no downtime.

With a design based on microservices, the SaaS platform supports quick deployment of new Docker containers. The modular architecture makes it much easier to add or change (or rollback) of software functionality. As a result, developers have a clear, step-by-step path for quick deployment, testing, and integration, as the platform adds new service capabilities and adopts new technologies.

24/7 Infrastructure and Security Monitoring

Critical infrastructure requires mission-critical levels of security, monitoring, and compliance assessment. CloudGeometry ensures the integrity of cloud operations by simplifying and streamlining visibility. Instrumenting the IaaS core services as well as the application stack with industry-leading tooling and technology (e.g. Cloudchekr and Amazon Cloudwatch) ensures the SaaS platform has the depth of automated reporting, alerting, analytics, and remediation to meet the strictest of SLAs.



Continuous data flow management

Kinesis for Real-time data flow integration & management to rapidly recover from unexpected problems in source data.

Data Transformation

Change data structures and types with functional expressions, within a data flow, using S3 Athena to keep costs low.

Operationalize Machine Learning

Managed data integration and ongoing workflow for model building, training, and deployment with AWS Sagemaker.

Splunk

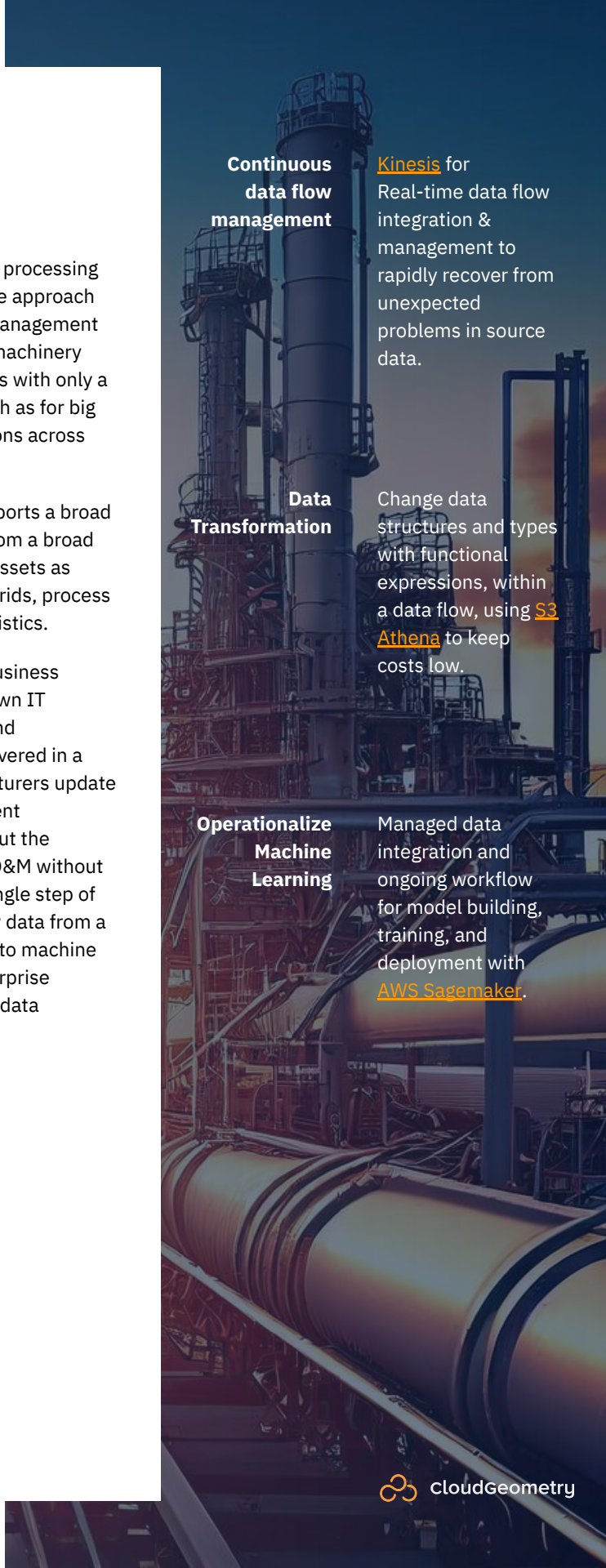
The Solution

SaaS = security, multitenancy, extensibility

Secure multitenancy and distributed processing are keys virtue of the elastic compute approach used by the SaaS Enterprise Asset Management platform. It's equally well suited to machinery from smaller specialty manufacturers with only a few deployed remote assets, as much as for big international enterprises with locations across continents and 1000s of assets.

The Krypton SaaS/EAM solution supports a broad range of data sources and devices from a broad range of equipment. It can support assets as diverse as utility-scale solar power grids, process manufacturing, or transportation logistics.

It also simplifies many supporting business processes that once required their own IT systems. For example, configuring and onboarding new systems can be delivered in a self-service portal that lets manufacturers update and configure their discrete equipment independently. New information about the machines is available to enterprise O&M without having to involve vendors in every single step of the onboarding. Once deployed, new data from a new machine even can be streamed to machine learning, again without needing enterprise technicians to do all of the low-level data configuration efforts.



Continuous data flow management

Kinesis for Real-time data flow integration & management to rapidly recover from unexpected problems in source data.

Data Transformation

Change data structures and types with functional expressions, within a data flow, using S3 Athena to keep costs low.

Operationalize Machine Learning

Managed data integration and ongoing workflow for model building, training, and deployment with AWS Sagemaker.

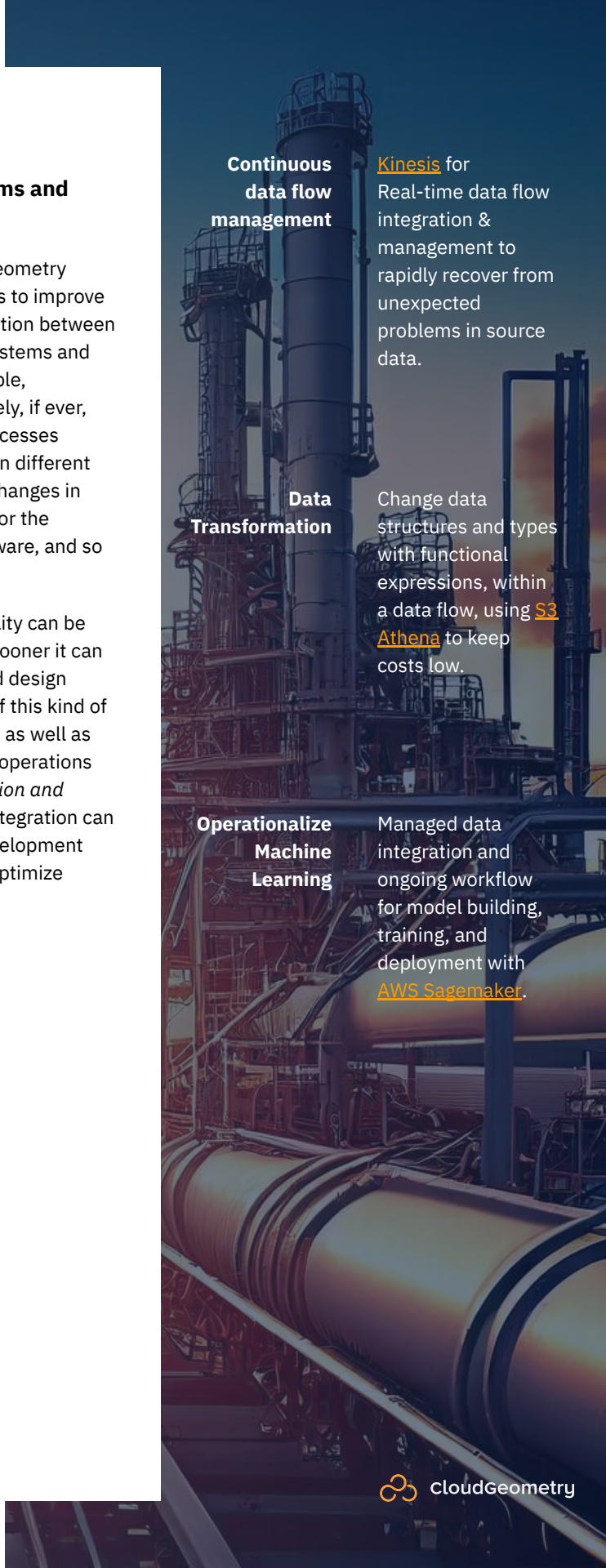
CloudGeometry

The Solution

Integration with Existing Systems and Customization

Another key strategy in how CloudGeometry architected the Krypton platform was to improve flexibility through the ease of integration between existing equipment and collection systems and other business processes. For example, enterprise businesses process is rarely, if ever, start with a clean slate. business processes change with different Market needs in different requirements of functions, such as changes in regulatory regimes and compliance, or the adoption of new manufacturing software, and so on.

Of course, the sooner new functionality can be added to the Enterprise IT mix, the sooner it can deliver value. CloudGeometry helped design deliver and maintain a broad range of this kind of systems — across new SaaS systems as well as legacy business processes and data operations (*more about CloudGeometry Integration and Customization services here*). Data integration can also be extended to establishing development and training for ML models used to optimize anomaly detection.



Continuous data flow management

Kinesis for Real-time data flow integration & management to rapidly recover from unexpected problems in source data.

Data Transformation

Change data structures and types with functional expressions, within a data flow, using S3 Athena to keep costs low.

Operationalize Machine Learning

Managed data integration and ongoing workflow for model building, training, and deployment with AWS Sagemaker.

CloudGeometry

Splunk

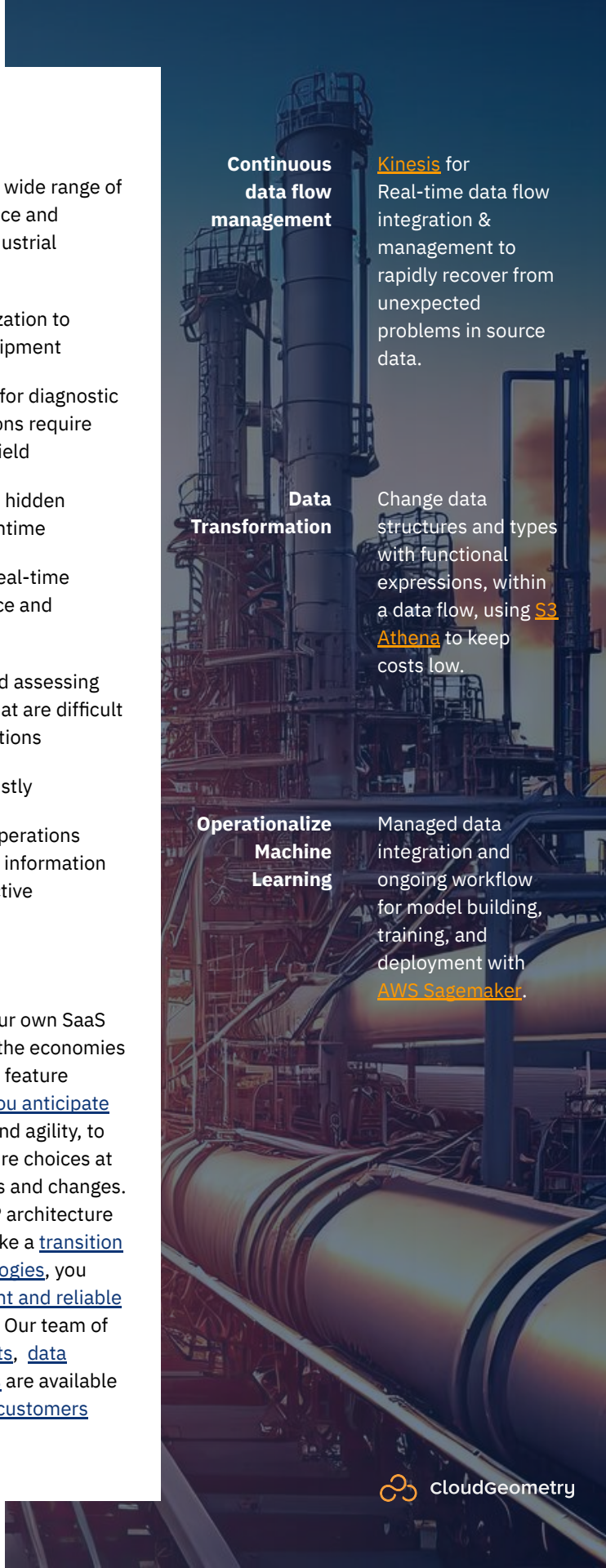
The Benefits

Krypton's cloud SaaS/EAM unlocks a wide range of benefits to the process of maintenance and operations of a complex portfolio industrial machinery:

- Timing of maintenance and utilization to maximize duty cycles of the equipment
- Assessing early warning signals for diagnostic problems before critical conditions require dispatching a technician to the field
- Distinguishing false alarms from hidden problems to prevent costly downtime
- Giving remote operations staff real-time information to make maintenance and operations trade-offs
- Cutting the cost of producing and assessing siloed asset inventory reports that are difficult to reconcile with real field conditions
- Accelerating time to value for costly
- Improving the performance of operations technicians with more complete information and more context for more effective decision-making

How CloudGeometry can help

Unlocking the market potential of your own SaaS platform is a balancing act between the economies of multi-tenancy and the potential of feature agility. At CloudGeometry, we help you anticipate the challenges of scale, availability and agility, to ensure you make the right architecture choices at the right time as your business grows and changes. Call on our team whenever your MVP architecture is showing its age, if you need to make a transition to more nimble cloud-native technologies, you need to plan and automate a coherent and reliable data supply infrastructure and more. Our team of solution architects, devops specialists, data engineers, and application designers are available to help you accelerate features that customers value up and down your SaaS stack.



Continuous data flow management

Kinesis for Real-time data flow integration & management to rapidly recover from unexpected problems in source data.

Data Transformation

Change data structures and types with functional expressions, within a data flow, using S3 Athena to keep costs low.

Operationalize Machine Learning

Managed data integration and ongoing workflow for model building, training, and deployment with AWS Sagemaker.

CloudGeometry

Technology Solutions & Services to build, optimize and run your cloud software and operations.

cloudGeometry

TECHNOLOGY SOLUTIONS

APPLICATION MODERNIZATION
Transform Legacy Systems for Future-Ready Innovation

AI & DATA
Achieve breakthrough automation and analytic insights via cutting-edge data strategies

CLOUD COST MANAGEMENT
Optimize Cloud Spending for Maximum ROI and Efficiency

SECURITY AND COMPLIANCE
Reinforce your cloud infra, workload, operations, and development end-to-end

FOUNDATION SERVICES

CLOUD INFRA & OPS
Robust Infrastructure Solutions for Seamless Operations

- DevOps as a Service
- Managed Cloud Operations
- Cloud Spend Optimization
- Resilience, Continuity & Backup
- AWS Well-Architected

MODERNIZATION & MIGRATION
Smooth Transitions to Modern Architectures with Minimal Disruption

- Application Modernization
- Kubernetes Adoption
- AWS Database Migration
- Data Engineering Operations
- Data Integration
- Data Migration
- Cloud Migration & Adoption

ADVANCED SERVICES

CLOUD-NATIVE DEVELOPMENT
Build Scalable, Resilient Applications with Cloud-Native Technologies

- CI/CD
- Multi- Platform App Design & Development
- Cloud-Ready Teams
- Enterprise SaaS Modernization
- Multi-Tenancy SaaS
- B2B Customer Success Engineering

CLOUD-NATIVE OPERATIONS
Streamline Operations with Advanced Cloud-Native Practices

- Platform Engineering
- Workload Management
- Monitoring & Observability
- Infrastructure Management

AI/ML & DATA SERVICES

AI/ML & DATA
Leverage Advanced Analytics and Machine Learning to achieve exponential acceleration in the ROI of your data assets

- AI/ML Engineering for Data Analytics
- Generative AI
- Traditional ML for Data Analytics
- AI/ML Development and and Data Science
- Data Engineering for MLOps

CloudGeometry

CloudGeometry delivers expert technical services, helping our clients unlock the full potential of cloud-native open source tooling and commercial platform technologies.

With roots in Silicon Valley, we've seen firsthand what works (and what doesn't). Count on CloudGeometry to accelerate application modernization, Kubernetes adoption, developer enablement, secure multi-tenancy, AI/MLOps, DevOps automation and more.

- As **AWS Advanced Consulting** partners, our certified solution architects and platform engineers help address the range of challenges facing enterprise innovators and venture funded startups alike.
- The **Cloud Native Computing Foundation** has accredited us as a **Kubernetes Certified Service Provider**.
- We serve as charter contributors to the **Linux Foundation Data & AI Commons** (LF Data & AI), supporting a diverse, sustainable ecosystem for open source data and AI technologies.

Over the last decade, we've built and deployed hundreds of big, fast full-stack apps with well-engineered cloud infrastructure across industries: Financial Services, Industrial Automation, Healthcare, AdTech, Consumer-grade Mobile, smart devices, and more.

From enterprise upgrades to data engineering to cloud-native scale-out, CloudGeometry helps you plot the shortest path across all dimensions of modern cloud software engineering.

aws partner network

Advanced
Consulting Partner

- SaaS
- Amazon Kinesis
- AWS Lambda
- Amazon Redshift
- AWS Database Migration Service

kubernetes CERTIFIED SERVICE PROVIDER

CLOUD NATIVE COMPUTING FOUNDATION

GENERAL MEMBER
LF AI & DATA
GENERATIVE AI COMMONS

CloudGeometry

Expert
Platform Engineering
& DevOps

Cloud Infrastructure
& Application
Modernization

AI & Machine Learning
Data Services

Open Source
Tooling & Integration

CloudGeometry.io
+1 408 444-7061
info@cloudgeometry.io
github.com/cloudgeometry

100 S Murphy Ave #200
Sunnyvale, CA
94086 USA

aws partner network

Advanced Consulting Partner

SaaS Architecture Competency